A psychometric assessment of the Temperament and Character Inventory in a South African sample of police recruits

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ABSTRACT

The current investigation is post-hoc in nature and is nested in a larger research project, which aimed to explore and compare the personality characteristics, coping mechanisms and psychological well-being of South African and Swedish police trainees.

The purpose of this particular study was to explore the psychometric properties of the Cloninger's Temperament and Character Inventory (TCI) in a sample of South African Police trainees. A literature review highlighted that the TCI has the potential to be applied across various cultures without the risk of any ethnic or gender bias; this characteristic is attributed to the theoretical model underlying the TCI, which assumes that personality consists of seven universal factors, which manifest in an invariant manner across all humans. Despite this, the majority of international research focussing on the TCI version nine has been undertaken with primarily European populations and Eastern populations. Research exploring the construct equivalence, factor structure and the level of instrument bias of the TCI in any African is virtually non-existent. The current study endeavoured to address the aforementioned knowledge gap by exploring the psychometric properties of the TCI in a multi-cultural South African sample.

The primary goal of the research endeavour was to explore whether the TCI can in the future be established as a valid and reliable personality assessment measure in a multi-cultural context like South Africa. Literature indicates that in the current South African psychometric context personality measures should adhere to the stipulations of the employment equity act (EEA), which especially in its amended form requires fair and just measurement. Studies such as this one can be used to adjudicate whether the TCI has the potential to be used as a fair and reliable measure, which does not violate the stipulation of the employment equity act. In this way the measure may contribute to provide evidence which can be used to make fair, just and reliable decisions not only in the South African Police Service, but also within the general public.

A quantitative investigation was conducted using analysis base on Item Response Theory, specifically the Rasch model, which is considered more accurate than Classical Test Theory in assessing the psychometric functioning of dichotomous personality assessment measures. The analyses rendered information with which the researcher was able to evaluate the validity, reliability, levels of gender and cultural bias, as well as the factors rendered by the TCI. The research sample was a convenient one, comprising 1144 police trainees whom completed a test-battery of four tests, which included the TCI.

The results derived from this investigation show that the primary TCI scales each measured a single factor, the presence of these factors among the current sample provide some support for the universality of the TCI; however most of these scales showed a high level of bias when measuring their respective constructs across ethnic and gender groups. The results also pointed out that numerous items and sub-scales possess a considerable level of ethnic and gender bias. There was also no attempt made to investigate the reasons underlying bias, bias may yield important information about cross-cultural differences and can also be seen as a phenomenon that requires explanation (Poortinga and Van der Flier, 1989), which means that the study created a launch pad for future investigations to explore the sources of bias.

These findings have stern implications for the larger research project, as it might decrease the validity of findings derived from comparing scores across groups within the current sample, and to a lesser degree if the performance of the current sample is compared to that of the Swedish sample. It can also be argued that another implication of the study's findings is that the information derived from the TCI cannot legally be used to make clinical or selection decisions based partially on the personality profile of individuals; however the convenient nature of the sample limits the generalizability of the investigation's findings. This means that additional research is first required before the legitimacy of the use of the TCI in a South African context can be evaluated.

KEY TERMS

Temperament, Character, Psychometric Properties, Rasch Analysis, Invariance Analysis, Bias, Gender Bias, Employment Equity Act, Personality

CHAPTER 1: INTRODUCTION

Personality assessment in South Africa should not be investigated without considering the wider psychometric context, which has directed its development (Foxcroft & Roodt, 2005; Shuttleworth-Jordan, 1996). In the past socio-political ideology guided psychometric research into a practice, which legitimised racial- and ethnic segregation by means of using personality assessment measures that were biased, non-equivalent and not standardised cross-culturally (Claasen, 1997). This type of systematic and discriminatory test development means that the psychometric performance of most, if not all, personality assessment measures were not screened for the degree to which they assess personality in a reliable, valid and invariant manner across males and females from African ethnic groups.

The first democratic elections in 1994 gave a huge impetus to develop assessment measures, which are fair, not discriminatory and unbiased towards individuals from all groups irrespective of their culture, ethnicity or gender (Foxcroft & Roodt, 2005). The initiative for fair, reliable and valid assessment was consequently legitimised in the Employment Equity Act, 1998 (Act no. 55 of 1998) (EEA) (Government Gazette, 1998; Government of South Africa, 2012). In other words if a personality measure is not supported by a body of evidence indicating that it reflects a valid and unbiased projection of personality, irrespective of aspects such as ethnicity or gender, it cannot be used to make clinical and selection decisions between individuals from different groups.

In recent times the psychometric research community have focussed on rectifying biased test development by exploring the psychometric performance of assessment measures across different cultural or ethnic groups. This research movement has already made an immense contribution to illustrate the cross-cultural utility of multiple assessment measures such as the 16 Personality Factor Inventory (16 PF) and other measures based on Costa and McCrae's (2002) Five-Factor model (FFM). Despite these efforts there still remains paucity on research exploring the cross-cultural psychometric performance of several other personality assessment measures, including Cloninger's Temperament and Character Inventory (TCI).

This situation regarding the legitimacy and utility of personality assessment measures motivates research endeavours that focus specifically on the psychometric performance of personality measures, such as the TCI. Findings rendered through such research will indicate the degree to which this measure is able to assess personality in an invariant way across different ethnic and gender groups.

1.1 RESEARCH PROBLEM

A meticulous review of literature indicates that within the current South African psychometric context personality measures should adhere to the stipulations of the amended EEA (Government Gazette, 1998) and be approved by the Health Professions council of South Africa (HSPCA) (Government of South Africa, 2012; HSPCA, 2005). It has been alluded to in several instances that most personality measures used in South Africa does not meet the criteria set out by the amended EEA (Abrahams, 1996; Foxcroft and Roodt, 2005; Government Gazette, 1998; Government of South Africa, 2012; Jopie van Rooyen & Partners, 2011; Taylor & De Bruin, 2005; Taylor, 2008). A certain degree of responsibility exists within the psychometric research community to rectify the aforementioned situation by establishing the degree to which different personality measures, such as the TCI, can legitimately be used to assess personality across different ethnic and gender groups.

The literature review[1] revealed that there is virtually no research, apart from the current overarching project (see Section 1.2), indicating the psychometric performance of the TCI among a South African sample, especially across different ethnic and gender groups. Currently multiple international studies support the universal personality structure of Cloninger's psychobiological model; however, there is also considerable evidence, which disputes that Cloninger's personality structure is universal across different ethnic and gender groups (Cloninger, Prezybeck, Svarick, & Wetzel, 1994; Gana & Trouillet, 2003; Herbst, Zonderman, McCrae, & Costa, 2000; Maitland, Nyberg, Backman, Nilsson and Adolfson, 2009). Research exploring the psychometric properties of the TCI in a diverse South African sample will not only be able to explore the TCI's adherence to the EEA, but more importantly will also provide a unique opportunity to test the proposed universality of Cloninger's model, which proposes that personality consist of seven factors across all humans.

The absence of research regarding the psychometric performance of the TCI in a South African sample, especially across different ethnic and gender groups constitutes the primary research problem of this investigation; this problem can also be translated to form this investigations primary research question: What are the psychometric properties of Cloninger's TCI among a sample of South African police trainees?

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[1] The literature review included searches on several databases including, but not limited, to the following: Science Direct, Ebscohost, Eric, PubMed, Google Scholar, SAGE, Sabinet and JStor.

Answering the preceding question by investigating the construct equivalence as well as the instrument-and item bias of the TCI will indicate the degree to which the TCI can measure personality in a reliable, valid and invariant way across different ethnic and gender groups. Evidence rendered by the aforementioned processes will also indicate whether the TCI can be utilised to investigate the personality structure within the current sample of South African Police trainees. Secondly the evidence will either offer more support to or detract from the universality of Cloninger's psychobiological model as defined by the TCI. The aforementioned answers can also be analysed to explore the TCI's adherence to the EEA.

1.2 JUSTIFICATION AND MOTIVATION

The current dissertation forms part of a greater research project undertaken collaboratively by Umea University in Sweden and the University of Pretoria, of which the primary aim is to explore and compare the high prevalence of psychological disturbances experienced by law enforcement officers in South Africa to those in Sweden (du Preez, Cassimjee, Ghazinour, Lauritz, & Richter, 2009). However, the psychometric performance of the TCI among South Africans should first be explored before valid comparisons can be based on at least the South African contingent's scores derived from the TCI.

Existing psychometric properties for the TCI were established by utilizing samples with predominantly European and Eastern origins. Currently specific research regarding the psychometric performance of the TCI when used in a South African sample is virtually non-existent. In South Africa the psychometric research community carries some of the responsibility when it comes to assuring that personality and other psychometric assessment measures adhere to the stipulations of the EEA (Foxcroft & Roodt, 2005). Personality measures, which conform to the EEA, are invaluable in terms of their potential to produce valid and unbiased comparisons across groups from different cultures and genders.

The importance of exploring the psychometric performance of a supposedly all-inclusive personally measure such as the TCI is twofold; as it may contribute to general empirical research, which will in turn enrich the field of personality assessment and improve the fairness of selection and clinical decisions based on this assessment measure (Storm & Rothman, 2003). Confirming or rejecting the TCI as a reliable and valid personality measure in a diverse sample will be valuable to personality assessment not only in the police service, but also for the general South African public.

Apart from the practical implications mentioned above, evidence rendered by such an endeavour can also provide support for or against the model on which the TCI is based. The theory underlying the TCI proposes that the temperament and character domains are invariant across ethnic and gender groups, due to the shared genetic make-up of humans (Cloninger et al., 1994).

Testing the aforementioned assumption sparked the initial motivation for this project, which aims to explore whether a personality measure based on the theory that personality is regulated by universal genetic make-up will perform in a uniform way across a diverse South African sample. The South African Police service recruits individuals from both genders and several ethnic groups, which in turn presents a unique opportunity to explore the psychometric performance of the TCI. The majority of investigations that have explored the psychometric properties of the TCI (e.g. Arkar et al., 2005; Cloninger et al., 1994; Gana & Trouillet, 2003; Guitierrez et al., 2001; Herbst et al., 2000; Kose et al., 2009; Maitland et al., 2009; Pelissolo & Lepine, 2000; Sung, Kim, Yang, Abrams and Lyoo, 2002), based their findings on statistics derived from Classical Test Theory (CTT), which is argued to be limited in assessing the psychometric properties of especially dichotomous measures, such as the TCI (see Section 2.6). Analytical techniques derived from Item Response Theory (IRT) on the other hand possess greater sensitivity to assess the psychometric properties of dichotomous measures.

1.3 RESEARCH QUESTIONS

The purpose of the current research project is to explore the subsequent research question. What are the psychometric properties of Cloninger's TCI among an ethnically and gender diverse sample of South African police trainees? In order to provide a comprehensive answer to this question, it was unpacked into several secondary questions regarding the psychometric properties of the TCI, as follows:

- Can the seven personality dimensions proposed by Cloninger's psychobiological model be reproduced in a group of South African police trainees?

- Is the TCI a biased personality measure in a group of South African police trainees?

  - Is the TCI an ethnically biased personality measure in a group of South African police trainees?
  - Is the TCI a gender biased personality measure in a group of South African police trainees?

- Is the seven personality dimension constructs equivalent across gender groups in a sample of South African police trainee's?

1.4 RESEARCH AIMS AND OBJECTIVES

The primary aim of this psychometric investigation is to determine if the TCI has the potential to function as a valid, reliable and unbiased personality assessment measure across ethnic and gender groups in a South African context. In other words this investigation intends to explore the psychometric properties of the TCI with the purpose of evaluating its potential utility to assess personality in South Africa in a psychometrically coherent fashion. To achieve this aim the following objectives were set:

- Explore the general psychometric performance (i.e. reliability, validity and dimensionality) of the TCI in a sample of South African police trainees;
- Establish whether the personality factors proposed by Cloninger's personality theory can be reproduced by the current sample and how these findings compares to those of other relevant investigations;
- Determine if the items and sub-scales of the TCI are biased towards any of the ethnic groups represented in the sample (e.g. Sotho, Tsonga, Venda and Nguni language groups); and
- Determine if the items, sub-scales and primary scales of the TCI are biased to one or the other gender groups represented in the sample.

1.5 CONCLUSION

Currently there are a small number of personality measures utilised in South Africa, which can justly measure personality in line with the stipulations of the EEA. Most of the existing personality measures which seem to oblige to the necessary legislative regulations are based on factor analysis of a phenotypic model of personality, which is unable to capture the construct of personality comprehensively like a genotypic model.

Current research regarding the psychometric functioning of the TCI is virtually non-existent in South African literature. Another point of concern is that the majority of psychometric research conducted with the TCI was done with techniques derived from CTT, which has significant draw backs in terms of investigating item and construct bias of dichotomous measures, such as the TCI, across gender and cultural or ethnic groups.

It could be argued that this scenario creates a dilemma for the field of personality assessment in South Africa's multi-cultural context, but in turn it offers a great opportunity to explore the psychometric integrity and suitability of a measure like the TCI to assess personality in an unbiased manner across individuals from different ethnic and gender groups.

1.6 THESIS STRUCTURE

The remainder of this document is comprised of four chapters, each discussing in detail important aspects of the current research endeavour. In the literature chapter the domain of psychometric research in the South African context is discussed. Relevant theoretical models are also presented in order to contextualise and compare the personality model underlying the TCI. Literature regarding cross-cultural psychometric assessment is reviewed especially with regards to analytical-, personality-, and cross-cultural concepts. Trends regarding personality assessment across gender groups are also explored. The literature review is followed by a chapter delineating this investigation's research methodology; the chapter elaborates on the aims of the research, sampling procedure, the TCI instrument, research procedure- and process, and statistical analysis techniques.

In the fourth chapter the results and interpretations of the analyses are presented. This chapter includes designated sections for the interpretations of the different item, sub-scale, and primary scale analytical outputs. The dissertation is concluded with a final chapter, which integrates the theoretical assumptions, relevant literature and significant results regarding the research questions. Finally the conclusions and recommendations derived from the investigation are presented.

CHAPTER 2: LITERATURE REVIEW

2.1 OVERVIEW

This literature review intends to contextualise personality assessment in South Africa. This contextualisation will also explore the degree, to which research regarding the psychometric properties of personality assessment measures across cultural and gender groups can contribute to psychometric assessment within South Africa.

There are currently a limited number of personality assessment measures utilised in South Africa, which can measure personality in accordance with the amended EEA (Government Gazette, 1998; Government of South Africa, 2012; Taylor & De Bruin, 2005). This means that there are a small number of assessment measures that can legally be used by the psychometric society and other test users to make clinical and/or selection decisions based on personality profiles derived from these measures.

Most existing personality measures (e.g. 16 Personality Factor Inventory, Neuroticism-Extroversion-Openness Personality Inventory – revised, and Basics Trait Inventory) utilised in South Africa are based on factor analyses of a phenotypic model of personality (Cloninger et al., 1994; HSPCA, 2005). A phenotypic model of personality is based on observable behaviour, while genotypic models are derived from the genetic influences that contribute to personality formation (Cloninger et al., 1994). It is argued that a measure based on the phenotypic model will not capture the construct of personality as comprehensively as a measure based on the genotypic model (i.e. the TCI).

Although the TCI is an internationally used personality measure, current research regarding the cross-cultural suitability of the TCI in South Africa is virtually non-existent. The same is true for the utility of the TCI across gender groups. Despite the considerable lack of evidence for the TCI's validity across different gender and cultural groups it is utilised to assess personality in South African samples (e.g. Peirson & Heuchert, 2001; Peirson et al., 1999; Lochner et al., 2007; Lochner et al., 2005). It could be argued that this scenario creates a dilemma for the South African psychometric community, but in turn it offers an interesting opportunity to explore the psychometric properties of a measure like the TCI across individuals from different cultural/ethnic and gender groups.

To elaborate on the aforementioned scenario this review will initially discuss ontological and theoretical points of departure, which will contribute to the comprehension of the subject matter. After the researcher's understanding of personality has been grounded in a theoretical framework, the review will turn its focus onto information, which contextualises psychometric assessment within the South African context. This will provide a backdrop for a discussion specifically focussed on personality assessment in South Africa.

In the remainder of the review findings derived from various international studies, which assessed the psychometric performance of the TCI across cultural and gender groups are evaluated. Statistical methods and concepts appropriate for investigating the psychometric properties of personality assessment measures in a diverse sample will be explored. The chapter concludes with a motivational summary, which draws from the literature discussed throughout the review.

2.2 THEORETICAL POINTS OF DEPARTUTRE

This section provides an overview of this investigation's theoretical and ontological points of departure, aspects discussed include:

- The research premises on which this investigation are based;
- The theory underlying Cloninger's universal psychobiological model; and
- Language as an indicator of culture and/or ethnicity.

2.2.1 Research Premises

The research departs from a realist assumption, which argues that social reality can be explored from an external point of view (Maree, 2007). Hence, the construct of personality is understood as objective in nature. It is argued by the researcher that the construct of personality can be investigated by applying a critical realist epistemological framework. Critical realism assumes that the objective world exists, but that human knowledge regarding a phenomenon will always be linguistically mediated and partial to some degree (Easton, 2002). It is argued that although anyone's essential methodology, understanding and ideas about personality are socially mediated, there still are appropriate empirical methods to package this partial knowledge as either universal or contextual phenomena (Easton, 2002). Cloninger's psychobiological personality model assumes that personality exist as a universal construct, which can be empirically verified. The proposed universality of Cloninger's personality construct seems to converge with the capacity of critical realism to package knowledge about personality.

The limitation in assuming a critical realist position with regards to the methods used to empirically verify personality; is that the knowledge gathered from various sample's regarding personality will always be partial to some degree. This means that conclusions from any project investigating personality under the guidance of critical realism will always be unable to comprehensively describe the contextually mediated structure and dynamics of human personality.

It is argued that personality can be explored with a neuro-cognitive paradigm, which presupposes that an individual's personality can be explained in the way that underlying neural processes regulate cognition formation and information processing (Galotti, 2008). It is stated elsewhere that a neuro-cognitive paradigm may be nested in a quantitative framework, which should preferably be nomothetic in nature (Mouton, 2001; Shuttleworth-Jordan, 1996). Such a quantitative nomothetic framework entails that procedures and methods used in any study should be geared at exploring the underlying tendencies of the subject matter (Maree, 2007). Personality can therefore be investigated with a quantitative lens to ultimately describe its perceived underlying dynamics.

It is suggested by Whitley (2002) that questionnaires (i.e. pen and paper assessment measures, such as the TCI instrument) can be used as an appropriate method to collect data in an empirical quantitative investigation. Van de Vijver and Leung (1997) illustrate that there are multiple statistical techniques, which can be used to analyse data derived from questionnaires. These techniques will be introduced later in this chapter (see section 2.9), and critically discussed in the methodology chapter (see section 3.4.6.1).

2.2.2 Theoretical Assumptions of the Temperament and Character Inventory

The TCI is based on an operant learning dynamic, which is mediated by neurobiological processes that guides the development of temperament (Cloninger, 1987; Cloninger, Svrakic & Prezybeck, 1993; Cloninger et al., 1994). Cloninger propose that certain genetic structures, which regulate neurotransmitters (i.e. dopamine, serotonin, noradrenaline /norepinephrine, and glutamine levels) are functionally organised within the human brain to take responsibility to activate, maintain, inhibit, and persist behavioural responses to specific stimuli (Cloninger, 1987; Cloninger et al., 1994). A neurotransmitter is a specific chemical bond that stimulates neurons to behave in a certain manner (Zilmer, Spiers & Culbertson, 2008). Neural activity ultimately manifest in physical and emotional human behaviour.

From this argument Cloninger (1987) established that individuals who possess different levels of behavioural activation in response to novelty, rewards, and diminished punishment have higher levels of dopamine; this domain of individual differences is called novelty seeking. Cloninger (1987) further determined that certain individuals differ with the degree to which they react to signals of punishment or no-reward; this temperament domain, which is associated with individual differences in serotonin, is called harm avoidance. Thirdly individuals also differ with the degree to which they continue with certain behaviours, which were previously rewarded; these variations are correlated with differences in levels of noradrenaline and is named reward dependence (Cloninger, 1987). The final temperament domain, in which one person can vary from another, is labelled persistence. In this case people are dissimilar regarding the degree to which they persevere with certain behaviours even though they experience fatigue (Cloninger et al., 1994).

The aforementioned personality dimensions constitute Cloninger's four factor temperament model. Temperament refers to an individual's personalised behavioural response to the environment (Swartz, de la Rey & Duncan, 2004). Cloninger's temperament structure is supported by twin studies, which confirm that the behavioural domains of novelty seeking, harm avoidance, reward dependence and persistence possess no shared genetic factors (Heath, Cloninger & Martin, 1994; Stallings, Hewitt, Cloninger, Heath & Eaves, 1996). These authors argue that temperament domains are genetically unique and independent from one another. This implies that any individual's ethnic or gender grouping is not supposed to mediate or influence the composition of their temperament profile.

Cloninger's psychobiological model of personality is based on the genotypic structure of personality (De Fruyt, Van de Wiele & Van Heeringen, 2000; Stallings et al., 1996). This genetically mediated personality dynamic of Cloninger distinguishes it from other personality models like the Five-Factor and Eysenck's personality model, which are derived from the phenotypic facets of personality (Cloninger et al., 1994; Kose, 2003; Stallings et al., 1996).

Phenotypic personality models assume that genetic and environmental factors contribute in an equivalent and similar manner to produce observable behaviour (Cloninger, 1987; Kose, 2003). Phenotypic models disregard the notion that genetics has a unique influence on personality (Cloninger, 1987). The psychobiological model argues that genetic-and environmental factors shape behaviour in diverging ways (Cloninger, 1986; Cloninger et al., 1993; Cloninger et al., 1994). In other words personality cannot be accurately described if the unique effect of biological mechanisms (i.e. genetics) on personality is disregarded, as is the case with robust phenotypic personality models.

If biological predispositions and social factors interact in a significant but dissimilar way, it will culminate in a different personality structure than those previously established solely on phenotypic (observable) personality facets. It can be argued that the TCI captures the construct of personality more accurately than measures derived from the observable aspects of human behaviour (i.e. phenotypic behavioural characteristics). Measures based on the phenotypic structure of personality including the 16 Personality Factor Questionnaire (Catell & Catell, 1989), 15 Factor Questionnaire+ (Tyler, 2002), and measures based on the Five-Factor Model (FFM) like the Neuroticism-Extroversion-Openness personality inventory revised (NEO-PI-R) (Costa & McCrae, 1990); are considered to be inadequate by Cloninger and colleagues (Cloninger et al., 1993; Cloninger, 1986; Cloninger et al., 1993; Cloninger et al., 1994).

The TCI was developed as an alternative measure to the aforementioned measures, and is able to account for both normal and abnormal deviations in personality (Kose, 2003). It should be noted that the initially proposed four factor temperament model was only able to account for the traditional subtypes of personality disorder, but was unable to differentiate whether someone portrayed normal behaviour or actually suffered from a personality disorder (Cloninger et al., 1994; Kose, 2003). This limitation resulted in an expansion of Cloninger's model from four to seven personality domains. Three character domains regarding individual differences (i.e. self-directedness, cooperativeness and self-transcendence) were added to Cloninger's model (Cloninger et al., 1994; Kose, 2003).

These three domains are based on the assumption that as personality develops, changes in cognition and self-concept take place that are related to, and determined by, factors that are unique to each individuals environment. It should however be noted that the temperamental make-up of the individual will play a pivotal role in how every individual is shaped by the socialisation process. In other words these dimensions relate to development of the self-concept as an autonomous individual, a fundamental part of humanity and the entire universe (Kimura, Sato, Takahashi, Narita, Hiano, & Goto, 2000).

The primary theoretical difference between the character and temperament domains is that character development necessitates changes in an individual's propositional memory, while temperament is regulated by individual differentiation in the procedural memory system (Cloninger et al., 1994). Procedural memory is implicit, habitual and is demonstrated in autonomous behavioural performance, while propositional memory refers to information that can be intentionally recalled and verbalised (Galotti, 2008; Zilmer, et al., 2008).

The three character domains (i.e. self-directedness, cooperativeness and self-transcendence) are believed to represent individual differences concerning self-constructed concepts about ambitions and values (Cloninger et al., 1994). The nature of these self-concepts determines the meaning attached to immediate and lived experience (Kimura, 2000; Kose, 2003). Hence the degree to which individuals with a similar temperament profile differ with regards to their character profile will account for differences in reactions/behaviour when confronted with a similar situation.

Self-directedness can be described as the degree to which an individual has the determination to manage their behaviour to conform to personal goals and values (Cloninger et al., 1994). Cooperativeness is viewed as the ability of an individual to identify and accept other people in their social environment (Cloninger et al., 1994). Finally self-transcendence refers to individual differences with regards to the degree, to which people consider themselves an essential part of the universe (Cloninger et al., 1994).

In summation, it is argued that a phenotypic model of personality will not comprehensively assess and predict personality dimensions of individuals. Sung et al. (2002) motivate that it is necessary to develop a comprehensive theory, which will explain personality in terms of both genetic-and environmental influences. This then deemphasises research based on measures derived from the phenotypic model, and shifts the focus onto research based on alternate models like Cloninger's psychobiological model.

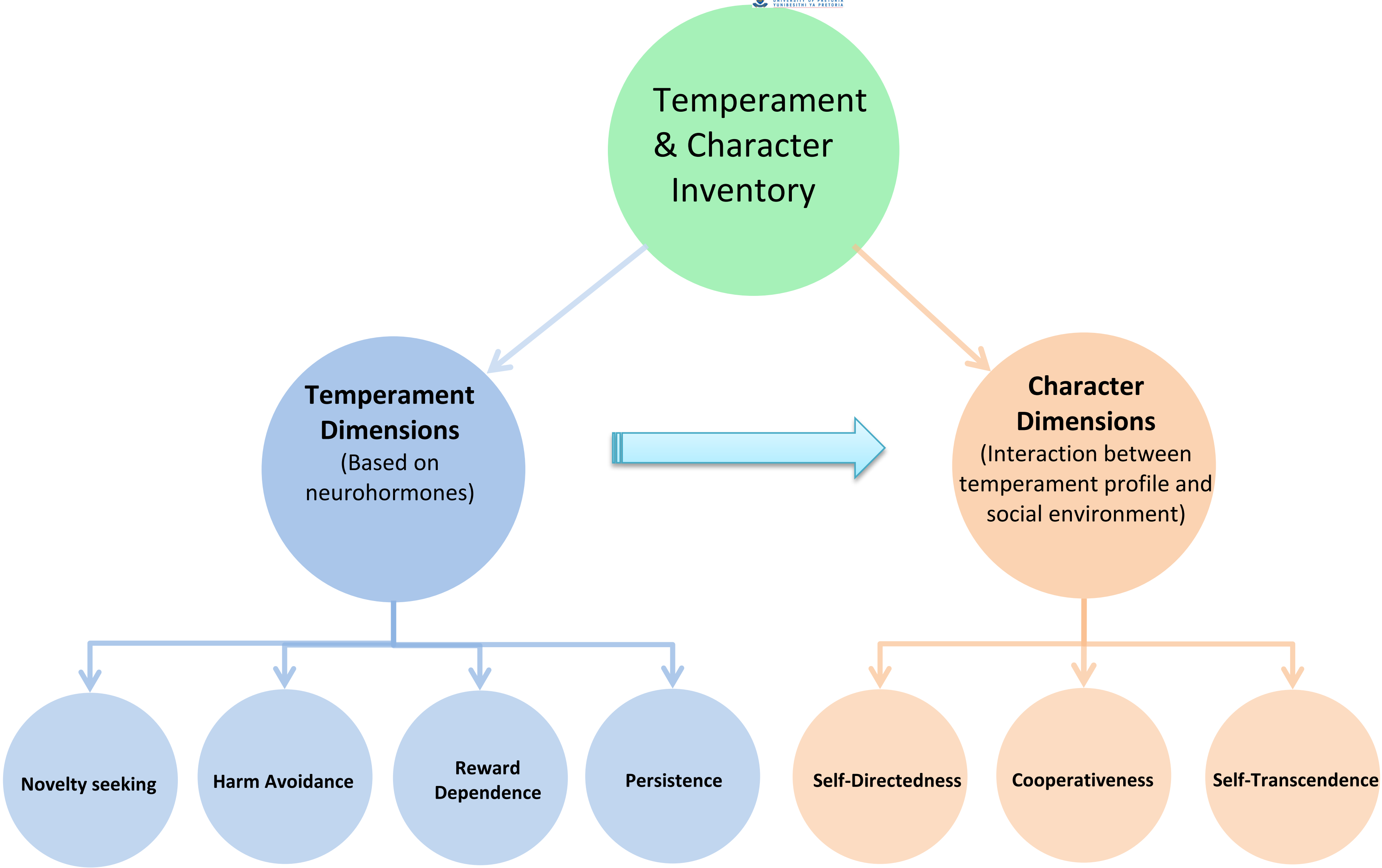

Figure 1: Cloninger's proposed personality structure

2.2.3 Ethnicity, Culture and Language

Cloninger's psychobiological model proposes that the structural components of personality are invariant across individuals from different socio-cultural and ethnic contexts. As will be illustrated throughout sections 2.3, 2.5, and 2.8, most investigations, which focus on the variance/invariance of personality structures across different groups, prefer to use culture or race as a grouping variable.

Culture and ethnicity can be considered overlapping terms, and depending on one's subjective definition of these constructs, they might even refer to similar human characteristics. Several studies have in the past attempt to explore the degree, to which individuals from supposedly different cultural groups vary in terms of their performance on psychological tests (e.g. Claasen, 1997; De Bruin, 2002; De Raad, & Peabody, 2005; Heaven & Pretorius, 1998; Meiring , Van de Vijver, Rothmann & Barrick,2005; Shochet, 1994; Taylor, 2000; Taylor, 2008). In a considerable number of these studies an individual's home language was used as an indicator of culture. In the same way that language can be used to indicate one's culture, it can also be argued that a person's home language is a reflection of their ethnicity.

Ethnicity has been a concept used in the literature of cross-cultural psychology for several years, however, clarity and an explicit definition of the construct remains challenging. Literature shows that two disparate schools (i.e. instrumentalist and primordialist) are dominant when it comes to conceptualizing ethnicity. Firstly the instrumental or constructivist approach argues that any individual's ethnic grouping is determined by individual motive. It focuses on subjective, self-ascribed attributes and how these attributes are manipulated for political and economic gain (Barth 1969; Fenton 2003; Larin, 2010). To instrumentalists, people with common interests conjoin in pursuit of these interests (Larin, 2010).

The primordialist model on the other hand argues that one's ethnicity is grounded within the psycho-cultural realm of shared sentiments, beliefs and values. For primordialist, there exist objective entities with inherent features, which can include territory, language, recognizable membership and even common mentality (Fenton 2003). Within this view, groups are fundamental divisions, therefore making classification objective. Applying a primordialist point of departure in conceptualising ethnicity, means that anyone's ethnic grouping is determined by the context in which they are raised and/or decides to ascribe to (Geertz, 1963). This includes the purposeful and active assimilation of a particular group's language and social practices. For primordialist, identities belong to the realm of sentiment as psycho-social bond, and social change disorientates and motivates people to strengthen the shared aspects that naturally define them as an individual and the community in which they actively participate in.

For this thesis a primordialist point of departure is assumed, from which it is argued that an individual's language can be used as an indicator of the person's culture or ethnicity. It is also contended that culture and ethnicity are not mutually exclusive terms, but rather overlapping to some degree. Therefore ethnicity and culture can refer to a similar construct within the realm of cross-cultural research, especially in research which focusses on the domain of personality assessment where the operational definition of one's cultural grouping has been informed by a respondent's home language. The term ethnicity is preferred above culture, as the latter refers to a much broader and flexible set of values.

2.3 BACKGROUND TO PSYCHOMETRIC ASSESSMENT

Any issue regarding personality assessment in South Africa should not be investigated without considering the wider psychometric context, which has shaped the nature of personality assessment in present day South Africa (Foxcroft & Roodt, 2005; Shuttleworth-Jordan, 1996). To contextualise personality assessment within the field of psychometrics, a brief backdrop of the development of psychometric assessment in South Africa is presented.

The development of psychological assessment measures in South Africa was significantly influenced by a context characterised by unfair socio-political mechanisms, which were intended to marginalise individuals from all African ethnic groups (Claasen, 1997; Shochet, 1994). Foxcroft and Roodt (2005) state that the majority of assessment measures utilised in the early 1990's were standardised for Caucasian populations only, while standardization and validation for black ethnic groups were intentionally disregarded (Shochet, 1994). It is argued that such practices were driven by the political ideologies at that time (i.e. the apartheid regime) (Claasen, 1997). In this socio-political environment, psychometrics was often misused to legitimize racial and ethnic distinctions between supposedly superior 'whites' and inferior 'blacks' (Hook, 2004).

During this era assessment measures were applied across race and ethnicity, with little or no concern for whether the measurement will reflect biased scores for marginalised ethnic groups (Foxcroft & Roodt, 2005). For example the use of English intelligence assessments on ethnic groups who may not have had the necessary linguistic capacity (due to a lack of opportunity or resources for English education) to complete the assessment in such a manner to provide an accurate reflection of their intelligence (Shochet, 1994). It is in this regard that Biesheuvel (1943) and Shuttleworth-Jordan (1996) argue that assessment measures developed for certain population groups, which are then applied to other population groups will not necessarily reflect a true measure of the intended construct like personality. In such cases the assessment measure can be inherently biased, as it will provide an advantage to the group, which were exposed to the more privileged socio-educational context (Claasen, 1997; Van de Vijver & Leung, 1997).

This situation culminated into a conscious ideological effort to hierarchically separate 'white' from 'black' with regards to skill, ability and personality with the aid of scientific proof in the form of test scores. During the 1960's and 70's psychometric assessment was characterised by developing assessment measures along racial lines (Foxcroft & Roodt, 2005). This trend is attributed to the lack of demand for a common yardstick to assess all South Africans on, as Caucasian and black African populations were not competing for the same opportunities (Owen, 1991).

It is noteworthy that a lack of psychometric research across especially black African ethnic groups necessarily implies that gender differences in performance on assessment measures across these groups have also been neglected to the same the degree. In other words, although gender differences in performance on assessment measures have been compared between Caucasian males and females, and standardised accordingly, the same quantity and quality of investigations have not been undertaken in samples representing males and females ascribing to black African ethnicities. Almost no research has been undertaken with a South African sample, that focusses entirely on the psychometric properties of the TCI, this obviously implies that very little research has been done with the TCI where personality composition of South Africans are explored, not even mentioning comparisons on the composition of personality across males and females from black African ethnic groups.

From the mid 1980's when the socio-political climate of South Africa began to change, the psychometric community started to acknowledge the discriminatory effect that political ideology had on test development and the issues it created regarding cultural/ethnic bias of assessment measures (Claasen, 1997; Foxcroft & Roodt, 1997). The first democratic elections of South Africa held in 1994 gave a huge impetus to develop assessment measures that are fair, not discriminatory and unbiased towards individuals from all groups, irrespective of the ethnicity they ascribe to or the gender they belong to. The legislation, which was put in place to legitimise these democratic visions, is discussed in Section 2.4 .

It is noteworthy that the majority of recent investigations have primarily been focussed on rectifying separatist test development of the past, by investigating variance in psychometric properties across different ethnic groups, or comparing how similar gender groupings from different ethnicities differ (i.e. black males vs. white males). This trend has resulted in paucity on research exploring variance between males and females from especially African ethnic groups.

2.4 LEGISLATION AND POLICIES

According to Richter and Brandstorm (2009) the necessity to standardize and validate assessment measures across different groups is highlighted in international best practice guidelines, as set out by the World Health Organisation (WHO) during a conference in 1971. With regards to psychiatric diagnosis, which also includes personality assessment, the WHO recommends, among other things, that culture specific aspects should receive critical consideration (Richter & Brandstorm, 2009). In other words culturally mediated aspects in personality assessment should be identified and considered in the process of validating personality measures. It is argued that this should also apply to any gender specific effects that might manifest in the results of personality assessments that is intended to inform clinical or selection decisions.

In South Africa the initiative for fair, reliable and valid cross-cultural assessment was legitimised in the Employment Equity Act, 1998 (Act no. 55 of 1998). Paragraph 8 of the Act stipulates:

Psychological testing and other similar forms of employee assessment are prohibited unless the test or assessment that is used: a.) has been scientifically shown to be valid and reliable b.) can be applied fairly to all employees c.) is not biased against any employee or group and d.) has been certified by the Health Professions Council of South Africa (HSPCA) established in terms of the Health Professions Act, 1974 (Act no. 56 of 1974) (Government Gazette, 1998, p. 9).

The HSPCA is tasked with the implementation of Health Professions Act (HSPCA, 2005). It needs to be noted that sub-paragraph d of the Act has only recently been added to paragraph 8 of the EEA (Government of South Africa, 2012).

The EEA summarizes the current domain of psychometric assessment, including research and development endeavours regarding psychological assessment measures. It could be argued that the EEA, especially in its amended format, necessitates that all psychological assessment measures (including personality measures) should be investigated for bias and cross-cultural validity, as well as the psychometric integrity across gender groups (Foxcroft & Roodt, 2005; Meiring et al., 2005). However several issues regarding the implementation of sub-paragraph d of the Act is currently under debate.

Psychological assessment measures are able to produce information that can be used in employment practices to inform decisions regarding employees. It is critical to note that the manner in which this information is used to inform a decision, may determine whether the decision discriminates fairly or unfairly between employees or patients categorised in different groups according to their standing on a certain construct (e.g. personality profile). It is for this reason that the EEA stipulates that any psychological measure used for selection purposes should be fair and unbiased. It can be argued that measures, which are not reliable and biased, might increase the chances to take decisions that will unfairly discriminate against employees from different cultural or gender groups. This then partially motivates the addition of sub-paragraph d to the Act, which requires certain measures to be validated and approved by the HSPCA (Government Gazette, 1998, p. 9; Government of South Africa, 2012; HPCSA, n.d).

The HPCSA is a government institution tasked with the regulation of psychological activities. They are responsible for registration of qualified individuals as psychologists, psychometrists and psychtechnicians. They are also responsible to ensure that legislation around psychological test use is implemented (HSPCA, 2005). The Professional Board for Psychology (PBP) is subsumed under the HPCSA.

Although all psychological measures used in South Africa should be certified by the HPCSA, the PBP is responsible for the compilation and publication of a list of all the certified assessment measures (Jopie van Rooyen & Partners, 2011). It is also stated that the PBP does not have the resources to support the amendment by being able to classify psychological tests and keep the list updated (Jopie van Rooyen & Partners, 2011). The list as it stands at the time of writing this dissertation contained several outdated measures that did not satisfy the requirements of Section 8 of the amended EEA (Government of South Africa, 2012; Jopie van Rooyen & Partners, 2011).

In a High Court case Association of Test Publishers of South Africa and Saville Holdsworth Limited vs. the Chairperson of the PBP (North Gauteng High Court, 2010), it was established that no list, which fulfils the requirements of the Health Professions Act exists. The ultimate finding of the case entailed that there is no published list to support the amendment to the EEA (i.e. sub-paragraph d). This means that the legislation regarding this matter should preferably be inoperative until such a list is drafted and approved. The consequence of this inability to establish, maintain and update a list of legal psychological measures may adversely affect the use of assessments in industry, as psychologists would not be able to legally use newer assessment measures in their assessment and selection procedures.

Another prominent role player in the regulation of psychological assessment measures is the Test Commission of the Republic of South Africa (TCRSA). The TCRSA was established in 1975 after a request of the International Test Commission (ITC) (Owen & Taljaard, 1996). One of the primary objectives of the ITC and TCRSA is to strive for higher psychometric standards in the compilation of psychometric assessment measures. Psychometric standards of a measure like a personality measure include its degree of validity, reliability and bias (Foxcroft & Roodt, 2005). Owen and Taljaard (1996) state that the TCRSA is considered an authoritative body in so far as the use of psychological assessment measures in South Africa are concerned. The commission also advises the PBP on matters in this regard.

The categorization of psychological assessment measures is the responsibility of the TCRSA (Owen & Taljaard, 1996). It is reasonable to argue that if a measure like the TCI were submitted for evaluation, and if it met the general requirements with regards to its psychometric properties, it would be placed on a list of registered psychological tests and assigned to a particular category. The TCI would be classified as a category C test, which includes individual intelligence and personality measures.

According to the researcher's knowledge there is virtually no literature illustrating the utility of the TCI across cultural and gender groups in a South African context. Due to its relatively late introduction into the South African context, the TCI was also not evaluated by TCRSA and PBP, which means that this measure should still undergo extensive trials before it can be acknowledged as a legitimate psychological measure for the South African context.

This situation motivates the need to conduct psychometric research with the TCI, before its adherence to the guidelines of the EEA can be explored. According to the HSPCA (2005) and PBP the TCI is currently not approved for use in South Africa. It can be argued that any assessment measure with acceptable psychometric properties will be an invaluable tool for the South African psychometric assessment society.

The rational for research regarding psychometric properties of personality assessment measures across cultural and gender groups have strongly been motivated in the preceding arguments from both a legislative, socio-political and practical perspective. However it is also important to elaborate on the domain of personality assessment in the South African context, as unpacking this topic will allow for an assessment of the extent to which additional research regarding alternate personality measures in this field is necessary.

2.5 PERSONALITY ASSESSMENT IN THE SOUTH AFRICAN CONTEXT

Meiring et al. (2005) provide a backdrop of personality assessment measures used in the South African context. Their review concluded that investigations focussed on the cross-cultural appropriateness of personality measures are virtually non-existent before the 1980's, especially across black African and Caucasian groups (Meiring et al., 2005). After this period cross-cultural personality research in South Africa increased considerably (Meiring et al., 2005). During this surge the primary focus of psychometric research with personality measures was their structural equivalence across cultures (Meiring et al., 2005). In other words psychometric research endeavours were mostly focussed on proving or disproving a universal personality structure across cultural groups; consequently most of these investigations neglected whether the psychometric performance of these measures varied significantly across gender groups within ethnicities (also see Section 2.3).

The cross-cultural applicability of various personality models have been investigated among South African samples. Research conducted by Meiring et al. (2005) show that the 15 Factor Questionnaire (15FQ+) personality measure did not prove its structural equivalence across people from different language groups in South Africa.

Prinsloo and Ebersohn (2002) conclude that the 16 Personality Factor Inventory (16PF) has received significantly more research attention than other personality measures in South Africa. Although the 16PF has been investigated extensively across several cultural groups in South Africa, evidence supporting its cross-cultural appropriateness (i.e. factorial structure and absence of bias) is lacking considerably (Abrahams, 1996; Foxcroft and Roodt, 2005). The utility of the 16PF in a South African context seems to deviate from the stipulations of the EEA, especially in its amended format (Government Gazette, 1998).

As mentioned earlier the theoretical model of the 16PF is derived from the factor analysis of behavioural phenotypes, and not genotypes like the TCI (Catell, 1970; Cloninger et al., 1993) (See Section 2.2.2). Foxcroft and Roodt (2005) emphasise that the cross-cultural applicability of both the Minnesota Multiphasic Personality Inventory (MMPI-2) and Meyer Briggs Type Indicator (MBTI), two other widely used personality measures, is also not yet established. Both these measures are similarly based on the factor analysis of behavioural phenotypes.

Another prominent personality model derived from behavioural phenotypes is the Five-Factor model (FFM) of personality (Costa & McCrae, 1990). In short the FFM postulates that personality consist of five constructs: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. The application of measures based on the FFM has resulted in diverging results in South Africa. A study conducted with an Afrikaans speaking group confirms the five-factor structure (De Bruin, 2002). Contrasting to this finding several other investigators failed to replicate the factor structure of the FFM among black South African samples (Heaven, Connors & Stones, 1994; Heaven & Pretorius, 1998; Taylor, 2000).

The Revised NEO Personality Inventory (NEO-PI-R) is a measure based on the FFM (Costa & McCrae, 1992; Costa & McCrae, 1990). Several cross-cultural investigations show that the factor structure of the NEO-PI-R derived from Western samples is different from the factor structure rendered by samples from Eastern origins (Cheung, 2004; Church, 2000; McCrae & Terracciano, 2005). McCrae and Costa (2004) argues that this mismatch can be ascribed to the cultural differences between individualistic Western societies and collectivist societies of the East.

Taylor (2000) conducted an examination of the construct validity of the NEO-PI-R in a South African sample of black African and Caucasian employees. The data from the African participants failed to reproduce the openness to experience factor, while all five factors could be extracted from the Caucasian group. A facet level factor analysis conducted on data derived from a South African student sample rendered a factor structure corresponding to the theorised structure of the NEO-PI-R (Heuchert, Parker, Stumpf & Myburgh, 2000).

Heaven and Pretorius (1998) administered the NEO-PI-R to a sample of Afrikaans and Sotho speaking individuals, they found that data from the two groups produced different factor structures. Unlike the predominantly white Afrikaans group, which reproduced the predicted five-factor solution, the Sotho group’s data rendered a different arrangement of factor loadings.

Taylor and De Bruin (2005) developed a personality measure named the Basics Trait Inventory (BTI), which is also based on the FFM. This measure has a hierarchical factor structure that is similar to that of the NEO-PI-R (Costa & McCrae, 1992; Taylor & De Bruin, 2005). When this measure was administered to a multi-cultural South African sample the predicted five-factor structure was extracted from all the cultural groups involved (Taylor & De Bruin, 2005; Taylor, 2008). This evidence points out that the BTI measures similar personality constructs across different cultural groups with little bias. Replication of such results will certainly strengthen the case for the cross-cultural utility of the BTI.

Voght and Laher (2009) summarises the research on the FFM, in stating that substantial disagreement exists between researchers whose investigations support the universality of the FFM and those who question the cross-cultural appropriateness of the model. This inability to reach consensus regarding the cross-cultural utility of the NEO-PI-R can arguably be extrapolated to the current disagreement regarding the appropriateness of the FFM for the South African personality assessment context.

The previous discussion illustrates a problematic scenario for those using personality assessment measures in the current South African psychometric assessment context. It could be argued that the personality measures discussed above will not be able to assure fair and reliable personality assessment across cultures and genders, and will thus not comply with the stipulations of the EEA, especially in its amended format. Hence research investigating the appropriateness of the TCI for a South African context is motivated. Currently there is no research, which is based on data derived from a South African sample that explores the stability of the TCI across cultural and gender groups.

As mentioned earlier the TCI is based on the genotypic structure of personality, which in turn implicates that despite ethnic and gender differences the structure of personality should still conform to Cloninger's original personality model (Cloninger et al., 1994). Such a model can be extremely valuable in a multi-cultural society like South Africa. In line with the psychobiological model, Shuttleworth-Jordan (1996) recommends that research in the psychometric assessment domain could draw from the essential compatibility in general neurobehavioral relationships and its reflections in assessment measures. It is argued that this approach will maximize the utility of available assessment measures like the TCI, which is supposed to be a collective assessment measure for personality. Such an approach will prevent the psychometric research community to revert back to trends in the past where separatist measures were developed for specific groupings of individuals (see Section 2.3). To conclude this section, the author argues that there is a need to conduct research with the TCI in the domain of personality assessment in South Africa.

2.6 THE TEMPERAMENT AND CHARACTER INVENTORY (TCI)

The TCI is intended to measure the seven universal personality domains delineated by Cloninger's psychobiological personality theory (Cloninger et al., 1993). If these seven dimensions are indeed universal they are supposed to exist in any human population, regardless of their ethnic or gender grouping (Parker, Cheah & Parker, 2003). It could be expected that a similar seven factor solution should present itself in a sample of South African individuals, despite their diverse ethnic backgrounds. Parker et al. (2003) states that it is essential to explore the factor structure of the TCI across diverse socio-cultural populations, especially non-western samples. It is argued that such investigations will test Cloninger's proposition of a universal personality structure and will either diminish or increase the possibility that the measure is confounded by western influences. In the same way the universality of Cloninger's model can be explored by comparing its presence across gender groups.

Therefore, if a diverse South African sample renders evidence that support Cloninger's personality model, it will contribute significantly to the body of evidence underlying the TCI. On the other hand if findings dispute the psychobiological model, it may indicate a need to either concentrate on refining established personality assessment measures to eventually produce unbiased measures or to develop new models.

Researchers explored the psychometric performance of the TCI in samples from various countries. Evidence from these studies indicates the TCI's ability to assess personality accurately in different cultures and across gender groups.

2.6.1 Cross-Cultural Application of the TCI

Various studies conducted in Europe (e.g. Czech Republic, Yugoslavia, Italy, Spain and Norway) established that Cloninger's proposed temperament and character model consistently retain the same seven factor structure across different cultural and gender groups (Cloninger et al., 1994). More recent investigations with the TCI (version nine) illustrates that the measure can successfully be translated into foreign languages, while still retaining the same factor structure, and adequate reliability and validity estimates. If it is assumed that language is a valid indicator of one's ethnicity and/or culture, then these findings provide at least some support for the generalizability of the psychobiological model.

Sung et al. (2002) explored the performance of a Korean version of the TCI on a non-clinical sample of Korean speaking students, and established that a.) the TCI's psychometric performance is satisfactory and b.)Cloninger's original psychobiological model is acceptable. Another study, which investigated the psychometric properties of the TCI in a psychiatric sample, confirmed that the Spanish version of the TCI has satisfactory psychometric properties and a factor structure which conforms to Cloninger's model (Guitierrez et al., 2001).

The factorial structure of the TCI and adequacy of its psychometric properties was again reaffirmed in a Turkish student population with the Turkish version of the TCI (Kose et al., 2009). Another study conducted with the Turkish version of the TCI on healthy volunteers and psychiatric patients illustrates that the measure possesses satisfactory psychometric properties and a seven factor structure (Arkar et al., 2005). During Cloninger's initial development of the TCI, a multi-racial sample rendered data that show that the performance of African-Americans did not differ significantly from the Caucasian group also included in the sample (Cloninger et al., 1994). It needs to be noted that this sample originated from the United States, a mostly westernised society.

Despite several promising supportive findings for the cross-cultural utility of the TCI, some researchers also found evidence that notably detracts from the universality of Cloninger's psychobiological model.

An investigation conducted by Maitland, Nyberg, Backman, Nilsson and Adolfson (2009) on a Swedish sample rejects Cloninger's psychobiological model by means of a confirmatory factor analysis (CFA); these authors argue that there is very little theoretical grounding to use this assessment measure. An American investigation, which focused on the underlying genetic framework of Cloninger's psychobiological model, also failed to establish support for Cloninger's model when they conducted a principal component and explorative factor analysis (EFA) (Herbst, Zonderman, McCrae, & Costa, 2000). Gana and Trouillet (2003) also conducted a CFA on data derived from a convenient French sample, these authors concluded that the data did not replicate Cloninger's proposed seven factor model.

A meta-analysis conducted by Miettunen, Lauronen, Kantojarvi, Veijola and Joukamaa (2008) on studies, which used the TCI version nine with samples exceeding 100 participants primarily supports Cloninger's psychobiological personality theory. The French version of the TCI was also applied to a non-clinical sample; this investigation concluded that although the factor structure and psychometric properties are satisfactory, the results suggest that specific cross-cultural norms should be taken into account when interpreting the TCI (Pelissolo & Lepine, 2000).

As mentioned previously research which focus on the factor structure and psychometric properties of the TCI in South Africa is virtually non-existent. Hence, there is a need for investigations to produce useful information in this regard; such investigations will aid the interpretation of the TCI in a South African context. Most of the samples utilised in the research reported throughout this section are culturally homogenous, and either of European descent and/or socialised within a Western culture. This motivates the use of an ethnically heterogeneous sample, from an African context, which will likely provide a unique opportunity to explore the universality of Cloninger's psychobiological model. When taking South Africa's multi-cultural demographics into consideration it becomes apparent that South Africa may offer a unique research sample to evaluate the proposed universality of the TCI's psychometric properties across different ethnicities and genders.

2.6.2 Performance of TCI across gender groups

Although males and females are considerably different in terms of the dominant temperaments and characteristics which comprise their personality (See Section 2.7); the general composition of their personality profiles is expected to be similar (Cloninger et al., 1993; Costa & McCrae, 2001). Several investigations explored and compared the performance of gender groups on the TCI.

Cloninger et al. (1993) state that scores derived from the TCI are to a certain degree confounded by demographic variables such age and gender, whereas ethnicity did not account for any meaningful variation in scores. Score standardisation has been able to negate these differences and allow for comparison across age and gender groupings. It should be noted that differences in the fundamental composition of personality across gender groups, if any, cannot be negated by standardizing scores.

A meta-analysis conducted on studies using the TCI with samples exceeding 100 participants shows that females tend to rate considerably higher on the Reward dependence (RD) and Harm Avoidance (HA) scales, while there was no significant difference between males and females on either the Novelty Seeking (NS) and Persistence (PS) scales (Miettunen et al. 2007). Arkar et al. (2005) founded that females tend to rate significantly higher than males on HA, RD, and Cooperativeness (C) scales, while no considerable differences were found between gender groups on the PS, Self-Directedness (SD) and Self-Transcendence (ST) scales. Cloninger et al. (1993) established that females tend to have considerably higher ratings on both the C and ST scales.

A four factor solution was found for Cloninger's temperament scales when compared across different race and gender groups (Cloninger et al., 1993). Other studies also support Cloninger's postulated temperament model, these investigations suggest that the four factor temperament model does not vary considerably across gender groups (Stalling et al., 1994). Cloninger shows that the three character domains of personality are invariant across different genders in American samples (Cloninger et al., 1993). Despite these findings Miettunen et al. (2007) recommends that gender differences should be considered when interpreting scores derived from the TCI.

2.7 PERSONALITY, GENDER AND CULTURE

Feingold (1994) explored the degree, to which personality traits, as defined by the facets and dimensions of the FFM, differ across gender groups (see Section 2.5); and established that males tend to rank considerably higher on Assertiveness, while females rated higher on Anxiety, and Trust and Nurturance. These patterns remained invariant irrespective of age, education and culture (Feingold, 1994).

An investigation which analysed self-report data rendered by the NEO-PI-R across 26 cultures, found considerable differences between the personality profiles of males and females. In most cultures females rated higher on Neuroticism, Agreeableness, Extraversion and Openness to Experience, and Conscientiousness (Costa, McCrae, & Terracciano, 2001). McCrae and Terracciano (2005) showed the robustness of these trends when they found similar differences after the analysis of observer ratings obtained from the NEO-PI-R across 50 cultures.

In an African context, Teferi (2004) shows that males tend to score higher than females on Extraversion and Openness and lower than females on Agreeableness. Costa et al. (2001) compared the performance of Zimbabwean nationals and black South Africans on the NEO-PI-R and found very little evidence for gender differences on any of the five-factors. McCrae and Terracciano (2005) found no significant gender differences in samples from Nigeria, Botswana or Ethiopia. The most significant gender differences among the 50 cultural groups were found in the United Kingdom, where females again scored higher than men in all domains (McCrae & Terracciano, 2005). During this study gender differences among white South Africans were also found, females outranking males on all five domains. It could be argued that only including white participants could make this finding more generalizable to a Western than an African context. Apart from the previous study, one of the few studies that explored gender differences in South Africa found that females only rate significantly higher than males on the Neuroticism domain (Zhang & Akande, 2002).

Hyde (2005) cautions that over-inflated claims about the differences between males and female could saturate mass media, resulting in the development of misinformed gendered stereotypes. These stereotypes can have detrimental effects on relationships, court cases, parenting and the advancement of women in the workplace.

In general studies show that gender differences are greater in Western than non-Western cultures (Costa et al., 2001; McCrae & Terracciano, 2005). Costa et al. (2001) argue that this trend may represent differences in personality traits arising from individualistic versus (vs.) collectivist cultural influences. Western societies are typically individualistic while non-Western or African cultures are collectivist (Costa et al., 2001).

Considering the aforementioned findings it could either be argued that a.) the FFM is more sensitive to detect gender differences in Western than in African cultures, or b.) the fundamental structure of personality might be shaped by contextual rather than universal factors, in the case of the latter, it would fundamentally contradict the assumptions underpinning the TCI (see Section 2.2.2).

2.8 CROSS-CULTURAL PSYCHOMETRIC RESEARCH

The evidence presented throughout this document show that the most renowned personality measures used to assess personality among South Africans are not extremely effective in producing valid means to assess personality across cultures and/or languages (see Section 2.5). It is argued that this scenario creates a dilemma for the field of personality assessment in South Africa, but in turn offers motivation and opportunity to explore the feasibility and utility of a measure like the TCI.

To explore the psychometric performance of the TCI in a diverse sample of South Africans, it is necessary to utilise an appropriate research approach. It is recommended that psychometric research conducted within the cross-cultural assessment domain should preferably enhance the opportunity to make fair and valid comparisons across groups (Berry, Poortinga, Segall, & Dasen, 2002; Matsumuto, 1994). For example if a research project determines that a measure is equivalent across different ethnic or cultural groups, the assessment scores can be utilised to make fair comparisons and decisions in terms of intelligence, aptitude or personality across the groups under evaluation (Foxcroft & Roodt, 2005).

Cross-cultural psychometric research conducted with personality assessment measures like the TCI is often conducted to confirm or disconfirm the universality of theoretically or empirically verified personality dimensions across different groups (Church, 2000). The TCI's factor structure and psychometric properties have been confirmed and disconfirmed in diverging cultural samples, except samples from the African continent (see Section 2.6).

The domain of cross-cultural assessment can be conceptualised as all the concerns, which are related to the application of psychometric assessment measures in a single country, which houses multiple cultures (Van de Vijver & Leung 1997). Methods and techniques utilised in the domain of cross-cultural research are therefore valuable in assessing the psychometric performance of the TCI across different groups.

2.9 CONCEPTS AND STATISTICAL METHODS IN CROSS-CULTURAL RESEARCH

Meiring et al. (2005) suggest that psychometric research in multi-cultural contexts should preferably be undertaken in the cross-cultural assessment domain. Concepts and methodology developed in the field of cross-cultural research can enhance the ability to establish whether personality assessment measures can be applied justly across different cultures (Berry et al., 2002). It is argued in this dissertation that the ability of these concepts to compare different groupings should also be advantageous when comparing different gender groups. Methods and concepts relevant to the cross-cultural psychometric evaluation of personality measures will now be explored.

2.9.1 Bias and Equivalence of Psychometric Assessment Measures

An understanding of concepts such as bias and equivalence are necessary to successfully explore psychological assessment measures in a multi-cultural context like South Africa (Foxcroft & Roodt, 2005; Meiring et al., 2005; Van de Vijver & Leung, 1997). The amended EEA necessitates that personality assessment measures should preferably have the inherent capacity to be applied fairly across all persons and should not be biased towards any individual or group (Foxcroft & Roodt, 2005; Meiring et al., 2005).

According to Van de Vijver and Tanzer (1997) equivalence refers to the degree, to which scores on an assessment measure can be directly compared, specifically pertaining to whether the measurement level, at which scores were attained for different cultures or genders can be compared. It is stated elsewhere that if the basis for comparison is not equivalent across different cultural-or gender groups; then valid comparisons between these groups are not feasible (Foxcroft & Roodt, 2005).

The idea of equivalence is well known and introduces bias; bias tends to challenge and can lower the level of equivalence. According to Van de Vijver and Leung (1997) equivalence is mostly associated with measurement level issues in score comparisons across groups, whereas bias has become the generic term for nuisance factors in cross-cultural score comparisons. Despite this, bias can be assessed from the perspective of equivalence. According to Van de Vijver and Leung (1997) there are three equivalence levels, as follows:

- *Construct equivalence* implies that the same construct is measured across all groups, regardless of whether or not the measurement of the construct is based on identical instruments across groups. In other words a construct will be non-equivalent, when a.) a measure like the TCI assesses different constructs across two groups; b.) the concepts of the constructs only partially overlap across groups; or c.) constructs are associated with different manifestation across groups. The non-equivalent performance of constructs can be explained by the "emic" position which emphasizes the unique features that distinguish groups in the first place.
- *Measurement unit equivalence* is achieved when two metric measures have the same measurement unit but different starting points. In other words, the scale of one measure is shifted with a constant offset as compared to the other measure. An example can be found in the measurement of temperature using Kelvin and Celsius scales.
- *Scalar equivalence* can be obtained when two metric measures have the same measurement unit as well as the same origin. For example, scalar equivalence across French and English-language versions of the TCI would mean that a score of 12 on the Novelty Seeking scale of the French version of the test "means the same thing" as a score of 12 on the same scale on the English version of the test.

Bias is defined as the opposite of equivalence and tends to decrease any measures level of equivalence. More generally, bias occurs if score differences on the indicators of a particular construct fail to correspond to differences in the underlying domain (Van der Vijver & Leung, 1997). Interpretations based on biased scores are invalid and often do not generalise to other instruments measuring the same construct. Three kinds of bias can be distinguished (Taylor, 2008; Van de Vijver & Tanzer, 1997), as follows:

- *Construct bias*, occurs if the construct measured is not identical across cultural groups;
- *Method bias,* which could be induced by a.) sample bias, which occurs when samples are incomparable on aspects (e.g. motivation, test-readiness etc.) other than the target variable; and/or b.) instrument bias which derives from instrument characteristics that can confound participant's scores on the measured construct; and
- *Item bias*, refers to distortions at an item level, biased items have a different psychological meaning across groups, for example a comparison on mean scores across gender groups would be invalid when gender biased items are included. In

other words an item systematically favouring a particular group will disguise the underlying variances on the construct.

Construct bias leads to conceptual in equivalence. As a consequence, instruments that do not adequately cover the target construct any of the groups cannot be used for comparisons across groups. On the other hand, method and item bias will not affect construct equivalence. Construct equivalence implies only that the same construct is measured across cultures. If score comparisons are intended across groups, method and item bias will be threat equivalence. Method and item bias can also confound scalar equivalence (Van de Vijver & Leung, 1997).

The degree of item and construct bias in measurement (i.e. item- and construct bias) can be identified through the presence of systematic error, which generates artificial rather than valid differences between groups on a certain construct like a facet of personality (Van de Vijver & Leung, 2001). For example if the NS scale of the TCI is continuously measuring a certain trait in a unique way for one culture and not another, a systematic error is created that can predispose researchers to erroneously conclude cultural or gender dissimilarities from artificial mean differences. The fact that systematic measurement error can indicate bias implies that the investigation of measurement error will likely reveal the degree, to which a measure like the TCI is biased (Taylor, 2008). Measurement error can be induced by both item and construct bias.

Van de Vijver and Tanzer (1997) state that construct or item bias exists when score dissimilarities derived from indicators (i.e. personality factors loadings of the TCI, or particular item scores) do not match up to the differences in the underlying construct. For example if a person scores high on the harm avoidance scale or a certain item of the TCI, but in actual fact that person should reflect a low score on that scale or item. In these instances item or construct bias is caused by measurement error, which points out that the problematic items and scales might be biased (Foxcroft & Roodt, 2005).

Classical Test Theory (CTT) or True Score Theory (TST) and Item Response Theory (IRT) are the most common statistical approaches used to investigate the general psychometric properties of assessment measures, including measurement error (Smith, Conrad, Chang, & Piazza, 2002). This means that these paradigms are also the most popular approaches used detect construct and item bias.

2.9.2 Critique of the Classical Test Theory

CTT or TST assumes that the total score a respondent achieves after completing an assessment reflects the respondent's standing on the measured construct (Bond & Fox, 2001; Smit, Conrad, Chang, & Piazza, 2002). This implies that a respondent's standing on the Self-Transcendence (ST) construct of the TCI will solely be reflected by the respondent's grand score on the ST scale. The interaction between individual items and the respondent is not considered when determining the respondent's standing on a particular construct.

Models based on Item Response Theory (IRT) on the other hand depend on the individual interactions between respondents and items, whereas CTT statistics (e.g. Cronbach Alpha Reliability, Inter-item correlation, and factor analysis) rely primarily on information derived from aggregate scores on a test (Smith et al., 2002). Statistics derived from IRT models can usually provide more accurate data on measurement error on different measurement levels (i.e. item level), than statistics derived from CTT. This feature of IRT models can therefore render statistics that are more accurate in the detection of construct and item bias. Furthermore CTT models have other characteristics, which make their utility in the evaluation of measurement properties of especially dichotomous measures undesirable. Smith et al. (2002) list the following limitations of CTT:

- The accuracy of item and test indices produced by CTT (e.g. item–total correlation) is dependent on respondent ability. For example if a personality test is administered to a sample with a high standing on the personality construct the proportion (p-value) of persons, which will endorse items will be higher than in a sample with a low level of the construct. In the same way a respondent will appear to have a higher inherent level of the construct, if the test only consists of items which are easily endorsed by respondents with low levels of construct. Schumacker (2004) summarizes the situation in stating that CTT statistics will always depend on the ability distribution of a sample and the item difficulty of a test. This means that statistics derived from a sample will always be a function of item or test difficulty; while item statistics will always be determined by a sample's ability;

- CTT lacks the ability to validate and predict the response patterns of individuals. For example, if a respondent does not endorse the five easiest endorsable items on a personality scale, but endorses the five most difficult endorsable items on the same scale, does he/she possess a low or high score on that construct? It can be argued that such an individual does have a high inherent standing on the construct, despite the fact that they did not endorse the easy items in such a way that it would increase their standing on the measured construct;
- CTT also lacks adequate statistical techniques to evaluate how measurement error varies across different groups. In most instances one standard error is applied to all cultural or gender group's scores. This is especially detrimental to the ability to evaluate construct and item bias with variance in measurement error;
- One of the more significant limitations associated with CTT, is that most of the analytical techniques derived from this theory were originally developed to use interval level data to calculate statistics like standard deviations, means, measurement error and item-total correlations. Unfortunately this feature detracts from CTT's potential to make valid mathematical comparisons across groups on ordinal and nominal level data; primarily because equivalent raw score variation between pairs of points does not mean that equal levels of the measured construct exist. In other words the interval level data required by CTT limits the statistical techniques that can be validly used to analyse especially dichotomous data.

Taking into consideration the above limitations of CTT statistics and how they can confound the assessment of measurement error and bias, the IRT model seems more appropriate than the CTT when it comes to analysing nominal data and especially detecting measurement error on item and sub-scale level from data derived from dichotomous measures.

The majority of research conducted on the psychometric properties of the TCI (e.g. Arkar et al., 2005; Cloninger et al., 1994; Gana & Trouillet, 2003; Guitierrez et al., 2001; Herbst et al., 2000; Kose et al., 2009; Maitland et al., 2009; Pelissolo & Lepine, 2000; Sung et al., 2002), utilised statistical techniques derived from CTT (e.g. factor analysis, Cronbach alpha reliability, and inter-item correlation), which rely on interval or ratio level data. At best the raw scores of the TCI can produce nominal or ordinal level data. This in itself creates multiple problems, which compounds on the existing drawbacks of CTT, which may confound research findings regarding construct and item bias established during the analyses of data derived from the TCI. It is argued in this dissertation that statistics derived from IRT models should rather be applied, instead of models based on CTT, to analyse whether the TCI functions in a bias and non-equivalent manner across different groups.

2.9.3 Evaluation of the Item Response Theory

According to Van de Vijver and Leung (1997) models based on IRT can be utilised to evaluate measurement error and in turn item and construct bias. A variety of authors argue that statistics derived from IRT can detect measurement error more accurately than statistics derived from CTT (Bond & Fox, 2001; Schumaker, 2004; Smith, Schumaker, & Bush, 1998).

IRT models can be arranged into three categories depending on the number of parameters, which needs to be estimated for measurement. There are three parameters namely: item difficulty, slope of the item (discrimination), and measurement. The number of parameters a model includes determines whether it is a one, two-or three parameter logistic model (Van de Vijver & Leung, 1997).

The Rasch measurement model is a one parameter model as it does not compute a slope parameter (i.e. item discrimination); this feature distinguishes it from other logistic models derived from IRT (Schumaker, 2004; Smith, 2000). Taylor (2008) mentions that unlike other models, which fit the model to the data, the Rasch model requires the data to fit the model. This approach necessitates that the data should fit the predicted theoretical model, in the case that the data does not fit the model it is assumed that the model is correct and the problem is with noise in the data (Maree, 2004). This noise can in some cases be interpreted as a sign of biased measurement.

With Rasch measurement the data is fitted or compared to the model by constraining the slope of an item to a constant, and nullifying the effect of guessing (Van de Vijver & Leung, 1997). This enables the model to generate a common unit of measurement for persons and items. Log-odds units (logits) are the common measurement units that are computed by the Rasch model, it reflects the odds of a respondent endorsing an item in such a way that it will increase their standing on the construct (Schumaker, 2004; Smith et al., 1998). These odds are calculated by dividing the probability of successfully endorsing a certain item by the probability of not endorsing an item in such a manner that it will increase the respondent's standing on the measured construct (Bond & Fox, 2001).

The natural log of these odds for each item or person is then represented as a logit score. A logit score indicates the chance of endorsing a personality test item in such a way that it will increase a participant's standing on a construct versus the chance to answer an item in such a way that it will diminish the participant's standing on the same construct (Schumaker, 2004). An item logit value represents the natural log-odds of failure with a person's natural standing on the construct at the scale origin, while the person logit value is the natural log-odds of success on the items of the sub-scale (Smith et al., 2002). Larger logit values for both item- and person measures indicate a higher item difficulty for any item, and higher standing on a construct for any person. This means that negative or low item- and person logit values, respectively point to less difficult items or to participants with lower standings on the measured construct (Maree, 2004).

Schumaker states that the "[r]asch algorithm facilitates the separate conditional probability estimation of person ability logit and item difficulty logit values by conditioning out person parameters in item calibrations – sample free measurement, and conditioning out item parameters from person calibrations, yielding test free measurement" (Schumaker, 2004, p. 231). Smith (2002) adds that the Rasch measurement model computes logistic probability ogives with a gradient that is similar for both person ability and item difficulty parameters, but also independent from either the item or sample distribution. This means that person and item parameters are independent from the distributional properties of the other parameter, which is why item statistics can be calculated independently from the sample distribution; and sample statistics can be calculated independently from the difficulty level of the sample of items (Smith, 2002).

It is important to note that Rasch modelling always results in addivity; measurement units is said to be additive when they are exactly similar in size over the entire range of measurement (Smith et al., 1998). In other words the Rasch model is able to convert ordinal level data to interval level data; this implies that the Rasch model transcends two limitations of CTT in that a.) it uses interval level data for interval level calculations and b.) both the person and item statistics are independent from each other's distributions.

The aforementioned characteristics enable the Rasch model to plot probability estimates or logits for both items and persons on a linear interval continuum with the same scaled units (Schumaker, 2004). In other words this mutual property of person and item statistics allows Rasch software packages to illustrate both the sample and item distribution on a person item map according to their respective logit values. Figure 2 below depicts a typical example of a person item map; several observations can be made from this figure. Firstly the left hand side of this figure shows the sample's distribution on the measured construct, each '#' represent three respondents while every '.' is equal to one respondent. The left hand side of the figure shows how the set of items divided the sample according to their inherent level of the measured construct. Groups of respondents located at the top end of the scale have higher logit values, which mean they have a higher latent level of the measured construct.

On the right hand side of the figure, the names of items comprising the scale are presented (e.g. NS 1-29) in a hierarchical order; with more difficult items located at higher logit values and the easier items located towards the bottom end of the scale. Schumaker (2004) suggests that when two or more items occupy the same logit value one can be removed, as the function of the item can be accurately predicted. This predictability means that the duplicate item does not provide any additional information about the sample than the remaining item is already providing. It is argued elsewhere that duplicate items can be altered or modified to eventually relocate to an unpopulated logit value range, this will allow for the measurement of another part of the construct (Maree, 2004). For example the wording of the item could be altered from negative to positive to assess the positive range of the construct.

Figure 2 also depicts the mean for the sample's average standing on the construct and the item difficulty mean, both means are indicated by an 'M' on the respective side of the figure. The standard deviation for the sample's standing on the construct and item difficulty is indicated by an 'S' on each side. The 'Q' on either side represents two standard deviations from the mean.

It needs to be noted that data should fit the Rasch model before valid interpretations can be inferred from respondent measures and item calibrations that appear on the logit scale (Smith et al., 1998). This implies that the data of the Rasch model like the person item map can only be interpreted with confidence, if the data fits the predicted model (Bond and Fox, 2001; Smith et al., 1998). The degree to which the data fits the model is discussed in section 2.9.6.

```
ADULTS                         MAP OF ITEMS
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Figure 2: Person Item Map

2.9.4 Using the Rasch Model to Analyse Dichotomous Data

The Rasch model was developed to analyse dichotomous data (Schumaker, 2004). Dichotomous data is data of which the parameters are defined by only two values (e.g. 1 and 0). In other words there are only two response options, meanings, or codes for any item or question (Bond & Fox, 2001). Dichotomous data usually has nominal properties, which means that the data can only indicate different categories of a certain variable (Bond & Fox, 2001). For example questions regarding a person's gender or questions that require respondents to endorse either a true or false response in reaction to a statement.

It should be reiterated that unlike models based on CTT, the mathematical properties of Rasch models permit transformation of discrete counts (e.g. 1 and 0 or correct and wrong) into continuous probabilistic values, from which test developers can objectively define variables with linear, interval and continuous properties (Bond & Fox, 2001;Schumaker, 2004; Smith et al., 1998). In other words Rasch software allows dichotomous data to transcend its nominal properties to become more meaningful. A response value of one can become meaningfully greater than the value of zero, in such cases responses offers an opportunity not just to separate scores categorically, but also with more sensitivity on an interval scale.

For example in an ability test, which is intended to distinguish between respondents with different ability levels, a certain code (e.g. 1) is used for a correct answer while another code is used for the incorrect answer (e.g. 0). The correct answer as opposed to the incorrect answer indicates that a respondent has more of a certain trait or ability than the person who answered in an incorrect manner. A response of 1 is rated higher than 0 because it indicates the ability rather than the absence of ability. This means that dichotomous responses, which represent the level/amount of a certain construct like personality, can be ordered in a meaningful hierarchical order (Bond & Fox, 2001).

2.9.5 Unidimensionality in Rasch models

The Rasch model necessitate that any measurement scale should be unidimensional in nature (Bond & Fox, 2001; Smith et al., 1998). Only when the scale proves to be unidimensional the data output derived from the scale can be interpreted or used in more detailed analyses (Schumaker, 2004). A scale is unidimensional when a single construct is being measured by the set of items of a scale, and the raw scores on these items reflect a single line of inquiry (Smith et al., 1998). In other words all the items on a specific personality scale should preferably evaluate a single dimension or aspect of personality.

Smith et al. (1998) identified the following common threats to unidimensionality: speeded measures, gender bias, cultural bias, and interaction between content and instructions. All the aforementioned factors may prevent the items of a scale to function in a unidimensional manner. This implies that a lack of unidimensionality can be considered as evidence of items that might be biased towards a certain cultural or gender group. When a scale of a personality measure like the TCI is evaluated and found to be multi-dimensional rather than unidimensional, it means that the scale might be assessing a construct in a dissimilar manner across the groups constituting the sample. More in-depth comparisons between the groups involved can illustrate whether the lack of unidimensionality is linked to cultural and/or gender bias (Bond & Fox, 2001).

It is evident from the arguments presented above that the degree, to which any assessment measure evaluates a unidimensional construct, should first be evaluated before other outputs of the Rasch model can be used to critically evaluate the psychometric properties of the TCI. In other words, before item and construct bias can be examined from Rasch statistics, the degree of unidimensionality should first be explored for the TCI's primary scales as well as the respective sub-scales.

2.9.6 Assessing Unidimensionality and Validity

When an assessment measure is comprised of multiple sub-scales (like the TCI), unidimensionality exist if each sub-scale and its corresponding primary scale has a common line of inquiry (Bond & Fox, 2001). Schumaker (2004) argues that validity can be seen as the degree, to which a measure (e.g. sub-scale) or its associated items accurately captures a single construct. This means that the unidimensionality of a scale also provides an indication of the validity of the scale. Furthermore content validity (items which measure one construct) and construct validity is directly dependant in Rasch measurement. This means that the unidimensionality of a scale can provide evidence of both content-and construct validity (Schumaker, 2004).

If the statistics produced by Rasch software (e.g. BigSteps or Winsteps) fits the Rasch model it can be assumed that the scale and items under investigation measures a unidimensional construct (Smith, 1996). When assessing unidimensionality Smith (1996) recommends that the nature of fit statistics should be explored.

2.9.7 Fit Statistics

In order to calculate fit statistics the parameters of the Rasch model are estimated by a maximum likelihood estimation process, these parameters are then used to calculate expected responses for each respondent to each item (Smith et al., 1998; Smith, 2000; Smith, 2002). Fit statistics are then computed by the Rasch software, which makes a comparison between predicted and observed scores for both items and persons. In other words the functioning of items of a scale is predicted by the model according to their difficulty level, this predicted functioning is then compared to the item's actual functioning (Bond & Fox, 2001). In the same way a respondent's performance is predicted according to their standing on the construct and then compared to their actual performance on individual items. When the comparison between predicted and actual statistics shows that the predicted functioning corresponds to the actual functioning then it can be concluded that: a.) the data fits the predictions of the model and b.) that noise is minimal (Maree, 2004).

Fit statistics can be utilised to identify items that are not contributing to a unidimensional construct (Bond & Fox, 2001). Items which do not fit the model can be examined for item bias (Smith et al., 1998). The Rasch model is able to calculate two sets of independent statistics; one for the sample of persons and another for the sample of items (Bond & Fox, 2001; Schumaker, 2004).

2.9.8 Respondent and Item Fit Statistics

Respondent fit statistics indicate the extent, to which an individual's pattern of interaction with items corresponds to the response pattern predicted by the model (Bond & Fox, 2001). A valid response requires that a person of a given ability should have a greater probability of providing a higher rating on items which are easier to endorse, than items which are more difficult to endorse (Smith, 2002). A person with a high inherent level of harm avoidance (HA) is expected to endorse the easy items of the HA scale in such a manner that it will increase their standing on the construct, while items with a difficulty value greater than the individual's ability level will be more difficult to endorse. In a similar manner item fit statistics reflects the comparison between an items expected functioning and it's actual functioning.

Two additional indices of fit statistics are calculated for both respondent and item fit statistics, namely infit and outfit statistics (Lincare, 2002). Infit or weighted statistics represent the degree to which a respondent's actual response patterns to items, which are close to their ability level, are similar to the predicted response pattern for the same items (Lincare, 2002). Outfit or unweighted statistics represent the degree to which a respondent's actual response patterns to items, which are far from their ability level, are similar to the predicted response pattern for the same item (Bond & Fox, 2001).

This means that infit statistics are more sensitive to unexpected responses close to a person's ability or inherent construct level, while outfit statistics are more suited to detect atypical response patterns to items, which are distant from a respondent's ability level. For instance, if a respondent with a high ability or construct level answers an easy endorsable item in the incorrect manner, it will be reflected in the respondent infit statistics. On the other hand when a person with a low ability or construct level answers a very difficult item correctly, it will be reflected in the respondent outfit statistic.

Fit values smaller than one indicates that response patterns or item functioning are too predictable, while values greater than one mean that response patterns or item performance vary excessively from the prediction made by the model (Maree, 2004). Smith (2002) notes that fit values, which range between 0.6 and 1.4 are acceptable for most self-reporting assessment measures such as the TCI. For self-report measures fit values smaller than 0.6 indicates response patterns, which are too predictable. Items with a high degree of predictability are unable to add to the statistical information, which is already provided by the rest of the scale's items (Smith, 2002). Values greater than 1.4 indicates items that are not contributing to a unidimensional construct (Smith, 2002).

The infit and outfit transformations of item and person fit statistics are usually presented in the data output calculated by Rasch Software. An example of individual item fit statistics computed in BigSteps (a Rash software package) is presented Table 1 below.

Table 1: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
10	1012	1139	-1.67	.10	1.08	1.2	1.25	1.8	A .00	NS1(211)
4	270	1139	2.23	.08	1.10	2.5	1.21	2.8	B .00	NS1(70)
2	256	1139	2.32	.08	.99	-.1	1.10	1.3	C .08	NS1(29)
8	1054	1139	-2.16	.12	.97	-.3	1.09	.5	D .12	NS1(167)
7	755	1139	-.03	.07	1.02	.8	1.04	.7	E .09	NS1(144)
6	912	1139	-.88	.08	.98	-.4	1.02	.2	e .13	NS1(114)
5	303	1139	2.05	.07	.97	-.8	1.01	.1	d .11	NS1(99)
9	906	1139	-.84	.08	.96	-.9	.93	-.9	c .16	NS1(191)
3	929	1139	-1.00	.08	.94	-1.3	.90	-1.1	b .18	NS1(52)
1	752	1139	-.02	.07	.92	-2.8	.88	-2.6	a .20	NS1(1)
MEAN	715.	1139.	.00	.08	.99	-.2	1.04	.3		
S.D.	301.	0.	1.56	.01	.06	1.4	.12	1.5		

As mentioned earlier the fit of the data to the model provides an excellent indication whether a scale is unidimensional or if it assesses more than one construct. Multiple fit statistics are presented in Table 1 some of these are more accurate than others when evaluating the fit between actual item performance and the performance predicted by the model.

Fit can be determined by evaluating the Z standardised individual item fit statistic (ZSTD), which has a type 1 error of 0.05 and a critical value of either '+ or – 2' for both infit and outfit values. When a Z value exceeds '+ 2' it points to an irregular response pattern, while a value smaller than '- 2' indicates a redundancy in responses to a particular item (Schumaker, 2004). In Table 1 this statistic is calculated for each item and presented in both the 'INFIT' and 'OUTFIT' columns. The ZSTD values for item NS 1 (211) in the first row for both columns are 1.2 and 1.8 respectively, which does not exceed the critical value of two.

Smith et al. (1998) state that unstandardised infit-and outfit mean statistics can also illustrate the degree, to which the data fits the model. In Table 1 these statistics are presented in both the infit and outfit columns under the 'MNSQ' headings. These statistics are more appropriate than the standardised infit and outfit (ZSTD) statistics when evaluating the fit of data derived from large samples. This superiority can be ascribed to the fact that the sensitivity of the standardised fit statistics to detect non-random error decreases as sample size increases (Smith et al., 1998).

Smith et al. (1998) state that outfit or unweighted fit statistics can sometimes be used in determining data fit and in turn unidimensionality. Despite this feature outfit statistics are considered inappropriate to determine the fit of the data to the model in cases where item difficulty or person ability is variable. Smith et al. (1998) argues that scales containing items with relative variance in item difficulty will always render large outfit statistics, which will not be a true representation of the fit of the data to the model. In this case large outfit statistics can be attributed to an insignificantly small number of respondents who produce unpredicted correct responses. It is argued that even a very small number of atypical responses or item performances may artificially inflate the outfit statistics to a value that may erroneously indicate misfitting data (Smith, 2002).

The unstandardised mean square infit statistic can be considered the prime indicator of an item and scale's unidimensionality (Bond & Fox, 2001). A scale is considered to be unidimensional if all the items of scale have infit mean square values ranging between 0.6 and 1.4 (Bond & Fox, 2001).

2.9.9 Point-biserial Correlation

The point-biserial statistic indicates whether an item positively correlates with the aggregate score on the rest of the items comprising the scale (Maree. 2004). In Table 1 the second last column to the right illustrates the point-biserial correlation values for each item. A negative point-biserial correlation means that the relationship between responses to dichotomous items and the total raw score is an inverse one (Schumaker, 2004). Negative point-biserial values are especially effective in indicating problems with the coding of items, a negative value usually indicates that the item was coded in the wrong direction. Schumaker (2004) recommends that any item with a negative correlation should be eliminated from a scale. It is argued in this investigation (in your dissertation?) that very low negative point-biserial correlation values (e.g. < - 0.10) are negligible and do not indicate the presence of a second factor or construct.

2.9.10 Detecting Item and Construct Bias

As mentioned earlier a measure is biased to one or another group, if one or more of its items significantly influences the scores to such a degree that an unfair advantage/disadvantage is created for any group (Van de Vijver & Tanzer, 1997). It is argued that these advantages or disadvantages are created by systematic measurement error, which artificially creates or inflates differences between groups on the measured construct. Foxcroft and Roodt (2005) stress that it is essential to eliminate bias especially in multicultural assessment contexts like South Africa. The majority of studies investigating item or construct bias depend on statistics derived from Classical Test Theory to explore the degree, to which constructs are equivalent and non-biased across cultures.

2.9.10.1 <u>Classical Test Theory: Explorative and Confirmative Factor Analysis</u>

Explorative factor analysis (EFA) can be utilised to assess the degree, to which constructs exist and reflect themselves in an invariant manner across different groups (Garson, 2006; Van de Vijver & Leung, 1997; Van de Vijver & Tanzer, 1997; Whitley, 2002). EFA enables one to explore the fundamental factor structure of a set of variables; this method of analysis assumes that any indicator can be correlated with any factor (Garson, 2006). EFA assumes no prior theory to establish a predetermined set of factors to test if the data fits, but rather rely on factor loadings to indicate the structure of the data (Garson, 2006; Maree, 2007; Suhr, 2006; Whitley, 2002). Hence, EFA can be applied to the TCI scores of participants of different groups to establish if the measure produces the same factor structure across different cultures and genders.

Confirmative factor analysis (CFA) is a statistical technique applied to data, to establish whether the data produces a fixed number of factors, which in turn conforms to the factor solution proposed by theory (i.e. psychobiological theory) (Garson, 2006; Maree, 2007; Whitley, 2002). In other words unlike EFA where no prediction is made regarding the number of factors and their corresponding variable loadings, CFA requires that the researcher should forecast the factor structure (Garson, 2006).

Both CFA and EFA utilise statistics derived from CTT, which have multiple limitations and negative implications for validity of research findings regarding item and construct bias, especially when analysing dichotomous data. IRT is considered to be more appropriate than CTT to assess item and construct bias of measures designed to render nominal data (Smith, 2000; Schumaker, 2004). Data derived from analyses based on IRT can be used in invariance analysis as an alternative method to factor analysis to explore both construct and item bias. The unidimensionality of a scale can also be used to evaluate whether a scale or sub-scale measures a single unidimensional factor (Smith et al., 1998).

2.9.10.2 Using the Rasch Model to Evaluate Factors

As was shown earlier item fit statistics are essential in adjudicating the fit of the data to the model and determining the dimensionality of a scale (Bond & Fox, 2001). It is argued elsewhere that Principal Component Analysis (PCA) of the residuals of item scores can also be applied in conjunction with fit statistics to detect unidimensionality (Smith, 2002).

When a scale proves to be unidimensional it means that all the items on the scale measures a single construct, which implies that the scale also measures one unidimensional factor. Smith (2002) emphasizes that PCA of residuals is not theoretically appropriate to analyze dichotomous data. The only situation when this type of factor analysis (i.e. PCA) is more appropriate than the Rasch model to detect unidimensionality is when equal numbers of items exist on each factor or subscale and the correlation between the two factors are low (Smith, 2002).

Rasch item fit, especially unstandardised fit statistics, works better than PCA analysis of residuals when there are fewer items on the second factor than on the first and when the two factors are strongly correlated (Smith, 2002). This might be the case with the TCI; especially if it is taken into consideration that the different sub-scales are highly correlated with each other because there are multiple sub-scales grouped together within each of the primary scales of the TCI. For example although there are four novelty seeking (NS) sub-scales, they are all designed to measure one factor of personality called NS. Hence, when testing if the entire NS scale measures one bigger encompassing construct with its four sub-scales the evaluation of item fit statistics is more appropriate than PCA.

Although the evaluation of fit indicates whether a scale or subscale measures one construct in the entire sample, it is unable to determine whether items, sub-scales and primary scales function in a biased manner across groups. This means that construct and item bias should be evaluated with more sophisticated techniques that facilitate a comparison between the psychometric performances of a set of items across two groups of respondents.

2.9.10.3 Detecting Item and Construct Bias: Invariance Analysis

Bond and Fox (2001) describe invariance analysis as an appropriate technique to assess item and construct bias. This analysis can be applied to assess the degree, to which a set of items on a sub-scale functions in invariantly (i.e. consistently) across groups (ethnic and gender groups). If the analysis points out that particular items do not possess invariant properties across groups it means that the items are biased (Bond & Fox, 2001). When the performance of enough items is not invariant across the groups it means that the scale does not retain the same measurement properties (i.e. measurement error) in both groups.

Bond and Fox (2001) argue that if a significant number of items are not invariant across groups the entire scale under scrutiny does not retain its measurement properties across the groups. This means that measurement error of the scale functions differently for one group than another on a systematic basis. Such a systematic error mechanism creates an artificial rather than a valid difference between the two groups. When such an artificial difference is created, the items or scale responsible for the difference is considered to be biased to one or the other gender or cultural group (Bond & Fox, 2001; Vijver & Leung, 2001).

As mentioned earlier construct equivalence refers to the degree to which scores on an assessment measure can be directly compared between groups (Van de Vijver & Leung, 2001). If measurement properties are not invariant across groups then valid comparisons between these groups on the measured construct are not feasible, this might influence the degree, to which the measure under consideration can assess personality according to the amended EEA (See Section 2.4).

2.9.11 Person Fit Statistics and Reliability

Rasch modelling has the unique advantage of applying the same analytical logic and interpretation to both respondent and item data (Bond & Fox, 2001). This allows Rasch modelling programs to produce two sets of output; one for items, which was illustrated earlier in Table 1 and another one for persons which is shown in Table 2 below.

Table 2: Summary of Respondent Statistics

```
+-----------------------------------------------------------------------------+
|           RAW                            MODEL         INFIT        OUTFIT    |
|          SCORE     COUNT     MEASURE     ERROR      MNSQ   ZSTD   MNSQ   ZSTD |
|-----------------------------------------------------------------------------|
| MEAN        5.9      11.0         .29      .82        .99    -.2   1.04    -.2 |
| S.D.        1.9        .0        1.25      .09        .45    1.0   1.25     .7 |
| MAX.       10.0      11.0        3.41     1.20       2.93    4.2   9.90    3.5 |
| MIN.        1.0      11.0       -3.55      .76        .29   -2.1    .14   -1.2 |
|-----------------------------------------------------------------------------|
| REAL RMSE    .90  ADJ.SD     .87  SEPARATION   .97  ADULT  RELIABILITY  .49 |
|MODEL RMSE    .83  ADJ.SD     .94  SEPARATION  1.14  ADULT  RELIABILITY  .57 |
| S.E. OF ADULT  MEAN    .04                                                  |
| WITH     2 EXTREME ADULTS  =  1144 ADULTS   MEAN      .29  S.D.     1.26     |
| REAL RMSE    .90  ADJ.SD     .89  SEPARATION   .98  ADULT  RELIABILITY  .49 |
|MODEL RMSE    .83  ADJ.SD     .95  SEPARATION  1.15  ADULT  RELIABILITY  .57 |
+-----------------------------------------------------------------------------+
```

The person fit statistics in Table 2 indicates the degree to which a participant's responses to the items of the scale conform to the pattern predicted by the model. According to Smith et al. (1998) when an individual's response pattern does not fit the model it may be ascribed to one of the following reasons: the respondent may not be part of the sample which was initially targeted, the test was either too easy or difficult, or the person responded to items by using a uniform response style (e.g. socially acceptable responses or answering true or false to all questions). Person fit statistics is not useful in evaluating item or construct bias, due to the fact that they are calculated independently from item information (Smith et al., 1998, Smith, 2000). They are however useful in estimating the reliability of a measure.

Unlike models based on CTT, item response models calculate reliability estimates from logits rather than raw scores or ordinal level data, where after error variance is approximated for individual items and persons (Schumaker, 2004). This excludes the CTT tendency to use an average error variance, which is sample dependent (Schumaker, 2004). In other words a standard error can be estimated for each respondent, which provides a more specific error measure (unlike CTT it does not overestimate the error variance for individuals with extreme scores). In essence then the summation of squared individual error variances equates to a more accurate estimate of error variance than calculations based on a mean error variance (Schumaker, 2004). A standard error is calculated for all the person ability and item difficulty estimates. This standard error quantifies the accuracy of both these measures, and can be utilised to calculate confidence intervals, in which a person's real ability or an item's real difficulty is located (Schumaker, 2004; Smith et al., 1998).

The mean error variance can be deducted from the observed individual error variance, which is also measured in logits to calculate an adjusted variance for each individual (Schumaker, 2004). Finally the person reliability statistic can be calculated by using the proportion of the adjusted person variance to the observed individual variance (Schumaker, 2004). This reliability figure is presented in the last two rows of Table 2.

The person reliability statistic provides an indication of how the particular set of items of a sub-scale is able to separate the group of respondents on the continuum of the measured construct. This separation can be observed in the person item map illustrated earlier in Figure 2. It is evident from the figure that the set of items is able to differentiate between persons with regards to their standing on the construct. This allows the ability to differentiate between people with a high, medium, or low level of the measured variable. The significance of these differences should first be determined before grouping participants according to their standing. The higher the value of the person separation reliability value, the more confidence can be assigned to the separation of respondent scores along the continuum of the measured construct. Therefore in highly reliable scales one can assign higher confidence to the hierarchy of the participant order on the measures construct (Bond & Fox, 2001).

Item reliability statistics is calculated similarly to the person reliability statistics. Item reliability values provide an indication of how the items of a scale are spread out along the continuum of the construct (Bond & Fox, 2001; Smith, et al., 2002). Both person and item reliability statistics ranges from zero to one. It is standard practice to interpret these values in a similar way as Cronbach Alpha statistics (Maree, 2004). For example a person reliability of 0.33 means that the respondents who completed the measure did not respond in a consistent manner to the set of items comprising the scale (Schumaker, 2004). An item reliability statistic close to one means that the items behaved in a consistent manner across different individuals and that the items were relatively spread out along the continuum of the measured construct.

These reliability statistics are in most cases transformed into person or item separation indices. These separation indices are calculated for both persons and items, and are presented on the bottom left hand side of both Table 1 and Table 2. According to Bond and Fox (2001) the item separation index shows reliability as the number of standard errors of spread among the items or persons. The magnitude of item or separation represents the ability of the assessment measure to define a hierarchy of items along the measured variable. Hence, the higher the reliability or separation value the more confidence we can place in the replication of item or person placement across other samples (Smith et al., 2002).

This item distribution can be interpreted as an item hierarchy where items located at the top-end of the person item map represent those items, which participants found more difficult to endorse in a manner that will increase their standing on the construct, while items located at the lower logit range represent items, which participants found easy to endorse in such a manner that will increase their standing on the construct. The item hierarchy illustrated in Figure 2 depicts the way in which the sample defined the measured construct. For example if the items cover a narrow logit space, the measured construct represents a variable with a constricted range. On the other hand if the items are spread out over a large logit range with a few items located at the high logit values and the rest of the items located in the lower logit regions it means that the entire middle section of the construct is not being measured. If items are created to populate the gaps on the person item map it will increase the accuracy of the scale, decrease standard errors associated with the scale, and ultimately equate to higher reliability statistics (Smith et al., 2002).

2.9.12 Synopsis of the Rasch Model

It is concluded from the discussions above that the Rasch model should preferably be applied to analyse dichotomous data as it will overcome some of the limitations imposed by statistics derived from CTT. This can be ascribed to the fact that the Rasch model can compute interval level data from nominal data and calculate independent statistics for both persons and items (Schumaker, 2004; Smith et al., 2002; Smith et al., 1998). These features support and motivate a thorough psychometric evaluation of any measure rendering dichotomous data, through statistics derived from IRT, rather than statistics derived from CTT (e.g. EFA and CFA).

It is shown that the Rasch model is particularly suited to apply IRT to dichotomous data, but only when the data adheres to the assumptions of the Rasch model. The fit of the data to the model can be determined by evaluating both the individual item mean square fit values and item point-biserial correlations. If it is established that the data adheres to the core assumptions of the Rasch model, then the Rasch output is valid and can be scrutinised for item and construct bias with more sophisticated techniques (i.e. invariance analysis).

2.9.13 CONCLUSION

Parker et al. (2003) conclude that the TCI can be applied in various cultures, and argue in line with the original theoretical proposal of Cloninger, in stating that this assessment measure incorporates constructs that exist in all individuals. Consequently it is argued that the application of the TCI in diverse cultures may aid the field of personality research to reach a more comprehensive understanding about normative personality and the genetic, socialised and psychological similarities and/or differences of people ascribing to different cultures (Kose et al., 2009; Sung et al., 2002).

Pelissolo and Lepine (2000) state that in order to advance the interpretation of the TCI's results in various cultures, the psychometric performance of the TCI should first be explored in a variety of contexts. It is argued that such explorations will a.) assist the larger research project in determining the validity and reliability of comparisons drawn between police trainees who belong to different ethnic and gender groups; and. b.) allow the psychometric assessment community to critically evaluate whether the TCI converges with the criteria set out by the EEA, HSPCA and WHO (Government Gazette, 1998).

It is also evident from the literature overview that the majority of international research focussing on the TCI version nine has been undertaken with primarily European populations (i.e. French, Swedish-, and Spanish samples) and Eastern populations (i.e. Korean-, Chinese- and Turkish samples). Currently research regarding the psychometric properties (i.e. construct equivalence, factor structure and instrument bias) of the TCI in any South African sample is virtually non-existent. It is argued in this thesis that the onus lies within the psychometric research community to address the aforementioned situation.

The South African Police (SAP) service recruits individuals from different cultures and gender groups, which then presents a relatively diverse sample and a unique opportunity to explore the psychometric integrity of the TCI across diverse groups. The theory underlying the TCI proposes that the factor structures or item performance in different cultural and gender groups should be similar; evidence supporting or discouraging this assumption will in turn indicate the degree of construct equivalence and bias towards different ethnic and gender groups (Van de Vijver & Leung, 1997).

The literature reviewed in this chapter strongly motivates that any investigation into the psychometric properties of the TCI will can be invaluable for personality assessment in South Africa.

CHAPTER 3: METHODOLOGY

3.1 OVERVIEW

The current investigation is post-hoc in nature and is nested in a larger research project, which aims to explore and compare the personality characteristics, coping mechanisms and psychological well-being of South African and Swedish police trainees. The discussion presented in this chapter will discuss and elaborate on the research methodology as it was applied in the original investigation conducted by du Preez, Cassimjee, Ghazinour, Lauritz, and Richter (2009). Although the essential methodological strategies are similar to the original study, novel research questions will be asked, which necessitates that unique statistical analysis are applied to the data rendered by the initial investigation.

The primary purpose of this chapter is to explicate the methods and procedures utilised in the research project (Mouton, 2001). This meticulous discussion of the research methodology enables the broader research community to replicate or expand the current research project when necessary. The discussion in this chapter will firstly document the investigation's aims and research questions; where after the sampling process and research instrument are described. Finally the chapter outlines the research design and process implemented throughout this psychometric investigation of Cloninger's Temperament and Character Inventory (TCI) (Cloninger et al., 1994). The discussion regarding the research design and process is guided by a structure proposed by Graziano and Raulin (Graziano & Raulin, 2000).

3.2 RESEARCH SAMPLE

The data was originally obtained from a sample conveniently drawn from a population of South African Police (SAP) trainees whom were chosen from a national pool (n = 70 000). Approximately 28 000 trainees were selected from this pool, this group was then split into smaller groups, which were then apportioned to different police colleges in South Africa. A considerable number (n=1450) of these trainees were enrolled at the Pretoria Police College in 2007, during this time they took part in the investigation's data collection process.

Before the SAP training commences the trainees are divided into platoons, where after male trainees are separated from females. Throughout the first six months the recruits undergo basic training, where after each recruit needs to complete an additional six months of training at a specific police station of the SAP. The final training phase is a 12 month probation period.

The 1450 recruits were assessed during the first six months of probation before they got exposed to police work in the field. The participants completed three assessment measures which included the TCI. Some of the answer sheets were spoilt or incomplete; resulting in attrition of the number of participants, with 1144 of participants producing usable data and constituting the final research sample.

This convenient sample will limit the generalizability of the investigation's findings (Whitley, 2002). The sample only provides data from black African ethnic groups. Participants came from various ethnic backgrounds, as is illustrated in Figure 3 (i.e., Sotho n=550, Venda n=202, Tsonga n=188, Nguni n=133, and Ndebele n=66), with 646 male and 493 female participants.

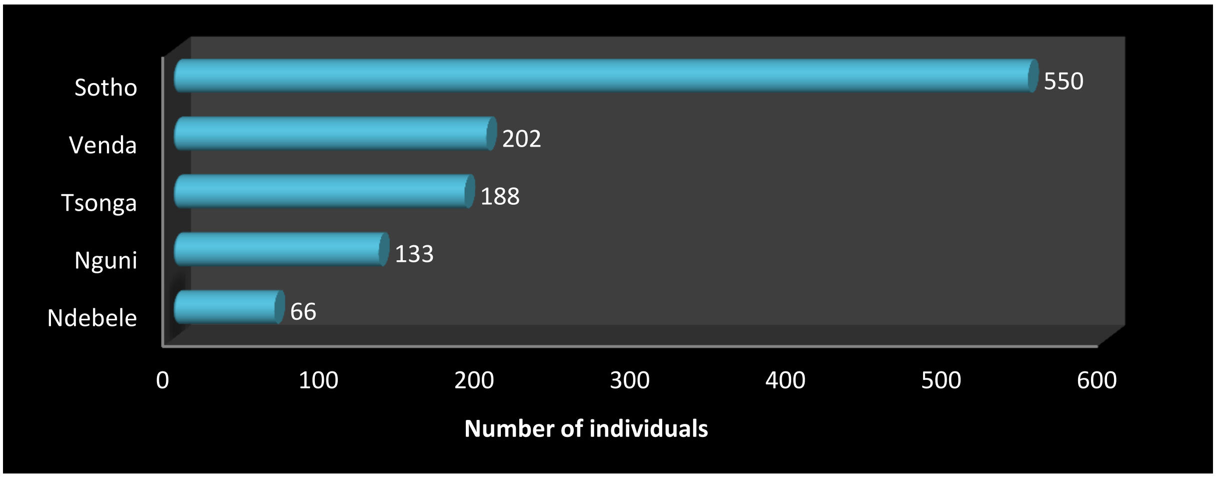

Figure 3: Ethnic Distribution of Sample

3.3 RESEARCH INSTRUMENTS

All participants were required to answer a biographical questionnaire, which inquired about their home language, age, gender, racial grouping, English language proficiency and highest educational qualification. Participants also completed three psychometric assessment measures including: the Ways of Coping Checklist (WOC), TCI version nine, and Symptom Checklist-90- Revised (SCL-90). These instruments were purposefully selected to explore the relationship between personality profiles, coping mechanisms and psychological wellbeing (du Preez et al., 2009). It is argued in this dissertation that before such a relationship can be validly inferred from data produced by these instruments, all instruments should first portray adequate psychometric properties across the different ethnic and gender groups represented in the sample (i.e. cross-group equivalence). The current investigation only focuses on the psychometric performance of the TCI version nine.

3.3.1 Cloninger's Temperament and Character Inventory Version Nine

Cloninger's theory postulates that any individual's personality consist of seven dimensions, four of these are temperament domains and three are character domains (Cloninger et al., 1994). The TCI version nine is utilised to assess this structure of personality, the TCI questionnaire is presented in Appendix C. The TCI is a self-administered questionnaire consisting of 238 dichotomous true and false items (Cloninger et al., 1994). The measure is designed to measure four genetically independent temperament domains with four primary scales and their related sub-scales. In addition to the temperament scales, the TCI also incorporates three character scales and their related sub-scales. The character scales assesses the three character domains, which are mediated by the interaction of social and genetic factors (Cloninger et al., 1993).

Cloninger et al. (1994) argues that the four temperament domains are genetically determined and independently heritable, each of these four personality domains are correlated with the levels of specific neurotransmitters in the human brain. The novelty seeking (NS) scale consists of four sub-scales (NS1 - exploratory excitability vs. stoic rigidity; NS2 – impulsivity vs. reflection; NS3 – extravagance vs. reserve; and NS4 – disorderliness vs. regimentation). The second primary temperament scale is harm avoidance (HA) and is also constituted by four sub-scales (HA1 – uninhibited optimism; HA2- fear of uncertainty; HA3 – shyness with strangers; and HA4 – fatigue vs. rigour). The third temperament scale is reward dependence and it has three sub-scales (RD1- sentimentality; RD2 - attachment vs. detachment; and RD3 – dependence vs. independence). The fourth and final temperament scale is persistence, which has eight items and no sub-scales.

The TCI also measures three character domains (self-directedness, cooperativeness and self-transcendence), which are regulated and shaped by individual self-concepts formed by an individual's responses to socialisation processes (Cloninger et al., 1994). Firstly self-directedness (SD) can be delineated into five sub-scales (SD1 – responsibility vs. blaming; SD2 – purposefulness vs. lack of goal direction; SD3 – resourcefulness vs. inertia; SD4 – self acceptance vs. self-striving; and SD5 – congruent second nature vs. bad habits). Cooperativeness (CO) is the second primary character scale and consists of five sub-scales. (C1 – acceptance vs. social intolerance; C2 – empathy vs. social disinterest; C3 – helpfulness vs. unhelpfulness; C4 – compassion vs. revengefulness; and C5 – integrated conscience vs. self-serving advantage). The final character scale is self-transcendence (ST) and consists of three sub-scales (ST1 - creative self-forgetfulness vs. self-consciousness; ST2 – transpersonal identification; and ST3 – spiritual acceptance vs. rational materialism) (Cloninger et al., 1994). The items subsumed in each sub-scale are presented in Section 4.4.

3.3.2 Structuring and Scoring of the TCI's Sub-scales

All of the sub-scales of the TCI are designed to measure constructs with a bipolar nature, with a lack of a certain construct, indicating an opposite tendency. For instance a high score on any sub-scale means the participant is more inclined to the right-hand pole of the construct, while a lower score means that the participant has an absence of the construct measured at the right pole. Therefore a high score on the 'C3 - helpfulness vs. unhelpfulness' sub-scale will mean that the respondent is categorised as helpful, while a low score will rather place the person at the unhelpful pole.

Several authors argue that there is specific measurement problems associated with bipolar scalar design; in particular such scales may result in ipsative measurement (e.g. Baron, 1996). The fact that most of the TCI's sub-scales measure a bipolar construct, and are comprised of items which have forced choice response formats, may lead one to assume that these scales are ipsative. A scale is ipsative when a given set of responses always sum to the same total. According to Hicks (1970) any score matrix is said to be ipsative when the sum of the scores obtained over attributes measured for each participant is a constant. That is, an ipsative measure yields a mean over all assessed attributes, this mean being the same for each individual.

Constraints are imposed on scale scores for ipsative measures because items from different scales are paired with each other and individuals make a forced choice among them. Since the total score is fixed and invariant for ipsative scoring, each forced choice affects the scale score for both scale variables. This is not the case for the TCI as its items are never paired with items representing another bipolar scale. In other words, the TCI's forced choice items are only compared with items from the opposite pole of the same scale so that the sums of the scale scores are always independent and are absolute measure for each sub-scale.

Also Hicks (1970) distinguish absolute measures, where individual scale scores are independent and free to vary on each scale, from ipsative measures, where individual scores are relative to the score levels on another scale. Again scores on the TCI's scales are independent from other scales. When applying these definitions to the scales of the TCI, it becomes very clear that they are not ipsative, as participant responses do not add up to the same total on an item, sub-scale or primary scale level. It is argued that the forced choice-format of the TCI is a legitimate measurement practice.

Each of the items associated with the TCI's sub-scales present the respondent with the option to either endorse a true response option by circling a '1' response or a false response by circling the '2' response option. Irrespective of the response selected by the respondent only one response will increase the respondent's score on the particular scale/construct. Obviously then the contrasting response will decrease the respondent's standing/score on that particular scale or construct. In other words a true or a false response can increase/decrease the respondent's score on a scale. The total score of the respondent on the scale will determine whether their person is more inclined to the construct measured at either the left or right hand side of the scale.

With the TCI any response (true/false) that increases a participant's score on a scale is converted to 1, while a response which decreases a respondent's standing on a construct is converted to 0. For example the codes for some true responses will remain 1, while a true response to an item, which measures the construct in an opposite direction is converted to 0. In the same way a false response can either be converted to 1 or 0 depending on the direction the item is measuring the particular construct.

It is this feature of the TCI that necessitates that the raw scores of the TCI should always be recoded before analysing data. As mentioned earlier problems with coding can be detected by scrutinizing the point-biserial statistics rendered by items. The coding manual for the TCI can be seen in Appendix C.

3.3.3 Psychometric Properties of the TCI

Reliability and validity are usually indicated by score distribution, internal consistency and degree of construct validity. With any self-administered assessment measure like the TCI the reliability is indicated by the degree of internal consistency, which is in turn indicated by the Cronbach alpha and test-retest reliability. Cloninger et al. (1993) showed that the TCI version 9 has a test-retest reliability of 0.85 over a period of six months, which is adequate (Whitley, 2002). The TCI also rendered satisfactory alpha coefficients in various other investigations (Arkar et al., 2005; Cloninger et al., 1993; Miettunen et al., 2004; Miettunen et al., 2008).

Miettunen et al. (2004) illustrate that the English edition of the TCI version nine has sound psychometric properties when it was administered to 4349 participants from North Finland. Other investigators also established that the TCI's psychometric properties are acceptable in terms of reliability and validity when completed by European, Asian, Turkish, American, Swedish, Spanish and French samples (Arkar, et al., 2005; Fossati, et al., 2007; Gutierrez, et al., 2001; Kose, 2003; Parker et al., Sung et al., 2002). A meta-analysis conducted by Miettunen et al. (2008) also supports the validity and reliability of the TCI and its various scales and sub-scales.

One psychometric concern raised by Miettunen et al. (2008) regarding the psychometric functioning of the TCI is that the Reward Dependence (RD) and Persistence (PS) sub-scales are weaker in terms of validity but still acceptable. Internal consistency figures for the NS (.78) and HA (.85) scales were found to be consistently higher, than the values rendered by the RD (.69) and PS (.56) scales (Miettunen et al., 2007). The relatively low internal consistency value rendered by the PS scale is attributed to the fact that it has relatively few items compared to the other scales. It is argued that this trend might also be repeated for the sub-scales of the TCI, as all of these sub-scales are also comprised of relatively few items.

Sung et al. (2002) show that all four temperament scales have acceptable Cronbach alpha values with the figures ranging between .60 and .85. These authors also show that all the character scales rendered high Cronbach alpha values ranging from .82 to .85 (Sung et al., 2000). Test-retest correlation ranged from .52 to .72 for the temperament dimensions and from .52 to .71 for the three character scales. Arkar et al. (2005) found acceptable Cronbach alpha values for most of the TCI's scales and sub-scales, apart from the sub-scales of the cooperativeness (C) scale, the C 2, C 3 and C 5 sub-scales all rendered alpha values lower than .39.

As was mentioned throughout the literature review (Section 2.8.2) the majority of findings regarding the psychometric properties of the TCI are supported by statistics derived from analyses based on CTT. The calculations used to produce factor analysis-, Cronbach alpha reliability-, and inter-item correlation statistics rely on interval or ratio level data. Due to the dichotomous nature of the TCI's items it can only produce nominal or ordinal level data. Using nominal level data in calculations, which require interval level data may confound research findings regarding the psychometric properties established during the analyses of the TCI (Smith et al., 2002). During the literature review it was recommended that statistics derived from Item Response Theory (IRT) should rather be applied to the TCI data to overcome these limitations.

3.4 RESEARCH DESIGN AND PROCESS

The current research project can be considered as one that is empirical in nature, as it will use of observable data to test its hypotheses, in other words it will use numerical data to substantiate its eventual conclusions (Maree, 2007). A quantitative approach will be used, which assumes that personality is empirically measurable by a questionnaire like the TCI (Neumann, 2006). In this non-experimental design a survey research methodology will be utilised to produce data to test the research hypotheses (Whitley, 2002).

As mentioned earlier, this investigation is post-hoc in nature; the original design was a cross-sectional one. A cross-sectional design entails that a sample cohort is drawn from a population and then the dependant variable is measured during a single assessment (Mouton, 2001). For this investigation data derived from the aforementioned assessment will be utilised for correlational purposes using IRT. This will allow the research proponent to explore construct equivalence and differential item functioning across each of the defined ethnic and gender groupings.

To increase the transparency of the current research protocol the subsequent sections will elaborate on the conceptualisation of research ideas and questions, data collection methods and protocol, data capturing and consolidation, as well as data analysis methods. Graziano and Raulin (2000) recommend that a research design can be structured into the idea generating phase, problem definition phase, procedures design phase, observation phase, data capturing phase and interpretation phase. The current research design was structured and planned accordingly.

3.4.1 Idea generating phase

This research endeavour is nested within a larger longitudinal research project, which was undertaken by both the UMEA University in Sweden and the University of Pretoria from South Africa. The primary goal of this international project is to compare the psychological well-being, coping mechanisms and personality profiles of police trainees from South Africa to those in Sweden (du Preez et; al., 2009).

Before any valid comparisons can be made between the aforementioned samples, the validity and reliability of the measuring instruments should preferably be established across the different gender and ethnic groups. As was noted in the literature review chapter, it is also critical to establish the cross-cultural and cross-gender applicability of personality measures in an ethnically and culturally diverse context like which is found in South Africa. This psychometric investigation was originally motivated to assist the larger research project in arriving at valid and reliable cross-group comparisons between police trainees who belong to different ethnic and gender groups.

The literature review shows that the TCI as a personality measure offers a unique model to account for personality in the South African context. This provides even more emphasis on the need for the psychometric validation of the TCI in a diverse South African sample.

3.4.2 Problem definition phase

To refine the research idea into specific research questions and hypotheses, a literature review was undertaken. This review was guided by the following research parameters:

- Understanding psychometric and personality assessment in South Africa, especially assessment across different cultural/ethnic and gender groups
- Comparing Cloninger’s personality theory and measure to other relevant personality theories and their respective measures;
- Investigating the international and local application of Cloninger’s Temperament and Character Inventory (TCI); and
- Identifying relevant statistical techniques that would be suitable to adjudicate the utility of personality measures like the TCI to assess personality across different ethnic and gender groups.

These parameters enabled the research proponent to conduct a focussed review on relevant literature. The review indicated among other things that personality assessment measures should adhere to specific guidelines set out by the WHO, EEA and the HSPCA (Government Gazette, 1998; HSPCA, 2005; Richter & Brandstorm, 2009). These guidelines imply that, among other things, the psychometric properties of the TCI should first be explored in an ethnically and gender diverse sample, before any valid comparisons can be derived between such groups on their performance on the TCI.

Ultimately the following research question was structured from the literature review: What are the psychometric properties of Cloninger's Temperament and Character inventory (TCI) in an ethnically and gender diverse sample of South African police trainees? To answer this research in the most comprehensive manner, it is critical that the relevant questions should be converted into hypotheses. Such hypotheses will enable the research proponent to test the statements on the grounds of observable data (Welman & Kruger, 2001). The research hypotheses formulated for this study are as follows:

H1: There will be no evidence of item bias between male and female groups on items of the different sub-scales of the TCI

H2: There will be no evidence of item bias between different ethnic groups on items of the different sub-scales of the TCI

H3: There will be no evidence of construct bias between male and female groups on the different sub-scales of each primary scale of the TCI

H4: There will be no evidence of construct bias between different ethnic groups on the different sub-scales of each primary scale of the TCI

H5: There will be no evidence of construct bias between male and female groups on the seven primary personality scales of the TCI

H6: Temperament as measured by the TCI will produce four unidimensional factors, while character will produce three unidimensional factors in the entire sample of police recruits[2].

All of the hypotheses listed above are derived from Cloninger's bio-social personality theory, which postulates that personality consist of seven factors which are independent of ethnicity and gender (Cloninger et al., 1993). Hence, all hypotheses are intended to test this theory in a diverse South African sample of police trainees. Gender is determined by the participant's physical sexuality, while the participant's ethnic group is indicated by their primary home language.

3.4.3 Procedures design phase

During this phase it is crucial to decide, which observations will be important to answer the research question as comprehensively as possible (Graziano and Raulin, 2000). The TCI is a popular personality measure applied with psychometric success in various international countries; this measure will provide sufficient data to test the research hypotheses. A sample of 1144 individuals will provide enough data to apply appropriate statistical techniques to adjudicate the degree, to which the TCI is a measure that can be used fairly in across different ethnic and gender groups. It should be noted that when the sample is separated into different ethnic groups, the number of participants in each group are too few to establish whether the seven primary scales of the TCI function in an invariant way across these groups. The sizes of the ethnic groups are, however, large enough to test whether the items and the sub-scales of the TCI function in an unbiased manner across both ethnic and gender groups.

3.4.4 Observation phase

According to Graziano and Raulin (2000) this phase involves the operationalization of the procedures identified in the previous section. In other words the subsequent paragraphs will report on the procedures, which were implemented during test administration and data capturing.

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[2] It should be noted that the operational definition of a factor in this case, is a scale which measures a construct in a unidimensional fashion. In other words any scale or sub-scale which items statistics support the unidimensionality of the scale constitutes a single factor.

3.4.4.1 Test Administration

Before any physical data collection occurred, permission was requested and granted by the Pretoria Police training college; where after the research proponent negotiated with the relevant authorities to schedule an appropriate time, venue, and date for test administration. The TCI version nine and two other measures were completed by all participants at the Pretoria police college on 27 July 2007.

The police recruits, who constituted the participants of the study, completed the TCI, WOC and SCL-90 under the supervision and guidance of researchers and trained research assistants. These personal explained the primary purpose of the investigation to all participants and also emphasised the confidential nature of the research results. Finally all the participants were provided with questionnaires, answer sheets, stationary and test instructions before they were assessed in manageable groups of 400.

3.4.4.2 Ethical Considerations during Test Administration

As mentioned in the previous section all participants were informed that the test results will be managed in a confidential manner. The purpose of the project was made explicit to all participants. Adequate opportunity was provided to all participants to ask questions, which were answered appropriately by the research personal. Participants were informed that their participation in this assessment session is voluntary, and that they may decide to withdraw at any time without reporting their reasons for doing so. The research staff facilitating the assessment sessions were professionally trained and able to administer all instruments in an appropriate manner.

The police recruits that comprised the research sample originate from various linguistic backgrounds therefore the research proponent established whether the participants were proficient in English. This in turn enabled the researcher to determine whether participants could complete the assessment battery without the risk that language could confound their test scores. Taking into consideration that all participants recruited into the SAP should be a matriculate who can speak, read and write English, English proficiency is therefore not expected to have a confounding effect on test scores. The sample population also regularly completed similar test batteries during their selection into the SAP, which made them more comfortable within the assessment situation and also possibly decreasing the influence of test anxiety on scores (Whitley, 2002).

Finally the larger research project, in which the current research endeavour is nested, was granted as ethically sound by both the Research Proposal and Ethics Committee of the University of Pretoria as well as the SAP's research and training authorities. Taking into consideration that this study is post-hoc in nature, the research proponent will manage the research process, data analyses and results in such a manner that it will not violate any of the ethical principles undertaken with the participants during the original data collection process.

3.4.5 Data Capturing, Recoding and Formatting

3.4.5.1 Data capturing and recoding

The researcher will only use data derived from the TCI to test the hypotheses of this investigation. The participants test scores on the TCI were captured on a Microsoft excel spread sheet. Data from the TCI was originally captured as 1's and 2's, 1 indicating a true response and 2 a false response, true responses were kept as 1's while false responses were converted from 2's to 0's.

The TCI consist of two types of items, for one group of items the data can be used as it was captured, for example one for true responses and 0 for false responses. However a considerable number of items need to be recoded, recoding applies to items, for which a true response will deduct from a person's score on a construct and a false response will increase a respondent's score on the construct (see Section 3.3.2). These items were reverse coded to arrive at the actual score on each item. This means that for some items 1's were recoded to 0's, while for other items 0's were converted to 1's. The remaining items kept their original 1 or 0 coding values. This data was captured onto a single excel sheet, with rows indicating respondents and columns indicating items.

3.4.5.2 Data formatting and analysis

The TCI consist of seven primary scales each representing a separate personality construct; six of the seven scales also consist of smaller sub-scales (see Section 3.3.1), each of these sub-scales represent one smaller aspect of the primary construct under which it is subsumed (Cloninger et al., 1994). Only the scale measuring the persistence construct is not subdivided into smaller sub-scales.

In order to analyse the data it has to be organised into the correct format, this required that separate data sheets be compiled for each primary scale and their respective sub-scales. To achieve this, data captured in the original excel sheet was copy and pasted into separate excel sheets to represent the data for each of the scales and sub-scales. This process produced 31 excel datasheets (7 sheets for the primary scales and 24 sheets for the each of the sub-scales).

The next step in the formatting process was to generate a data sheet for each of the scales for each ethnic and gender group included in the sample. This means that for each of the seven primary scales and 24 sub-scales, six additional data sheets were created, this process rendered 186 excel data sheets. For example the responses on the HA 1 sub-scale were grouped by the ethnicity of the respondents, which implies that a separate data sheet was created for Nguni-, Xhosa-, Sotho-, and Venda respondent groups. The same process was replicated for male and female groups for both the primary and sub-scales.

This process transformed the original data set into 217 excel data sheets. These data sheets were destined for item analyses conducted in BigSteps and Winsteps (Lincare & Wright, 2003). In order for the data to be converted to an input format, which is readable by the BigSteps program, the data was copied from the excel documents to a Microsoft word processing program called Notepad. Notepad converts text into a format that is readable by MSdos programs like BigSteps. The appropriate analytic commands were added to each of the 217 notepad files, which were then loaded into the BigSteps program (see Figure 4). The Rasch software analysed the data and produced item and person statistics for each of the data sets.

```
control - Notepad
File  Edit  Format  View  Help
; This file is control.txt
&Inst
Title='C1 Social Acceptance vs. Intolerance
NI=8
Item1=6
NAME1=1
Person=Adult
Item=Item
Pffile=control.pf
Ifile=control.if
&END
C 1 (5)
C 1 (16)
C 1 (48)
C 1 (89)
C 1 (122)
C 1 (133)
C 1 (172)
C 1 (234)
End Names
0001     11111111
0002     11010110
0003     10111111
0004     11111110
0005     11111111
0006     11110111
0007     11111110
0008     11111010
0009     11111111
0010     11111111
```

Figure 4: Data Input Format for BigSteps

After the output of the original 31 primary-and sub-scales was evaluated with regards to their dimensionality, the BigSteps output of the other 186 datasets were used in invariance analyses (see Section 3.4.6.1.2) to determine, if any of the primary and sub-scale's functioned different in one group when compared to another. These analyses are also able to show whether items functioned in a variant or invariant manner across groups. Such comparisons are able to illustrate whether a particular item is measuring a certain construct significantly better in one group than in another, which implies that the item might be biased towards one of the groups.

Bond and Fox (2001) recommend that, if such comparisons are made that one anchor group is selected to which all other groups are compared. An anchor group is selected by scrutinizing the size of group and the group's overall performance on the primary or sub-scale. The group with the largest number of respondents and, which data fits the model best (according item infit fit statistics) should be defined as the anchor group (Bond & Fox, 2001). In this case the Sotho and male groups were selected to function as anchor groups for all the ethnic and gender comparisons on all the primary and sub-scales.

This means that the excel data for Venda, Xhosa, and Tsonga groups would be compared to the Sotho group to explore the degree of item and construct bias. Females would be compared to males in order to see, if items are biased with regards to gender or not.

The data necessary for each possible ethnic and gender comparison was extracted from the relevant Rasch outputs (i.e. individual item statistics) and captured in an excel sheet.

These excel sheets has three separate tabs, which functioned as a capturing template for the BigSteps outputs. The first tab was designed to capture the data of the anchor group, while the second tab contained a template in which the data for the comparison group/s could be captured. The third sheet contained a template with excel formulas, which draw on data from the first two tabs (e.g. measurement error and item measure value) to make a comparison and draw a graph plotting the comparative item performance; the invariance analysis sheets for both ethnic and gender comparisons across the primary and sub-scales are presented in Appendix A and B). This process will be discussed in more detail in the following section.

3.4.6 Interpretation phase

According to Mouton (2001) it is considered best practise to illustrate the rationale behind the selection of specific data analytic procedures, which are used to analyse and interpret the captured data. The rationale behind selecting Rasch item analyses to evaluate the factor structure of the TCI and detect item bias was argued in the literature review. The remainder of the section describes the function and application of the analytical techniques used to test the hypotheses of this investigation.

3.4.6.1 Description of Data Analysis Procedures

The data collected from the sample was captured in Microsoft excel and prepared for BigSteps analysis in Notepad. The TCI is scored dichotomously, is not restricted by time, and has adequate internal consistency figures (Arkar et al., 2005; Cloninger et al., 1993; Cloninger et al., 1994; Miettunen et al., 2004; Miettunen et al., 2008), which enables the researcher to apply the Rasch model to analyse the degree of bias with which items, sub-scales, and primary scales function, if any.

The bulk of the analysis will be conducted using a Rasch Software package named BigSteps (Lincare & Wright, 2003). The data of the primary and sub-scales of the entire sample will first be analysed to produce statistics from which it is possible to determine the dimensionality of the data (i.e. fit of the data to the model). In addition some of the general features (validity and reliability) of the primary and sub-scales will also be described by scrutinising additional BigSteps outputs (see Section 4.4.1). After the fit of the data to the Rasch model is evaluated the BigSteps output will be used in invariance analyses to explore item and construct bias for all primary and sub-scales.

3.4.6.1.1 BigSteps Analysis: Reliability and Validity

The BigSteps data analyses produced several statistics, which could be used to assess the general psychometric properties (i.e. reliability, validity and dimensionality) of all the primary and sub-scales for the entire sample.

Foxcroft and Roodt (2005) conceptualises reliability as the degree, to which any measuring instrument measures whatever it measures with the same consistency at each occasion of measurement. With regards to the TCI this means the degree, to which each scale measures its designated construct in a similar manner at different times across different samples. When a scale can consistently repeat the same way of measuring the same construct then reliability is assumed to be high.

When a measure is high in validity, then it accurately measures what it is intended to measure. It could be argued that the relationship between reliability and validity aims to provide information regarding the degree, to which a scale can measure constructs with consistent accuracy. It is noteworthy that reliability is necessary but not sufficient for validity. In the case where a scale constantly measures aspects of a certain construct, which it is not intended to measure then the scale is deemed highly reliable. This constant/repeated incorrect measurement of the unintended aspects of a construct is in turn not high in validity as the accuracy of the measurement is lacking.

The reliability of each of the primary and sub-scales is indicated by the reliability and separation indices for both persons and items. These statistics are presented at the bottom of both the summary of person and item statistic tables (e.g. Table 2 and Table 1). Additional evidence for reliability can be gathered from the person item map presented for each scale (e.g. Figure 2).

Validity is the degree, to which an item and a scale measure what it is supposed to measure (Whitley, 2002). In the literature review it is shown that validity can be seen as the extent, to which a scale and its associated items accurately capture a single construct (Schumaker, 2004). This means that the unidimensionality of a scale also provides an indication of the construct validity of a primary and sub-scale. Unidimensionality was assessed by evaluating the item infit mean square values presented in the individual item statistics table (e.g. Table 6).

The unidimensionality of the seven primary TCI scales indicates whether each of them measure a single construct, which means that this statistics could be used to test the following hypothesis. **H6** - Temperament as measured by the TCI will produce four unidimensional factors, while character will produce three unidimensional factors in the entire sample of police recruits. The rest of the hypotheses regarding construct and item bias is tested with invariance analyses.

3.4.6.1.2 Invariance Analyses

Bond and Fox (2001) describe invariance analysis as an appropriate technique to assess item and construct invariance across different groups from the same sample. In other words this analysis can be applied to assess the degree, to which a set of items on a primary or sub-scale functions invariantly across the ethnic or gender groups under scrutiny. If it is shown that items do not possess invariant properties across groups it means that the items are biased towards a particular group (Bond & Fox, 2001). In the same way it can also be argued that if a significant number of items are not invariant across groups that the primary or sub-scale under scrutiny is biased towards one of the groups (Bond & Fox, 2001). This analysis is used to test the following hypotheses:

> **H1:** There will be no evidence of item bias between male and female groups on items of the different sub-scales of the TCI
>
> **H2:** There will be no evidence of item bias between different ethnic groups on items of the different sub-scales of the TCI
>
> **H3**: There will be no evidence of construct bias between male and female groups on the different sub-scales of each primary scale of the TCI
>
> **H4**: There will be no evidence of construct bias between different ethnic groups on the different sub-scales of each primary scale of the TCI

H5: There will be no evidence of construct bias between males and female groups on the seven primary personality scales of the TCI

Item and scale invariance analysis involves various steps to arrive at an output that displays the invariance. Firstly the two groups of respondents are formed by grouping each group according to trait (e.g. ethnicity or gender) (Bond & Fox, 2001). Hence two sub-samples can be created for respondents from different ethnic or gender groups. A Rasch item analysis is conducted on the data for each of the sub-samples (determined by the different ethnic and gender groups) where after the fit of the data is evaluated (Bond & Fox, 2001).

The item difficulty measures in the Rasch output from each of the two groups are used to plot a point on a graph. The anchor group's item estimate is used for the x-coordinate, while the comparison group's estimate is used for the y-coordinate. Bond and Fox (2001) argue that this is possible because the item measures for both groups are anchored at 0.0 logits. When a diagonal line is drafted through the 0.0 coordinates, it models the ideal slope on which all items should appear if no measurement error were present. Practically this is rarely the case, as measurement is almost never exactly precise and always has some degree of measurement error (Bond & Fox, 2001).

Fortunately the Rasch measurement model provides error estimates for each item, which can be used to graph confidence bands. These 95% confidence bands can illustrate whether the plotted item difficulty points are close enough to the ideal diagonal line, which represents invariant item measurement. If an item is located outside these 95% confidence lines they are considered to be variable, which implies that they may be biased.

Finally these confidence bands also show whether 95% or more items are located inside the boundaries. If more than 5% of items are plotted outside the confidence bands it can be argued that the primary or sub-scale is functioning differently in one group than in another, and does not maintain its measurement properties across groups (Bond & Fox, 2001). This provides some evidence that the scale, which is assessing the construct, might be biased.

It is argued in this dissertation that these standards are extremely sensitive; as a result the criteria for concluding biased measurement were revised to provide a more robust indication of bias (see Section 3.4.6). To establish ethnic bias on an item level, the performance of the item is evaluated in all three ethnic comparisons, if an item behaved in a biased manner in two or more instances the item is considered ethnically biased. To establish ethnic bias on a primary and sub-scale or construct level, the scale's items should function in a biased manner in more than 20% of item comparisons across groups.

A more comprehensive description of the data analysis techniques and the interpretations thereof is provided in Chapter 4.

3.5 CONCLUSION

The methodology described in this chapter will aid the researcher in achieving the objectives outlined in the first chapter. It is shown that the TCI is psychometrically valid and reliable in various homogenous samples, but that these psychometric properties can at this stage not necessarily be extrapolated to a multicultural African sample (Miettunen et al., 2008). Furthermore the majority of the existing evidence on the validity, reliability and factors structures of the TCI was established through statistics derived on CTT, which has multiple limitations.

The TCI is structured in such a manner that statistical analyses based on IRT (e.g. item-and invariance analyses) can explore whether the primary and sub-scales are valid, reliable and non-biased. Finally this chapter illustrates the research protocol employed to operationalise the methodology, which makes the current project transparent and allows other researchers to repeat the research process if necessary.

CHAPTER 4: RESULTS

4.1 OVERVIEW

This chapter presents a compilation of the results derived from the analytical techniques delineated in the methodology chapter (see Section 3.4.6). The discussion presented in this chapter initially focusses on the characteristics of the sample that produced the data for the analyses (see Section 4.2). As mentioned in Chapter 3 all participants were requested to complete a demographic questionnaire and three self-report measures, which included Cloninger's Temperament and Character Inventory (TCI). After the sample description a brief overview of this investigation's analytical objectives are presented (see Section 4.3). The analytical techniques used to achieve these objectives are also discussed.

The remainder of this chapter presents the results of the Rasch and invariance analyses in three major sections, as follows:

1.) Results illustrating the psychometric properties of the TCI's primary and sub-scales are presented in Section 4.4. This section will discuss the reliability, validity and unidimensionality of the respective primary and sub-scales;
2.) Results illustrating the degree of item and sub-scale invariance in ethnic group comparisons are discussed in Section 4.5. The primary purpose of this section is to detect whether sub-scales and their associated items function invariantly across different ethnic groups; and
3.) Results illustrating the degree of primary and sub-scale invariance in gender group comparisons are presented in Section 4.6. This section of the analysis illustrates whether any of the primary or sub-scale's functions invariantly across gender groups.

The chapter will conclude with summaries for each of the seven primary TCI scales and their associated sub-scales and items (see Section 4.7).

4.2 SAMPLE DESCRIPTION

The sample described in the methodology chapter shows that the final research sample consist of 1139 police trainees. The entire sample originates from black African ethnic groups. The number of Sotho respondents comprises the largest ethnic group with 550 individuals. The second largest group is the 202 Venda respondents; followed in size by the Tsonga group who equate to 188 respondents. The Nguni and Ndebele groups have the smallest representation equating to 133 and 66 respondents respectively.

The proportion of each ethnic group is presented in Figure 5 below. It is evident from the figure that respondents from the Sotho grouping constitute the largest proportion of the sample at 48%. Ndebele respondents have the smallest representation as they only constitute 6% of the sample.

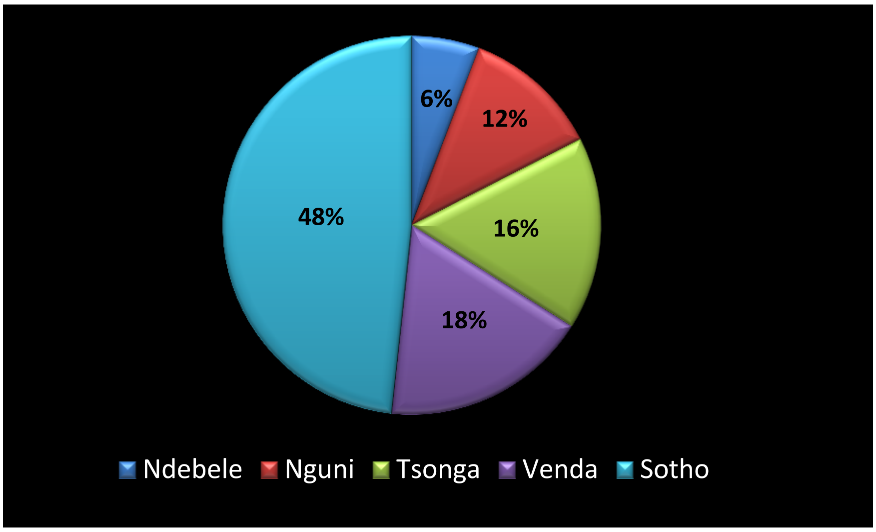

Figure 5: Ethnic Distribution of the Research Sample

Unlike the ethnic distribution displayed above, the gender composition of the sample is more balanced with 646 (57%) males and 493 (43%). The purpose of segregating the sample by ethnicity and gender is to illustrate the major groups for which the data is analysed. The analysis of item functioning utilises comparisons between the functioning of items across the different groups. Due to the extremely small size of the Ndebele group, the group is excluded from the analysis that focusses on how items function across groups. The results derived from the initial psychometric analysis (Section 4.4) are based on data derived from the collective sample.

4.3 STATISTICAL ANANLYSES: OBJECTIVES AND TECHNIQUES

4.3.1 Objectives

The first objective of the analysis is to explore the general psychometric performance (i.e. reliability, validity and dimensionality) of the TCI in a sample of South African police trainees. This objective needs to be pursued before any of the other objectives can be achieved, as the analyses which are necessary to provide the statistics to accomplish the second and third objectives can only be executed if the data rendered by each primary and subscale proves that these scales function in a unidimensional manner (see Section 3.4.6.1). The data necessary to achieve the first objective will render enough evidence to test the following hypothesis: **H6** - Temperament as measured by the TCI will produce four unidimensional factors, while character will produce three unidimensional factors in the entire sample of police recruits. Exploring this hypothesis will show whether the personality facets proposed by Cloninger's personality theory is reproduced by the current sample.

The second objective of the analysis is to determine whether the items associated with the different sub-scales of the TCI are biased to any one of the ethnic groups (Sotho, Tsonga, Venda and Nguni) represented in the sample. In other words does the performance of the TCI's items and sub-scales remain invariant when measuring a certain personality construct among respondents who belong to different ethnic groups? It needs to be noted that unlike the gender groups, the size of the ethnic groups are too small to establish the degree, to which each primary scale as a whole perform invariant across these groups. Hence, invariance analyses on the TCI's primary scales can only be performed between gender groups. The following hypotheses need to be explored before the second objective can be achieved:

H2: There will be no evidence of item bias between different ethnic groups on items of the different sub-scales of the TCI

H4: There will be no evidence of construct bias between different ethnic groups on the different sub-scales of each primary scale of the TCI

The third objective of this investigation is aimed at establishing the degree, to which the primary, sub-scales and items of the TCI performs invariantly across gender groups. It is necessary to explore the following hypotheses before this objective can be achieved:

H1: There will be no evidence of item bias between male and females on items of the different sub-scales of the TCI

H3: There will be no evidence of construct bias between male and females on the different sub-scales of each primary scale of the TCI

H5: There will be no evidence of construct bias between males and females on the seven primary personality scales of the TCI

4.3.2 Analytical Techniques

A Rasch item analysis was conducted on the data of the entire sample filtered by each scale. This analysis produced descriptive statistics, which include reliability-, means-, standard deviations-, point-biserial correlations, standard errors, fit statistics and measure values for both respondents and items. The same analysis was applied to the seven primary scales of the TCI, to evaluate the seven personality factors proposed by Cloninger.

These analyses on both the primary and sub-scales provided information on the general psychometric properties of the TCI. In completing these analyses enough data was rendered to achieve the first objective of this investigation. The discussion of these results is presented in Section 4.4. This analysis also shows whether the data of each scale fits the performance predicted by the Rasch model (i.e. if the data is unidimensional).

After unidimensionality was established for each primary and sub-scale in Section 4.4, separate Rasch item analyses were completed for each ethnic group on all the sub-scales of the TCI. This analysis produced measure estimates, standard errors, and fit statistics for items, which could be imported into an excel spreadsheet specifically designed to execute invariance analyses. Each invariance analysis compared the measurement properties of items and sub-scales in one ethnic group to another. The sheets detailing the ethnic comparison on each sub-scale are presented in Appendix A, while Appendix B present the excel sheets of the gender comparisons on the respective primary and sub-scales. The output of each analysis shows whether an item or sub-scale's measurement properties remained invariant across the two ethnic groups under consideration. This analysis produced tables and graphs for each sub-scale, which illustrated whether items and sub-scale were measuring a certain construct differently in any of the groups. These analyses are presented in section 4.5 and are relevant to the second objective of this investigation.

Invariance analyses were also conducted to establish whether the functioning of items, sub-scales and primary scales are invariant across gender groups. This data will aid in achieving the third objective of this study. Due to the restrictions imposed by the sample size, the invariance analysis of primary scales could only be executed for gender groups as the size of most of the ethnic groups are too small to generate data for valid and reliable invariance comparisons. The results of the analyses on the performance of the gender groups on the primary and sub-scales are presented in Section 4.6.

4.4 THE PSYCHOMETRIC PROPERTIES OF THE TCI'S PRIMARY AND SUB-SCALES

The results presented in this section discusses various statistics, which are necessary to evaluate the general psychometric properties of the TCI's primary and sub-scales. Four outputs derived from Rasch analysis will be interpreted to determine the reliability, validity and unidimensionality of every primary and sub-scale. These outputs include the following:

- The person item map (e.g. Figure 2);
- Summary of respondent statistics (e.g. Table 2);
- Summary of item statistics (e.g. Table 1); and
- Individual item fit statistics (e.g. Table 6).

The person item map (e.g. Figure 2) provides the following information about the performance of a scale and its corresponding items. Firstly it shows the sample's distribution on the measured construct on the left hand side, and item difficulty distribution on the right hand side. Items located at higher logit values are more difficult for respondents to endorse in a manner that will increase their standing on the construct, while persons located at high logit values are supposed to have a higher inherent level of the measured construct (Bond & Fox, 2001; Maree, 2004). The respondent- and item logit locations are directly equivalent to their measure values indicated in the respondent-and item summary tables. The person item map also indicates the mean of the respondent's standing on the construct as well as the item difficulty mean. These means are indicated by an 'M' on either side of the figure, one and two standard deviations are respectively indicated by an 'S' and 'Q' for both the respondent and item mean (Bond & Fox, 2001; Lincare & Wright, 2003).

Ideally a person item map should have a normal distribution of respondents (Bond & Fox, 2001), which cluster around the mean on the one side, and an even distribution of items over the entire construct range on the other side. These two distributions should preferably show a considerable overlap with each other. When interpreting person item map it is important to report and discuss the following; gaps in the item distribution, clustering or duplication of items, clustering of respondents at the top or bottom of the scale, and the degree to which the item and respondent distribution overlaps (Bond & Fox, 2001; Maree, 2004; and Smith, 2002).

The summary of respondent statistics (e.g. Table 2) contains information regarding the inherent construct level, which was measured in the sample, while the item summary table (e.g. Table 1) illustrates information regarding average functioning of the particular scale's items. Both these tables have similar headings. The raw score heading shows the average number of responses that are correct, correct responses on a personality scale are those responses that increases a respondent standing on the construct. The count heading indicates the total number of responses; this number is usually equal to the number of items on a scale (Maree, 2004). In the item table (see Table 1) the count heading is the number of persons who endorsed the item. The measure heading in the two tables is the quantification of both the measured construct level and the scale's difficulty level. As discussed earlier both the infit and outfit statistics indicate whether the actual interaction between persons and items fits the functioning predicted by the Rasch model.

In the respondent-and item statistic tables, the mean, standard deviation, minimum and maximum values are presented (see Table 1 and Table 2). At the bottom of both tables a model Root Mean Squared Error (RMSE) and real RMSE statistic are presented. These are reliability indications for both the sample-and item distribution. More robust reliability values are calculated and presented at the bottom of both item and respondent summary tables (this statistic is similar to a Cronbach Alpha statistic). The person-and item separation statistics is also calculated for the group of items and respondents.

Finally the individual item fit statistics (see Table 6) indicates whether all the individual items of a sub-scale possess a single line of inquiry. The item infit Mean square (Mnsq) needs to be scrutinised to evaluate unidimensionality (see Section 2.9.6). A scale is considered unidimensional if all the items included in the sub-scale have item infit Mnsq values which fall between 0.6 and 1.4 (Bond & Fox, 2001; Maree, 2004; and Smith, 2002). Table 3 below summarizes the meaning of the statistics presented in the BigSteps outputs presented for each of the primary and sub-scales in the Section 4.4

Table 3: Interpretation of Rasch Statistics and Observations

Table/Figure	Observation/Observation	Meaning and Interpretation	Recommendation
Person item map (e.g. Figure 6)	Respondents cluster at the top of the logit scale.	Ceiling effect created by a shortage of items to assess a sample with a high average level of the measured construct.	Creation of new items, or modification of existing items in order to represent the higher logit range of the construct.
	Respondents cluster at the bottom of the logit scale.	Floor effect created by a lack of items to assess a sample with a low average level of the measured construct.	Creation of new items, or modification of existing items in order to represent the lower logit range of the construct.
	Gap/s in the item distribution along the construct range.	The entire range of the construct is not comprehensively evaluated, may increase the standard error associated with the scale.	Create new items or modify existing items to populate the unpopulated area of the construct continuum.
	Clustering or duplication of items at similar logit values	Over representation of items at a certain logit location provide no extra information and can artificially confound the standard error associated with the scale.	Surplus items can either be deleted, or modified to represent areas in the item construct continuum that are not populated (i.e. aforementioned gaps)
Respondent summary fit statistics (e.g. Table 4)	Person Measure	When the mean person measure value is high, it means that the inherent construct level in the sample is also high. The minimum, maximum and standard deviation values indicate the variability in the measure value.	N/A
	Infit MNSQ values	When infit minimum and maximum values are far from one (i.e. 0.20 and 3 respectively), it means that there are response patterns that are too predictable.	N/A
	Outfit MNSQ values	When outfit minimum and maximum values are far from one (e.g. 0.19 and 6 respectively), it implies that there are outlying response patterns that are extremely irregular.	N/A
	Model RMSE or Real RMSE	Indicates how the set of items was able to separate the sample on the continuum of the construct. Low person reliability means that the respondents did not respond in a consistent manner to the items. This indicates a problematic fit between person response patterns and the patterns predicted by the model.	N/A
	Person Separation Reliability	The higher the value of the person separation reliability value, the more confidence can be assigned to the separation of respondent scores along the continuum of the measured construct (Bond & Fox, 2001).	N/A
Item summary fit statistics (e.g. Table 5)	Person Measure	When the mean item measure value is high, it means that the average item difficulty level is also high. The minimum, maximum and standard deviation values indicate the variability in the item measure value.	N/A
	Infit MNSQ values	The mean should be close to the expected value of one. If the value is below one it shows dependency in the data, if it is greater than one it indicates noise in the data.	N/A
	Outfit MNSQ values	When outfit minimum and maximum values are far from one (e.g. 0.19 and 6 respectively). It means that there are outlying response patterns that are extremely irregular.	N/A
	Model or Real RMSE	Provide an indication of how the items of a scale are spread out along the continuum of the construct.	An item reliability statistic close to one means that the items performed in a reliable manner across different respondents.
	Person Separation Index/ G-value	A high G value means that item logit measures are more spread out along the continuum of the construct, if a low G value is rendered it means that the dispersion of person logit measures is restricted.	
Individual Item Fit statistics (e.g. Table 6)	Measure	The higher the measure statistic associated with an item the greater the difficulty of the item. In other words only people with high levels of the measured construct will endorse the item in such a manner that will increase their standing on the construct.	
	Infit MNSQ	Items with infit values between 0.6 and 1.4 fit the Rasch model. Values larger than 1.4 are indicative of items that did not function as predicted by the model. Values smaller than 0.6 are too predictable.	If most items fall within the acceptable infit range, the scale can be considered unidimensional as all the items possess a single line of inquiry.
	Point-biserial Correlation or PTBIS	Represents a correlation between the total item score and the item score. Negative/low values may indicate reverse coding, which might cause the item to not correlate with the rest of the scale. In the last case a negative point-biserial value decreases the unidimensionality of the scale.	Point biserial correlations are considered high when they exceed 0.3 Negative values should be inspected for problematic scoring like reverse coding.

4.4.1 Psychometric Properties of the Novelty Seeking Scale and its Sub-Scales

The novelty seeking scale (NS) consists of four sub-scales: exploratory excitability versus (vs.) stoic rigidity scale (NS 1); impulsiveness vs. reflection scale (NS 2); extravagance vs. reserved scale (NS 3); and disorderliness vs. regimentation scale (NS 4). A Rasch item analysis was conducted on the data derived from the primary scale as well as each of the sub-scales. The results illustrating the psychometric properties for the primary scale is presented first, where after the psychometric properties of each sub-scale are discussed in designated sections (see sections 4.4.1.2-4.4.1.5). The person item map, respondent summary fit statistics, item summary fit statistics and individual item fit statistics are discussed for each scale. The items constituting each sub-scale are also listed. The discussion of the psychometric characteristics for remaining of the seven primary scales will also follow the same structure.

4.4.1.1 <u>Primary Novelty Seeking Scale (NS)</u>

Figure 6 shows that both the respondent and item distribution is relatively normal and overlaps considerably, which means the items are relatively well suited to measure the inherent construct level among the sample. Relatively few gaps exist along the participant distribution, which illustrates that the NS scale is well suited to assess the relatively narrow range of the construct.

It is noteworthy that multiple item clusters exist along the item distribution, for instance the shared logit location of the following items NS1 (167), NS1 (29), NS 3 (174), NS 4 (110) and NS 4(204). Duplication of items or overpopulated item clusters provide little extra information about the sample's standing on the construct and can artificially confound the standard error associated with the scale. It is recommended that some of these items should be altered to eventually appear in a logit range where little or no items are present. This will allow the scale to assess the construct with greater precision.

```
ADULTS                                 MAP OF ITEMS
            <frequ>|<less>
  4                +
                   |
                   |
                   |
                   |
                   |
                   |  NS 2 (82)
  3                +Q
                   |  NS 2 (237
                   |
                   |
                   |
                   |
                   |  NS 2 (148)
  2                +
                   |  NS 3 (41)
                .  |
                   |S NS 3 (155)
                   |  NS 2 (203) NS 4 (141) NS 4 (53)
                   |  NS 3 (109  NS 4 (183)
                .  |
  1             .  +
                .  |  NS 2 (61)  NS 3 (192)
                .  |  NS 3 (19)  NS 4 (34)
                .  |  NS 1 (52)  NS 1 (99)
              .# Q|  NS 1 (114) NS 3 (139)  NS 4 (91)
              .#   |  NS 2 (130) NS 4 (79)
             .##   |
  0        .####   +M NS 4 (165)
          .##### S|  NS 3 (219)
        .#######   |  NS 2 (13)  NS 2 (35)
   .############   |  NS 2 (108)
                   |
   .############ M|  NS 4 (212)
    .###########   |
 -1  .##########   +
       .########   |
         .###### S|  NS 3 (66)
                   |  NS 1 (167) NS 1 (29)  NS 3 (174) NS 4 (110) NS 4(204)
            .###   |S NS 2 (187)
             .## Q|
                .  |
 -2                +
                .  |  NS 1 (144) NS 1 (211)
                   |  NS 1 (70)
                .  |
                   |
                   |
                   |  NS 1 (238)
 -3                +Q
                   |
                   |  NS 1 (191)
                   |
                   |
                   |
                   |
 -4                +
             <rare>|<more>
```

Figure 6: Person Item Map

The mean measure value of -0.70 presented in Table 4, shows that the sample has a low average standing on the NS construct. The minimum, maximum and standard deviation values show that the construct has a range of just more than 4 logits (respondent measure values range from -2.39 to 1.71) and that the construct level varies to a certain degree. The mean infit and outfit mnsq values all fall within the acceptable range of 0.6 and 1.4 mnsq, which indicate that respondent response patterns are well behaved. The person separation value of 0.84 shows that relatively high confidence can be placed in the relatively narrow separation of the respondent groupings illustrated by Figure 6.

The low person reliability (0.42) presented in Table 4 below points out that a large number of the respondents did not respond in a reliable fashion to the set of items.

Table 4: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	14.9	39.0	-.70	.41	1.00	-.1	.99	-.2
S.D.	3.3	.0	.53	.02	.27	1.3	.48	1.1
MAX.	30.0	39.0	1.71	.51	2.26	5.5	4.41	5.1
MIN.	6.0	39.0	-2.39	.39	.43	-3.5	.32	-2.5
REAL RMSE	.43	ADJ.SD	.32	SEPARATION	.74	ADULT	RELIABILITY	.36
MODEL RMSE	.41	ADJ.SD	.34	SEPARATION	.84	ADULT	RELIABILITY	.42
S.E. OF ADULT MEAN	.02							

Table 5: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	435.8	1144.0	.00	.08	1.00	.1	.99	.1
S.D.	304.9	.0	1.53	.03	.03	1.1	.09	1.5
MAX.	1058.0	1144.0	3.16	.20	1.06	2.3	1.15	3.9
MIN.	27.0	1144.0	-3.32	.06	.90	-2.5	.68	-3.1
REAL RMSE	.09	ADJ.SD	1.52	SEPARATION	17.46	ITEM	RELIABILITY	1.00
MODEL RMSE	.09	ADJ.SD	1.52	SEPARATION	17.51	ITEM	RELIABILITY	1.00
S.E. OF ITEM MEAN	.25							

The mean construct level (-0.70) indicated in Table 4 is far lower than the mean novelty seeking measure value of zero (Table 5); this difference implies that on average the items of the NS scale are not too difficult for the current sample to endorse in such a manner that it will increase their standing on the construct. The infit mnsq statistics provided in Table 5 and Table 6 all range between 0.6 and 1.4, which points out that the entire NS scale is measuring a single unidimensional construct. It could be argued that the four NS sub-scales (NS 1, NS 2, NS 3 and NS 4) all contribute to the measurement of one greater construct. The point-biserial correlations presented in the table below shows that all the items rendered positive values, which offers additional evidence that the novelty seeking scale measures a unidimensional factor.

Table 6: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
14	27	1144	3.16	.20	.96	-.2	.68	-1.7	.21	NS 2 (82)
20	36	1144	2.86	.17	.98	-.1	.96	-.2	.14	NS 2 (237)
17	69	1144	2.17	.13	1.00	.0	1.00	.0	.12	NS 2 (148)
22	90	1144	1.88	.11	.96	-.5	.88	-1.2	.24	NS 3 (41)
26	112	1144	1.63	.10	.95	-.7	.82	-2.0	.29	NS 3 (155)
19	136	1144	1.41	.09	.99	-.1	.95	-.6	.19	NS 2 (203)
31	139	1144	1.38	.09	1.00	.0	.99	-.1	.17	NS 4 (53)
35	139	1144	1.38	.09	.99	-.1	.98	-.3	.19	NS 4 (141)
24	144	1144	1.34	.09	.91	-1.4	.78	-3.0	.37	NS 3 (109)
37	152	1144	1.28	.09	1.01	.2	1.00	.1	.16	NS 4 (183)
28	204	1144	.92	.08	.90	-2.1	.83	-3.1	.40	NS 3 (192)
13	219	1144	.82	.08	.99	-.2	.97	-.6	.23	NS 2 (61)
21	233	1144	.74	.08	1.01	.1	1.04	.8	.18	NS 3 (19)
30	233	1144	.74	.08	1.00	.1	1.02	.4	.20	NS 4 (34)
2	260	1144	.60	.07	.98	-.6	.94	-1.2	.27	NS 1 (52)
4	274	1144	.53	.07	1.01	.2	1.01	.3	.20	NS 1 (99)
33	290	1144	.45	.07	.97	-.9	.95	-1.3	.28	NS 4 (91)
25	305	1144	.37	.07	.94	-2.0	.91	-2.4	.35	NS 3 (139)
5	307	1144	.36	.07	1.00	.1	1.00	-.1	.22	NS 1 (114)
16	313	1144	.34	.07	1.01	.4	1.01	.2	.21	NS 2 (130)
32	336	1144	.23	.07	1.03	.9	1.04	1.1	.18	NS 4 (79)
36	377	1144	.06	.06	1.03	1.1	1.04	1.3	.18	NS 4 (165)
29	437	1144	-.19	.06	.95	-2.5	.95	-2.3	.33	NS 3 (219)
11	463	1144	-.29	.06	1.03	1.6	1.03	1.3	.19	NS 2 (13)
12	478	1144	-.35	.06	1.04	2.1	1.04	2.2	.18	NS 2 (35)
15	513	1144	-.48	.06	1.03	2.1	1.04	2.3	.18	NS 2 (108)
39	567	1144	-.68	.06	1.03	1.8	1.03	1.5	.20	NS 4 (212)
23	721	1144	-1.27	.06	1.02	.9	1.04	1.5	.20	NS 3 (66)
27	746	1144	-1.37	.06	1.01	.5	1.02	.9	.21	NS 3 (174)
1	756	1144	-1.41	.06	1.01	.3	1.01	.3	.22	NS 1 (29)
7	759	1144	-1.42	.06	1.01	.3	1.02	.8	.21	NS 1 (167)
38	771	1144	-1.47	.06	1.06	2.3	1.12	3.9	.10	NS 4 (204)
34	778	1144	-1.50	.07	1.04	1.7	1.08	2.4	.14	NS 4 (110)
18	779	1144	-1.50	.07	.98	-.9	.98	-.5	.26	NS 2 (187)
9	910	1144	-2.13	.07	1.00	-.1	1.02	.3	.20	NS 1 (211)
6	916	1144	-2.17	.08	1.04	1.0	1.12	2.2	.09	NS 1 (144)
3	933	1144	-2.27	.08	.99	-.2	1.02	.3	.21	NS 1 (70)
10	1016	1144	-2.87	.10	1.01	.2	1.15	1.7	.10	NS 1 (238)
8	1058	1144	-3.32	.11	.99	-.1	1.05	.4	.13	NS 1 (191)
MEAN	436.	1144.	.00	.08	1.00	.1	.99	.1		
S.D.	305.	0.	1.53	.03	.03	1.1	.09	1.5		

The evidence presented above suggests that several items of the NS scale are surplus and should either be deleted or modified to occupy under represented logit regions, however, this should be done with caution as it can influence the functioning of the items within their respective sub-scales. The NS scale rendered a high person reliability value, which means that a high confidence value can be attributed to the respondent distribution on the construct. Similarly the item separation and reliability are high, which means that it is likely that the same item hierarchy can be expected in future test administrations. Finally the NS scale is proven to be unidimensional, which means that the scale exclusively measures one construct. The unidimensionality of the scale supports both the construct and content validity of the scale. The four sub-scales comprising the primary NS scale is discussed in turn below.

4.4.1.2 Exploratory Excitability vs. Stoic Rigidity (NS 1)

The following items comprise the NS 1 sub-scale:

NS1 (1) – I often try new things just for fun or thrills, even if most people think it is a waste of time.

NS 1 (29) – I like old “tried and true” ways of doing things much better than trying “new and improved” ways.

NS 1 (52) – In conversations I am much better as a listener than as a talker.

NS 1 (70) – I like to stay at home better than to travel or explore new places.

NS 1 (99) – I have a reputation as someone who is very practical and does not act on emotion.

NS 1 (114) – I usually demand very good practical reasons before I am willing to change my old ways of doing things.

NS 1 (144) – I hate to change the way I do things, even if many people tell me there is a new and better way to do it

NS 1 (167) – I prefer to start conversations, rather than waiting for others to talk to me.

NS 1 (191) – I like to explore new ways to do things.

NS 1 (211) – I am slower than most people to get excited about new ideas and activities.

NS 1 (238) – When nothing new is happening; I usually start looking for something that is thrilling or exciting.

Figure 7 below shows that the sample and item distribution rendered by the NS 1 scale overlaps considerably, which means the items are relatively well suited to measure the inherent construct level among the sample. Although the participants form a relatively normal distribution, multiple gaps exist along the item distribution. Due to these gaps the items of the NS 1 sub-scale are unable to assess the entire continuum of the construct with precision. Multiple items are also located at the same logit values as other items. For example NS 1 (1) and NS 1 (144) are located at the same logit location; this is also the case for NS 1 (114) and NS 1 (191).

Duplication of items or overpopulated item clusters provides little extra information about the samples standing on the construct and can artificially confound the standard error associated with the scale. It is recommended that some of these items should be altered to eventually appear in a logit range where little or no items are present. This will allow the scale to assess the construct with greater precision. For example if a participant has a construct level equal to one logit, there are no items located in that range for the NS 1 scale to assess that particular level of the construct with the necessary accuracy. It is recommended that items should be more evenly distributed along the logit scale.

```
ADULTS                               MAP OF ITEMS
              <frequ>|<less>
    4             .  +
                     |
                     |
                     |
                     |
                     |
                     |
                .##  |Q
    3               Q+
                     |
                     |
                     |
                     |
                     |  NS1(29)
                     |  NS1(70)
          .########  |
    2                +  NS1(99)
                    S|
                     |
                     |S
                     |
                     |
       .###########  |
                     |
    1                +
                     |
                    M|
                     |
      .############  |
                     |
                     |
                     |
    0                +M NS1(1)    NS1(144)
          .########  |
                    S|
                     |
                     |
                     |
               .###  |
                     |  NS1(114)  NS1(191)
   -1                +  NS1(52)
                     |
                     |
                 .# Q|
                     |
                     |S NS1(211)
                     |
                     |
   -2             .  +
                     |  NS1(167)
                     |
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                     |
   -3             .  +
               <rare>|<more>
```

Figure 7: Person Item Map

Table 7: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	6.3	10.0	.81	.86	.99	-.2	1.03	-.2
S.D.	1.5	.0	1.08	.09	.49	1.1	1.04	1.0
MAX.	9.0	10.0	3.12	1.15	2.94	3.5	9.90	3.3
MIN.	1.0	10.0	-2.94	.77	.28	-2.0	.22	-1.4

REAL RMSE	.95	ADJ.SD	.52	SEPARATION	.55	ADULT RELIABILITY	.23
MODEL RMSE	.87	ADJ.SD	.64	SEPARATION	.74	ADULT RELIABILITY	.35
S.E. OF ADULT MEAN	.03						
WITH 5 EXTREME ADULTS = 1144 ADULTS		MEAN	.81	S.D.	1.10		
REAL RMSE	.95	ADJ.SD	.56	SEPARATION	.59	ADULT RELIABILITY	.26
MODEL RMSE	.87	ADJ.SD	.67	SEPARATION	.77	ADULT RELIABILITY	.37

The mean measure value of 0.81 in presented Table 7 shows that the sample has a low average standing on the construct. The minimum, maximum and standard deviation values shows that the construct has a range of almost six logits and that the construct level does not vary considerably. The mean infit and outfit mnsq values al fall within the acceptable range of 0.6 and 1.4 mnsq, which indicates that respondent response patterns behaved according to the model's predictions. The person separation value (0.77) reflects the relatively narrow separation of the different ability groups illustrated in the person item map. The low reliability (0.37) points out that a large number of the respondents did not respond in a reliable fashion to the set of items. This implies that not much confidence can be ascribed to the person distribution on the construct.

Table 8: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	714.9	1139.0	.00	.08	.99	-.2	1.04	.3
S.D.	300.9	.0	1.56	.01	.06	1.4	.12	1.5
MAX.	1054.0	1139.0	2.32	.12	1.10	2.5	1.25	2.8
MIN.	256.0	1139.0	-2.16	.07	.92	-2.8	.88	-2.6

REAL RMSE	.08	ADJ.SD	1.56	SEPARATION	18.43	ITEM RELIABILITY	1.00
MODEL RMSE	.08	ADJ.SD	1.56	SEPARATION	18.63	ITEM RELIABILITY	1.00
S.E. OF ITEM MEAN	.52						

It is evident from the mean measure value presented in Table 7 that the item difficulty of 0.00 is relatively well matched to the sample mean of 0.81. This indicates that items are not too difficult for the sample to endorse, in a manner that will increase their standing on the construct. Infit and outfit mnsq values all fall within the acceptable range of 0.6 and 1.4, which indicates that the item performance patterns does not deviate significantly from the model's predictions. Both the item separation (18.63) and item reliability (1.00) values are higher than the person separation and reliability values. This means that despite the duplication of items at similar logit values, the NS 1 items are more spread out on the construct than respondents. The high reliability value means that when this set of items are administered to another sample it is highly likely that item performance will be repeated and that the same item hierarchy will be generated.

Table 9 below presents the individual item statistics for the NS 1 sub-scale and shows that item NS 1 (29) is the most difficult item, with a measure value of 2.32, which implies that participants with a similar logit level of the construct are expected to endorse this item in a manner that will increase their standing on the construct. It is also evident from the table that all items have small error estimates, which is desired. The individual infit mnsq values for all items range between 0.6 and 1.4. These item infit mnsq values indicate that the items comprising the NS 1 sub-scale have a single line of inquiry, which supports the conclusion that the NS 1 sub-scale is unidimensional. The point-biserial correlation figures for all items are illustrated in the second last column; all of these values, except for NS 1 211 and 167, are high.

Table 9: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
10	1012	1139	-1.67	.10	1.08	1.2	1.25	1.8	A .22	NS1(211)
4	270	1139	2.23	.08	1.10	2.5	1.21	2.8	B .31	NS1(70)
2	256	1139	2.32	.08	.99	-.1	1.10	1.3	C .38	NS1(29)
8	1054	1139	-2.16	.12	.97	-.3	1.09	.5	D .28	NS1(167)
7	755	1139	-.03	.07	1.02	.8	1.04	.7	E .39	NS1(144)
6	912	1139	-.88	.08	.98	-.4	1.02	.2	e .38	NS1(114)
5	303	1139	2.05	.07	.97	-.8	1.01	.1	d .42	NS1(99)
9	906	1139	-.84	.08	.96	-.9	.93	-.9	c .40	NS1(191)
3	929	1139	-1.00	.08	.94	-1.3	.90	-1.1	b .40	NS1(52)
1	752	1139	-.02	.07	.92	-2.8	.88	-2.6	a .48	NS1(1)
MEAN	715.	1139.	.00	.08	.99	-.2	1.04	.3		
S.D.	301.	0.	1.56	.01	.06	1.4	.12	1.5		

The evidence presented above suggest that several items of the NS 1 scale are surplus and should either be deleted or modified to occupy under represented logit regions. Both the person separation and reliability values are extremely low, which means that relatively little confidence can be ascribed to the current distribution of persons on the construct. On the other hand item separation and reliability are high, which means that it is probable that the same item hierarchy can be expected in future test administrations. Finally the NS 1 scale is proven to be unidimensional, which means that the scale exclusively measured one construct. The unidimensionality of the scale supports both the construct and content validity of the scale.

4.4.1.3 Impulsiveness vs. Reflection (NS 2)

The following items comprise the NS 2 sub-scale:

NS 2 (13) – I often do things based on how I feel at the moment without thinking about how they were done in the past.

NS 2 (35) – It is difficult for me to keep the same interests for a long time because my attention often shifts to something else.

NS 2 (61) – I like to think about things for a long time before I make a decision.

NS 2 (82) – I usually think about all the facts in detail before I make a decision.

NS 2 (108) – I hate to make decisions based only on my first impressions.

NS 2 (130) – I often follow my instincts, hunches or intuition without thinking through all the details.

NS 2 (148) – I like to pay close attention to details in everything I do.

NS 2 (187) – I like to make quick decisions so I can get on with what has to be done.

NS 2 (203) – I nearly always think about all the facts in detail before I make a decision, even when other people demand a quick decision.

NS 2 (237) – I like to read everything when I am asked to sign any papers.

```
       ADULTS                        MAP OF ITEMS
              <frequ>|<less>
    4                +
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                     |
                     |
                     |
                     |Q
                  .  |
    3                +
                     |
                     |
                     |  NS 2 (82)
                     |
                     |  NS 2 (237)
                  .  |
    2                +
                     |
                     |S
                     |  NS 2 (148)
                     |
                  .  |
                     |
    1                +
                     |
                     |  NS 2 (203)
                  .  |
                    Q|
                     |
                     |
    0           ###  +M NS 2 (61)
                     |
                     |
                     |  NS 2 (130)
                    S|
         .#########  |
                     |
   -1                +
                     |  NS 2 (13)
      .############  |  NS 2 (35)
                     |  NS 2 (108)
                    M|
                     |S
   -2 .############  +
                     |
                     |
                     |
                    S|
                     |  NS 2 (187)
                     |
   -3     .########  +
                     |
                     |Q
                    Q|
                     |
                     |
                     |
   -4           .##  +
               <rare>|<more>
```

Figure 8: Person Item Map

The person item map for the NS 2 sub-scale shows that the majority of the sample cluster around the mean, this is indicative of a normal distribution. Figure 8 also illustrates that the majority of the respondent distribution overlaps with the item distribution. Hence, the items which comprise the NS 2 sub-scale are relatively well suited to assess the construct range in the current sample. It is important to note that except for the relative lack of items at the bottom end of the scale there are no other excessive gaps in the item distribution.

Numerous items are located at logit locations, which are not conducive in assessing the entire range of the construct among the sample. Items NS 2 (82), NS 2 (237), NS 2 (148), and NS 2 (203) are all located at the top end of the logit scale where only a small number of participant's construct levels are situated. This gives an indication that four of the ten items are off target, as they are too difficult to endorse for the majority of the sample. Although these items have little utility in separating the majority of the current sample along the construct continuum, they could be useful in other samples where the average standing on the NS 2 construct is higher.

NS 2 (108), NS 2 (35) and NS 2 (13) share a very similar logit location, which limits their capacity to differentiate between participants with different levels of the NS 2 construct. It is recommended that two of these items should be adjusted so they can assess the construct at the lower end of the scale where only one item is plotted.

Table 10: Summary of Respondent Statistics

```
+-----------------------------------------------------------------------------+
|          RAW                          MODEL         INFIT        OUTFIT     |
|         SCORE     COUNT    MEASURE    ERROR      MNSQ    ZSTD   MNSQ   ZSTD |
|-----------------------------------------------------------------------------|
| MEAN       2.8      10.0     -1.56      .89      1.01     -.1    .98    -.2 |
| S.D.       1.3        .0       .97      .12       .39      .9   1.15     .7 |
| MAX.       9.0      10.0      3.15     1.15      2.79     3.2   9.90    3.3 |
| MIN.       1.0      10.0     -3.07      .79       .40    -1.8    .22   -1.4 |
|-----------------------------------------------------------------------------|
| REAL RMSE    .97  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00 |
|MODEL RMSE    .90  ADJ.SD     .35  SEPARATION   .39  ADULT  RELIABILITY  .13 |
| S.E. OF ADULT  MEAN    .03                                                  |
| WITH     57 EXTREME ADULTS  =  1144 ADULTS   MEAN    -1.68  S.D.    1.07     |
| REAL RMSE   1.01  ADJ.SD     .37  SEPARATION   .36  ADULT  RELIABILITY  .12 |
|MODEL RMSE    .94  ADJ.SD     .51  SEPARATION   .55  ADULT  RELIABILITY  .23 |
+-----------------------------------------------------------------------------+
```

The respondent mean measure value (-1.56) in Table 10 shows that the sample has a very low standing on the NS 2 construct. The minimum, maximum and standard deviation values show that the construct has a range of just more than six logits and that there is no excessive variation in the construct level between respondents. The minimum infit mnsq value of 0.4 indicate too well behaved response patterns for some persons, while the maximum infit mnsq value of 2.79 point to individual response patterns that did not behave as the model predicted. The extremely high outfit mnsq value (9.9) provides evidence for the fact that multiple individuals have very atypical response patterns to items far removed from their ability.

The very low reliability (0.23) indicates that the majority of the respondents did not respond in a reliable fashion to the items of the NS 2 scale. This means that not much confidence can be ascribed to the person distribution on the construct.

Table 11: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	303.3	1087.0	.00	.10	.99	.0	.98	.4
S.D.	237.5	.0	1.64	.05	.07	1.7	.21	2.2
MAX.	779.0	1087.0	2.57	.20	1.10	4.0	1.26	4.9
MIN.	27.0	1087.0	-2.67	.07	.86	-2.6	.43	-2.5

REAL RMSE .11	ADJ.SD 1.64	SEPARATION 14.45	ITEM	RELIABILITY 1.00
MODEL RMSE .11	ADJ.SD 1.64	SEPARATION 14.54	ITEM	RELIABILITY 1.00
S.E. OF ITEM MEAN .55				

It can be concluded from Table 11 that the NS 2 measure is slightly too difficult for the current sample to endorse in a manner that will increase their standing on the construct, as the average respondent construct level (-1.56) indicated in Table 10 is considerably lower than the mean item measure value of zero. This is also evident in the person item map illustrated in Figure 8, which shows that four of the ten items are targeted to measure a construct level that is greater than the average construct level in the sample. The mean mnsq infit and outfit values presented in Table 10 shows that on average responses to the items of the NS 2 sub-scale conformed to the responses predicted by the Rasch model. Hence most of the items in the sub-scale are performing according to their predicted item difficulty.

Unlike the low person separation and reliability values, item separation and reliability statistics are high at 14.45 and 1.00 respectively. This indicates that despite the clustering of items at similar logit values, the NS 2 items are on average more spread out on the construct than the respondents. The high reliability value means that when this set of items is administered to another sample it is likely that the item performance will be repeated and that the same item hierarchy will be created.

Table 12 shows that items NS 2 (82) and NS 2 (237) are the two most difficult items of this scale, these two items also produced the highest error estimates. This is expected as these items are located at the top end of the person item map. It can be concluded from the individual item infit mnsq statistics presented in Table 12 that all the items have a uniform line of enquiry. All item infit mnsq values are located within the acceptable range of 0.6 and 1.4. Hence, it is argued that the ten NS 2 items measures one construct and that the NS 2 sub-scale is unidimensional in nature.

Table 12: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.		ITEMS
7	69	1087	1.52	.13	1.06	.5	1.26	1.4	A	.18	NS 2 (148)
5	513	1087	-1.43	.07	1.10	4.0	1.18	4.9	B	.36	NS 2 (108)
2	478	1087	-1.28	.07	1.04	1.8	1.12	3.3	C	.40	NS 2 (35)
6	313	1087	-.49	.07	1.00	.1	1.01	.2	D	.39	NS 2 (130)
3	219	1087	.05	.08	.99	-.2	.99	-.1	E	.35	NS 2 (61)
10	36	1087	2.25	.17	.97	-.2	.98	-.1	e	.18	NS 2 (237)
9	136	1087	.70	.10	.95	-.7	.97	-.3	d	.32	NS 2 (203)
1	463	1087	-1.21	.07	.96	-1.7	.97	-.9	c	.46	NS 2 (13)
8	779	1087	-2.67	.07	.92	-2.6	.89	-2.0	b	.54	NS 2 (187)
4	27	1087	2.57	.20	.86	-.8	.43	-2.5	a	.28	NS 2 (82)
MEAN	303.	1087.	.00	.10	.99	.0	.98	.4			
S.D.	238.	0.	1.64	.05	.07	1.7	.21	2.2			

The evidence presented suggest that several items of the NS 2 scale cluster together and should either be deleted or modified to occupy the lower logit regions of the scale. Both the person separation and reliability values are extremely low, which means that relatively little confidence can be ascribed to the current distribution of persons on the construct. On the other hand item separation and reliability are high, which points out that it is likely that the same item hierarchy can be expected in future test administrations. Finally the NS 2 sub-scale is proven to be unidimensional, which means that the scale exclusively measures a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

4.4.1.4 Extravagance vs. Reserve (NS 3)

The following items comprise this sub-scale:

NS 3 (19) – I am much more reserved and controlled than most people.

NS 3 (41) – I often spend money until I run out of cash or get into debt from using too much credit.

NS 3 (66) – It is hard for me to enjoy spending money on myself, even when I have saved plenty of money.

NS 3 (109) – I prefer spending money rather than saving it.

NS 3 (139) – I am better than saving money than most people.

NS 3 (155) – Because I so often spend too much money on impulse, it is hard for me to save money – even for special plans like a vacation.

NS 3 (174) – It is fun for me to buy things for myself.

NS 3 (192) – I enjoy saving money more than spending it on entertainment and thrills.

NS 3 (219) – Some people think I am too stingy or tight with my money.

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       ADULTS                         MAP OF ITEMS
               <frequ>|<less>
     3             .  +
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                   .  |
                   .  |
                      |
                      |Q
     2                +
                      |
                      |
                      |
                      |
                   .  |  NS 3 (41)
                      |
                   .  |
                      |  NS 3 (155)
                      |
     1                +S
                  .# Q|
                      |
                      |
                   .  |  NS 3 (109)
                      |
                      |  NS 3 (19)
                  .#  |
                      |
                      |  NS 3 (192)
     0             .  +M NS 3 (139)
                     S|
                      |
               .####  |
                      |
                      |  NS 3 (219)
                      |
                  .#  |
           .########  |
                      |
    -1                +S
                      |
                     M|
                      |
                  .#  |
       .############  |
                      |  NS 3 (174)  NS 3 (66)
                      |
                      |
                      |
    -2                +
                      |Q
                     S|
                      |
                  .#  |
           .########  |
                      |
                      |
                      |
                      |
    -3           .##  +
                <rare>|<more>
```

Figure 9: Person Item Map

Figure 9 illustrates that the majority of the sample cluster around the respondent mean, which indicates a relatively normal distribution on the construct. The figure shows that the respondent distribution does not perfectly match the NS 3 item distribution. Despite this mismatch the majority of the item and person logit locations still overlap. It could therefore be argued that the set of items of the NS 3 sub-scale could assess different levels of this construct.

From the person item map it is clear that the items are spread out along a logit range that is larger than the construct range present in the current sample. Although this provides motivation to alter the logit locations of the items to concentrate more on differentiating between persons with different levels of the construct within its current range, the current item spread can prove useful in a sample with a larger range of the NS 3 construct. If it is proven that the range of the NS 3 construct is narrow across infinite number of samples, then the scale should be revised to apply its items on a more limited range. For example items at the top end of the logit scale, NS 3 (155) and NS 3 (41), could be revised to differentiate between construct levels at the lower end of the continuum.

Items located at identical or similar logit values (e.g. NS 3-66 and NS 3-139) should either be deleted or revised to assess different construct levels on the NS 3 scale. As mentioned earlier duplication of items or overpopulated item clusters provide little extra information about the sample's standing on the construct and can artificially confound the standard error associated with the scale.

Table 13: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	2.7	8.9	-1.15	.89	1.00	-.1	1.05	-.2
S.D.	1.5	.3	1.05	.13	.42	1.0	.91	1.0
MAX.	8.0	9.0	2.44	1.13	2.53	3.3	6.73	3.1
MIN.	1.0	8.0	-2.49	.74	.48	-1.7	.33	-1.5

```
| REAL RMSE    .98  ADJ.SD     .37  SEPARATION   .37  ADULT  RELIABILITY  .12 |
|MODEL RMSE    .91  ADJ.SD     .52  SEPARATION   .58  ADULT  RELIABILITY  .25 |
| S.E. OF ADULT  MEAN     .03                                                  |
| WITH     56 EXTREME ADULTS  =  1144 ADULTS    MEAN   -1.24  S.D.     1.14     |
| REAL RMSE   1.01  ADJ.SD     .52  SEPARATION   .52  ADULT  RELIABILITY  .21 |
|MODEL RMSE    .94  ADJ.SD     .64  SEPARATION   .68  ADULT  RELIABILITY  .31 |
```

The mean respondent measure value of -1.15 in Table 13 shows that the sample has a low inherent level of the NS 3 construct. The minimum, maximum and standard deviation measure values shows that the construct has a range of just less than five logits and that excessive variation in the construct level of respondents is minimal. The minimum infit mnsq value (0.48) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (2.53) point to individual response patterns that did behave as the model expected. The very high outfit mnsq value (6.73) points out that multiple individuals have atypical response patterns towards items far removed from their ability level.

Table 13 shows a person separation value of 0.68, this figure indicates that the clusters of respondents distinguished in Figure 9 are on average separated by a very small margin. The low reliability figure (0.31) implies that the majority of the respondents did not respond in a consistent fashion to this set of items. This means that not much confidence can be ascribed to the person distribution on the construct.

Table 14: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	322.4	1072.6	.00	.08	.98	-.1	1.04	.7
S.D.	187.6	43.7	1.04	.01	.11	2.9	.19	3.4
MAX.	643.0	1088.0	1.51	.11	1.17	5.3	1.41	7.9
MIN.	106.0	949.0	-1.64	.07	.84	-4.4	.81	-3.6

REAL RMSE .08	ADJ.SD 1.03	SEPARATION 12.16	ITEM	RELIABILITY	.99
MODEL RMSE .08	ADJ.SD 1.03	SEPARATION 12.37	ITEM	RELIABILITY	.99
S.E. OF ITEM MEAN .37					

Table 14 shows that the NS 3 measure is slightly too difficult for the current sample to endorse in a manner that will increase their standing on the construct, as the average respondent construct level (-1.15) indicated in Table 13 is far lower than the mean measure value of zero. This scenario is also evident in the person item map, which shows that six items are targeted to measure a construct level that is greater than the construct level in the majority of the sample. The infit and outfit values presented in Table 14 show that the performance of the items of the NS 3 scale conforms to the performance predicted by the Rasch model. Hence most of the items in the sub-scale performed according to their predicted item difficulty.

Contrasting to the low person separation and reliability values of the NS 3 scale, item separation and reliability are high at 12.37 and .99 respectively. This means that despite the clustering and duplication of items at similar logit values, the NS 3 items are more spread out on the construct range than respondents. The high reliability value points out that when this set of items is administered to another sample it is likely that the item performance will be repeated and that the same item hierarchy will be established.

Table 15 illustrates that all the items rendered infit mnsq values higher than 0.6 and smaller than 1.4. No items rendered low point-biserial correlation values. From the evidence presented it is argued that the NS 3 sub-scale is unidimensional and that all its items possess a single line of inquiry.

Table 15: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD		PTBIS CORR.	ITEMS
7	643	1088	-1.64	.07	1.13	5.3	1.41	7.9	A	.33	NS 3 (174)
3	633	1088	-1.59	.07	1.06	2.4	1.22	4.7	B	.39	NS 3 (66)
1	202	0949	.40	.09	1.17	3.2	1.21	2.5	C	.30	NS 3 (19)
2	106	1088	1.51	.11	.97	-.4	1.00	.0	D	.38	NS 3 (41)
4	209	1088	.56	.08	.95	-1.0	.97	-.3	E	.44	NS 3 (109)
8	286	1088	.06	.08	.93	-1.7	.96	-.6	d	.47	NS 3 (192)
9	397	1088	-.52	.07	.93	-2.3	.91	-2.2	c	.50	NS 3 (219)
6	134	1088	1.19	.10	.87	-2.0	.83	-1.6	b	.46	NS 3 (155)
5	292	1088	.03	.08	.84	-4.4	.81	-3.6	a	.55	NS 3 (139)
MEAN	322.	1073.	.00	.08	.98	-.1	1.04	.7			
S.D.	188.	44.	1.04	.01	.11	2.9	.19	3.4			

The evidence presented in this section suggests that several items of the NS 3 scale either cluster together at similar logit values or are located at the same logit value. These items should either be deleted or modified to occupy the lower logit regions of the scale. Both the person separation and reliability are extremely low, while on the other hand item separation and reliability are high. This means that it is likely that the same item hierarchy can be expected in future test administrations. Finally the NS 3 scale is unidimensional and measures a single construct. The unidimensionality of the scale supports both the construct- and content validity of the scale.

4.4.1.5 Disorderliness vs. Regimentation (NS 4)

The following items comprise this sub-scale:

NS 4 (34) – I like to be very organised and set up rules for people whenever I can.

NS 4 (53) – I lose my temper more quickly than most people.

NS 4 (79) – I like it when people can do whatever they want without strict rules and regulations.

NS 4 (91) – I am usually able to get other people to believe me, even when I know that what I am saying is exaggerated or untrue.

NS 4 (110) – I can usually do a good job of stretching the truth to tell a funnier story or to play a joke on someone.

NS 4 (141) – Even when most people feel it is not important, I often insist on things being done in a strict and orderly way.

NS 4 (165) – I almost never get so excited that I lose control of myself.

NS 4 (183) – I often break rules and regulations when I think I can get away with it.

NS 4 (204) – I am not very good of talking my way out of trouble when I am caught doing something wrong.

NS 4 (212) – I have trouble telling a lie, even when it is meant to spare someone else's feelings.

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ADULTS                                    MAP OF ITEMS
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                      |
                      |  NS 4 (141)   NS 4 (53)
                      |S NS 4 (183)
                   .  |
    1                 +
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                      |
                     Q|
                      |
                 .##  |  NS 4 (34)
                      |
                      |
                      |  NS 4 (91)
                      |
                      |
              .#####  |  NS 4 (79)
    0                 +M
                     S|
                      |  NS 4 (165)
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                      |
                     M|  NS 4 (212)
   -1                 +
       .############  |
                      |S
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                      |
          .######### S|
                      |  NS 4 (110)   NS 4 (204)
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   -2                 +
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                      |Q
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   -3              .  +
               <rare>|<more>
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Figure 10: Person Item Map

The person item map for the NS 4 sub-scale is presented in Figure 10; it illustrates the respondent distribution on the construct as well as the item distribution on the right hand side of the map. The figure shows that seven of the ten NS 4 items occupy the same logit range as the majority of the sample. Hence, it could be argued that the items are relatively well matched to the construct level present in the sample. The majority of respondents seem to form a normal distribution around the sample mean. It is concerning that the lower end of the scale is only populated by three items, of which two are located at the same logit value. The dearth of items at this end of the scale may confound the standard error associated with the scale.

Three items, NS 4 (183), NS 4 (141) and NS 4 (53), are located at the top end of logit scale at a level where extremely few respondents' construct levels are located. These three items add very little value in assessing the construct level, but may prove to be useful if a sample with a higher construct level is assessed. The same three items are also located at a similar logit value and therefore have the same difficulty level, which means that all three items provide similar information about the sample. It is recommended that at least two of these three items should be revised so that they can eventually occupy the lower less populated region of the logit scale. This will allow the NS 4 scale to differentiate more accurately between people with a lower level of the NS 4 construct. A similar argument and recommendation is made with regards to items NS 4 (110) and NS 4 (204), which also occupies the same logit value.

Table 16: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	3.3	10.0	-.93	.81	1.00	-.1	.98	-.2
S.D.	1.4	.0	.86	.11	.38	1.0	.63	1.0
MAX.	8.0	10.0	1.73	1.12	2.38	3.2	5.52	3.1
MIN.	1.0	10.0	-2.70	.72	.44	-1.9	.30	-1.6

REAL RMSE	.87	ADJ.SD	.00	SEPARATION	.00	ADULT RELIABILITY	.00
MODEL RMSE	.82	ADJ.SD	.26	SEPARATION	.32	ADULT RELIABILITY	.09
S.E. OF ADULT MEAN	.03						
WITH 14 EXTREME ADULTS	= 1144 ADULTS	MEAN	-.96	S.D.	.90		
REAL RMSE	.88	ADJ.SD	.16	SEPARATION	.19	ADULT RELIABILITY	.03
MODEL RMSE	.83	ADJ.SD	.35	SEPARATION	.42	ADULT RELIABILITY	.15

The mean respondent measure value (-0.93) in Table 16 illustrate that the sample has a low standing on the NS 4 construct. The minimum, maximum and standard deviation measure values show that the construct has a narrow range (4.5 logits) and that there is minimal variation in the construct level among respondents. The minimum infit mnsq value of 0.44 indicates too well behaved response patterns for some persons, while the maximum infit mnsq value of 2.38 points to individual response patterns that do not behave as the model expected. The high outfit mnsq value of 5.52 provides evidence that multiple individuals have atypical response patterns to items far removed from their ability level.

Table 16 shows a person separation value of 0.42, which means that the clustering of respondents illustrated in Figure 10 are on average separated by a very small difference in their respective construct levels. In other words if a person's construct level differs only a little from another person construct level, the scale will be able to separate the two individuals from each other. The extremely low reliability figure (0.15) points out that not much confidence can be ascribed to the person distribution on the construct.

Table 17: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	378.2	1130.0	.00	.08	1.00	.1	.98	-.2
S.D.	233.7	.0	1.13	.01	.04	1.1	.09	1.5
MAX.	778.0	1130.0	1.28	.09	1.06	2.1	1.11	2.5
MIN.	139.0	1130.0	-1.84	.06	.96	-1.2	.85	-2.4

REAL RMSE .08	ADJ.SD 1.12	SEPARATION 14.40	ITEM	RELIABILITY 1.00	
MODEL RMSE .08	ADJ.SD 1.12	SEPARATION 14.50	ITEM	RELIABILITY 1.00	
S.E. OF ITEM MEAN .38					

Table 17 shows that the NS 4 measure is relatively difficult for the current sample to endorse in a manner that will increase their standing on the construct, as the average respondent construct level (-0.93) indicated in Table 16 is lower than the mean measure value of 0.00. This scenario is also evident in the person item map, which shows that three items are designated to measure a construct level that is greater than the construct level in the majority of the sample. Table 17 also presents the average infit and outfit values for the NS 4 scale. These values are all within the acceptable mnsq range of 0.6 and 1.4, which indicates that the items of the NS 4 sub-scale conform to the item functioning predicted by the Rasch model. These results indicate that on average the items in the sub-scale performed according to their expected item difficulty.

Contrasting to the low person separation and reliability of the scale, item separation and reliability are high at 14.5 and 1.00 respectively. This means that despite the clustering and duplication of items at similar logit values, the NS 4 items are more spread out on the construct than the respondents. The high item reliability value indicates that, if this set of items is administered to another sample, it is likely that the item performance will be repeated.

Table 18 illustrates that all the NS 4 items have mnsq infit values higher than 0.6 and lower than 1.4, and that all the point-biserial correlations are positive. From the evidence presented it is argued that a.) the NS 4 sub-scale is unidimensional and b). all the items of this sub-scale possess a single line of inquiry.

Table 18: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
9	771	1130	-1.81	.07	1.06	2.1	1.11	2.5	A .31	NS 4 (204)
5	778	1130	-1.84	.07	1.06	1.8	1.10	2.2	B .32	NS 4 (110)
1	233	1130	.61	.08	1.04	.9	1.06	.9	C .26	NS 4 (34)
10	567	1130	-.93	.06	1.00	-.1	1.00	-.2	D .38	NS 4 (212)
2	139	1130	1.28	.09	.99	-.2	.96	-.4	E .26	NS 4 (53)
7	377	1130	-.13	.07	.98	-.6	.96	-.9	e .37	NS 4 (165)
3	336	1130	.06	.07	.98	-.6	.96	-.8	d .36	NS 4 (79)
6	139	1130	1.28	.09	.97	-.5	.90	-1.0	c .29	NS 4 (141)
8	152	1130	1.17	.09	.96	-.7	.85	-1.6	b .31	NS 4 (183)
4	290	1130	.29	.07	.96	-1.2	.87	-2.4	a .38	NS 4 (91)
MEAN	378.	1130.	.00	.08	1.00	.1	.98	-.2		
S.D.	234.	0.	1.13	.01	.04	1.1	.09	1.5		

The evidence presented for the NS 4 sub-scale suggest that some items on the scale might have some flaws as they cluster together or are located at the same logit value. These items should either be deleted or modified to occupy the lower logit regions of the scale. Both the person separation and reliability are extremely low, while item separation and reliability are high, which points out that it is likely that the same item hierarchy can be expected in future test administrations. Finally the NS 4 scale functions in a unidimensional manner. The unidimensionality of the scale supports both the construct-and content validity of the scale.

It is concluded that the primary novelty seeking scale and all four its sub-scales (NS 1, NS 2, NS 3, and NS 4) are unidimensional, and have a high degree of construct validity and item reliability. This implies that one of the core criteria of the Rasch model is met, which in turn allows the interpretation of other output statistics derived from the Rasch model.

4.4.2 Psychometric Properties of the Harm Avoidance Scale and its Sub-Scales

The harm avoidance scale consists of four sub-scales: anticipatory worry and pessimism vs. uninhibited optimism (HA 1); fear of uncertainty (HA 2); shyness with strangers (HA 3); and fatigue vs. rigour (HA 4). A Rasch item analysis was conducted on the data derived from the primary scale and each of sub-scales. The results illustrating the psychometric properties for the primary scale are presented first (see Section 4.4.2.1), where after the psychometric properties of each sub-scale are discussed in designated sections (see sections 4.4.2.2-4.4.2.5).

4.4.2.1 Primary Harm Avoidance Scale (HA)

Figure 11 below shows that both the respondent and item distributions are relatively normal; however, the overlap between the two distributions is relatively small, as is also evidenced by the two distribution means, which are situated one logit apart from each other. This observation implies that a considerable number of the Harm Avoidance (HA) items are not perfectly suited to measure the inherent construct level among the current sample. However, the higher item mean might be useful, when assessing samples with a higher inherent level of the HA construct. As with the primary novelty seeking scale (see Section 4.4.1.1), relatively few gaps exist along the participant distribution on the HA construct, which illustrates that the HA scale is well suited to assess the entire range of the construct.

Multiple item clusters exist along the item distribution, for instance the shared logit location of the following items HA 1 (119), HA 2 (12), HA 2 (154), HA 4 (147), and HA 4 (92) (see Figure 11). Duplication of items or overpopulated item clusters provide little extra information about the sample's standing on the construct and can artificially confound the standard error associated with the scale. It is recommended that some of these items should be altered to eventually appear in a logit range where little or no items are present. This will allow the scale to assess the construct with greater precision, for instance more items can be adjusted to target the lower end of the HA construct.

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ADULTS                MAP OF ITEMS
                 <frequ>|<less>
    3                   +
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                        |  HA 1 (42)
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                        |Q
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    2                .  +  HA 1 (2)
                        |  HA 3 (142)
                     .  |  HA 1 (65)   HA 3 (100)
                        |
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                     .  |  HA 4 (22)
                     .  |S
    1                .  +
                     .  |  HA 1 (188   HA 4 (182)
                     .  |
                       Q|  HA 1 (149)  HA 3 (231  HA 4 (43)   HA 4 (63)
                    .#  |  HA 3 (54)   HA 4 (113)
                    .#  |  HA 3 (157)  HA 3 (27)
                    .#  |
    0              .##  +M
                  .###  |  HA 3 (209)
                .##### S|  HA 1 (112)  HA 1 (20)  HA 2 (217)  HA 2 (67)  HA 4 (202)
              .#######  |
             .########  |
            .#########  |  HA 1 (81)   HA 2 (129)
           .##########  |  HA 3 (80)
   -1      .##########  +  HA 1 (119)  HA 2 (12)  HA 2 (154)  HA 4 (147) HA 4 (92)
         .############ M|S HA 1 (164)  HA 2 (189) HA 2 (26)
            ##########  |
                        |  HA 1 (225
           .##########  |
              .#######  |
                        |
   -2          .###### S+
                 .####  |
                        |Q
                .#####  |
                        |
                       Q|
                   .##  |  HA 4 (236)
   -3                   +
                        |
                    .#  |
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   -4                   +
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   -5                   +
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Figure 11: Person item Map

The mean respondent measure value (-1.10), illustrates that the sample has a low average standing on the HA construct (see Table 19). The minimum, maximum and standard deviation respondent measure values points out that the construct has a range of just more than 6 logits; it is also evident that the construct level varies to considerable degree among respondents. The mean respondent mnsq infit and outfit values fall within the acceptable range of 0.6 and 1.4 mnsq, which indicate that on average respondent response patterns, conformed to the predictions made by the model. The person separation value (1.62) presented in Table 19 reflects the sensitivity of the scale. This sensitivity value implies that if a person's construct only differs a little from another person, that the scale will be unable to distinguish between the two individuals with regards to their standing.

The scale rendered a relatively high person reliability statistic (0.72), which means that the majority of the respondents did respond in a reliable fashion to the HA items. This indicates that a high confidence value can be assigned to the respondent distribution on the construct.

Table 19: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	10.9	35.0	-1.10	.43	.99	.0	1.03	.0
S.D.	4.6	.0	.84	.08	.16	.9	.52	1.0
MAX.	29.0	35.0	1.97	1.05	1.72	3.7	6.00	4.6
MIN.	1.0	35.0	-4.11	.38	.63	-2.9	.12	-2.1

```
| REAL RMSE    .45  ADJ.SD    .71  SEPARATION  1.57  ADULT  RELIABILITY  .71 |
|MODEL RMSE    .44  ADJ.SD    .72  SEPARATION  1.62  ADULT  RELIABILITY  .72 |
| S.E. OF ADULT MEAN   .02                                                   |
```

Table 20: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	357.6	1144.0	.00	.08	1.00	.0	1.03	-.2
S.D.	209.2	.0	1.17	.03	.09	2.2	.28	2.6
MAX.	954.0	1144.0	2.76	.18	1.39	6.6	2.48	9.9
MIN.	32.0	1144.0	-2.93	.06	.90	-3.4	.77	-3.5

```
| REAL RMSE    .08  ADJ.SD   1.16  SEPARATION 13.70  ITEM   RELIABILITY  .99 |
|MODEL RMSE    .08  ADJ.SD   1.16  SEPARATION 13.86  ITEM   RELIABILITY  .99 |
| S.E. OF ITEM  MEAN   .20                                                   |
```

The mean respondent measure level (-1.10) is far lower than the mean item measure value of 0.00 (Table 20); this difference implies that on average the items of the HA scale is relatively difficult for the current sample to endorse in such a manner that it will increase their standing on the construct.

The mean and individual mnsq infit and outfit values (see Table 20 and Table 21) show that most of the items of the HA scale performed according to their predicted difficulty ratings. Only one item (HA 236) rendered infit (1.39) and outfit (2.48) values close to, or larger than the acceptable range (0.6-1.4mnsq). Table 20 show that item separation and reliability are high at 13.86 and 0.99 respectively, this means that the HA items are on average more spread out on the construct than the respondents. The high reliability value points out that when this scale is administered to another sample it is likely that the same item hierarchy will be reproduced.

Table 21 shows that HA 1 (42) and HA 1 (2) are the two most difficult items of this scale. Participants with low standing on the HA construct is expected to endorse these items in a manner that will not increase their standing on the construct. These two items also produced the highest error estimates (0.18 and 0.13).

The individual item infit mnsq values are all located within the acceptable mnsq value range, which means that the entire HA scale is measuring a single unidimensional construct. It could be argued that the four HA sub-scales (HA 1, HA 2, HA 3 and HA 4) of the HA scale all contribute to the measurement of one greater construct. The point-biserial correlations presented in Table 21 below shows that all the items, except one, rendered positive values. Only item HA 236 has large low point-biserial correlation of -0.25. This negative correlation could mean that a coding error has occurred on this item, which warrants further scrutiny.

Table 21: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
3	32	1144	2.76	.18	1.00	.0	1.14	.6	.10	HA 1 (42)
1	65	1144	2.00	.13	1.00	.0	1.30	1.7	.14	HA 1 (2)
23	77	1144	1.81	.12	.95	-.6	.85	-1.0	.26	HA 3 (142)
4	81	1144	1.75	.12	1.03	.4	1.28	1.8	.13	HA 1 (65)
22	88	1144	1.66	.11	1.02	.2	1.02	.1	.17	HA 3 (100)
27	118	1144	1.32	.10	.93	-1.0	.77	-2.2	.32	HA 4 (22)
10	174	1144	.84	.09	1.01	.2	1.10	1.1	.23	HA 1 (188)
33	174	1144	.84	.09	.98	-.3	.95	-.6	.28	HA 4 (182)
29	203	1144	.64	.08	.96	-.9	.97	-.4	.27	HA 4 (63)
8	209	1144	.60	.08	.97	-.7	.88	-1.6	.33	HA 1 (149)
28	219	1144	.54	.08	.99	-.3	.96	-.6	.30	HA 4 (43)
26	222	1144	.52	.08	.99	-.2	.96	-.6	.30	HA 3 (231)
31	228	1144	.48	.08	.90	-2.3	.80	-3.0	.41	HA 4 (113)
20	233	1144	.45	.08	.90	-2.4	.85	-2.3	.41	HA 3 (54)
19	250	1144	.35	.08	.95	-1.2	.88	-2.0	.36	HA 3 (27)
24	263	1144	.28	.07	.90	-2.7	.80	-3.4	.42	HA 3 (157)
25	359	1144	-.20	.07	.94	-2.2	.92	-1.9	.39	HA 3 (209)
6	373	1144	-.26	.07	1.00	-.1	.99	-.2	.33	HA 1 (112)
34	377	1144	-.28	.07	1.16	5.8	1.25	5.4	.13	HA 4 (202)
2	387	1144	-.32	.07	1.01	.5	.99	-.4	.20	HA 1 (20)
14	387	1144	-.32	.07	1.03	1.0	.99	-.2	.31	HA 2 (67)
18	395	1144	-.36	.07	.94	-2.5	.90	-2.6	.41	HA 2 (217)
15	469	1144	-.67	.06	.93	-3.4	.89	-3.5	.43	HA 2 (129)
5	481	1144	-.72	.06	.97	-1.6	.94	-2.0	.39	HA 1 (81)
21	516	1144	-.86	.06	.98	-.9	.96	-1.3	.38	HA 3 (80)
7	536	1144	-.94	.06	1.08	3.8	1.07	2.4	.27	HA 1 (119)
16	544	1144	-.97	.06	.96	-1.8	.93	-2.5	.40	HA 2 (154)
32	548	1144	-.99	.06	1.09	4.2	1.09	3.1	.26	HA 4 (147)
12	562	1144	-1.05	.06	.96	-1.9	.95	-1.7	.40	HA 2 (12)
30	564	1144	-1.05	.06	.97	-1.6	.97	-1.0	.39	HA 4 (92)
9	584	1144	-1.13	.06	1.03	1.4	1.03	1.0	.33	HA 1 (164)
17	592	1144	-1.17	.06	1.02	1.0	1.01	.3	.34	HA 2 (189)
13	597	1144	-1.19	.06	1.00	.1	.99	-.3	.36	HA 2 (26)
11	654	1144	-1.42	.06	1.05	2.1	1.07	2.3	.30	HA 1 (225)
35	954	1144	-2.93	.08	1.39	6.6	2.48	9.9	-.25	HA 4 (236)
MEAN	358.	1144.	.00	.08	1.00	.0	1.03	-.2		
S.D.	209.	0.	1.17	.03	.09	2.2	.28	2.6		

The evidence presented above suggests that several items of the HA scale are surplus and should either be deleted or modified to occupy under represented logit regions, however, this should be done with caution as it can influence the functioning of the items within the respective HA sub-scales. The HA scale's person reliability value is relatively high, which means that a high confidence value can be attributed to the respondent distribution on the construct. The scale also rendered high item separation and reliability, which means that it is likely that the same item hierarchy can be, expected in future test administrations. Finally the HA scale functioned in a unidimensional manner, which means that it exclusively measures one construct. The unidimensionality of the scale supports both the construct and content validity of the scale. Only one item has a large negative point-biserial correlation which should be examined for a scoring irregularity. The four sub-scales comprising the primary HA scale are discussed in turn below.

4.4.2.2 Anticipatory worry and pessimism vs. uninhibited optimism (HA 1)

The following items comprise the HA 1 sub-scale:

HA 1 (2) – I usually am confident that everything will go well, even in situations that worry most people.

HA 1 (20) – I often have to stop what I am doing because I start worrying about what might go wrong.

HA 1 (42) – I think that I will have very good luck in the future.

HA 1 (81) – Usually I am more worried than people that something might go wrong in the future.

HA 1 (112) – If I am embarrassed or humiliated, I get over it quickly.

HA 1 (119) – I nearly always stay relaxed and carefree, even when nearly everyone else is fearful.

HA 1 (149) – I often stop what I am doing because I get worried, even when my friends tell me everything will go well.

HA 1 (164) – I never worry about terrible things that might happen in the future.

HA 1 (188) – I usually have good luck in whatever I try to do.

HA 1 (225) – Things often go wrong for me unless I am very careful.

The sample distribution on the measured construct and the item distribution in terms of item difficulty are illustrated in Figure 12 below. Eight of the eleven items are spread out along the same logit range in which the majority of the sample's construct levels are plotted. This means that the items are relatively well targeted to measure the HA 1 construct among the current sample.

Although the majority of the sample clusters around the sample mean, a large number of participants are grouped at the bottom end of the scale. This grouping points out that the scale is unable to differentiate between people with very low levels of the HA 1 construct. One way to rectify the aforementioned scenario is to include items on this sub-scale, which can measure a lower level of the HA 1 construct. Currently the lower end of the scale (-1 to -3 logits) is only populated by four items. The lack of items at this end of the scale may increase the standard error associated with the scale.

Items HA 1 (112) and HA 1 (20) are located at a similar logit value and therefore have the same difficulty level. This means that both items provide similar information about the sample. It is recommended that one of these items should be revised to occupy the lower less populated region of the logit scale. This will allow the scale to differentiate more accurately between people with a lower level of the construct.

Three items, HA 1 (42), HA 1 (2) and HA 1 (65), are located at the top end of logit scale at a level where only a small number of respondent construct levels are plotted. These three items do not add considerable value in assessing the construct level among the current sample, but might be useful if a sample with a higher construct level is assessed.

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ADULTS                         MAP OF ITEMS
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                    |   HA 1  (65)
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                    |   HA 1  (149)
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Figure 12: Person Item Map

Table 22: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	3.3	11.0	-1.34	.81	1.00	-.1	1.00	-.2
S.D.	1.6	.0	.98	.12	.29	.8	1.05	.7
MAX.	9.0	11.0	2.10	1.09	2.08	2.8	9.90	3.2
MIN.	1.0	11.0	-2.95	.72	.41	-2.0	.28	-1.8

REAL RMSE .86 ADJ.SD .47 SEPARATION .55 ADULT RELIABILITY .23
MODEL RMSE .82 ADJ.SD .54 SEPARATION .66 ADULT RELIABILITY .30
S.E. OF ADULT MEAN .03
WITH 61 EXTREME ADULTS = 1144 ADULTS MEAN -1.46 S.D. 1.10
REAL RMSE .91 ADJ.SD .62 SEPARATION .69 ADULT RELIABILITY .32
MODEL RMSE .87 ADJ.SD .67 SEPARATION .78 ADULT RELIABILITY .38

The mean respondent measure value of (-1.34) in Table 22 shows that the sample has a low standing on the HA 1 construct. This is also evident in the person item map where the majority of the sample is clustered in groups toward the lower end of the scale. The minimum, maximum and standard deviation measure values show that the construct has a range of approximately 4.5 logits, and that disproportionate variation in the measured construct level among respondents is negligible. The low respondent reliability figure (0.38) indicates that the majority of the respondents did not respond in a reliable fashion to the items of the scale. This means that not much confidence can be ascribed to the person distribution on the construct.

Table 23: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	325.1	1083.0	.00	.09	1.00	.0	1.02	.0
S.D.	213.1	.0	1.43	.04	.06	2.3	.12	2.3
MAX.	654.0	1083.0	2.62	.18	1.13	5.2	1.22	5.2
MIN.	32.0	1083.0	-1.85	.07	.92	-3.3	.84	-3.4

REAL RMSE .10 ADJ.SD 1.43 SEPARATION 14.22 ITEM RELIABILITY 1.00
MODEL RMSE .10 ADJ.SD 1.43 SEPARATION 14.38 ITEM RELIABILITY 1.00
S.E. OF ITEM MEAN .45

When comparing the mean item measure value of 0.00 to the mean respondent measure value of -1.34 (see Table 22 and Table 23), it is clear that the HA 1 scale was relatively difficult for the current sample to endorse in such a way that it will increase their standing on the construct, as the respondent construct level is much lower than the mean item measure value. This scenario is also evident in the person item map, which shows that three items are targeted to measure a construct level that is greater than the construct level of most respondents. Contrasting to the low respondent separation and reliability statistics reported earlier, item separation and reliability are high at 14.38 and 1.00 respectively. This points out that despite the clustering and duplication of items at similar logit values, the HA 1 items are on average more spread out on the construct than the respondents. The high reliability value indicates that if this sub-scale is administered to another sample it is likely that the item difficulty spread will be repeated.

Table 24 present the individual statistics for every item on the HA 1 sub-scale and shows that HA 1 (42) is the most difficult item to endorse (i.e. only participants with extremely high levels of the construct are expected to endorse this item in such a way that it would increase their standing on the construct). The table indicates that all the HA 1 items have mnsq infit values that fall within the acceptable mnsq value range. These fit statistics provide sufficient evidence to support the unidimensionality of the HA 1 scale. The point-biserial correlation figures for all items are illustrated in the second last column of Table 24; all of these values are positive and do not indicate any scoring errors.

Table 24: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
3	32	1083	2.62	.18	1.02	.1	1.22	.8	A .14	HA 1 (42)
7	536	1083	-1.32	.07	1.13	5.2	1.19	5.2	B .35	HA 1 (119)
10	174	1083	.61	.09	1.04	.7	1.12	1.3	C .29	HA 1 (188)
11	654	1083	-1.85	.07	1.07	2.6	1.07	1.8	D .42	HA 1 (225)
1	65	1083	1.83	.13	.98	-.2	1.04	.2	E .23	HA 1 (2)
4	81	1083	1.57	.12	1.04	.4	.99	-.1	F .23	HA 1 (65)
6	373	1083	-.57	.07	.98	-.6	.99	-.2	e .43	HA 1 (112)
9	584	1083	-1.53	.07	.98	-.7	.98	-.5	d .47	HA 1 (164)
8	209	1083	.35	.08	.93	-1.5	.84	-2.2	c .41	HA 1 (149)
5	481	1083	-1.07	.07	.92	-3.3	.89	-3.4	b .51	HA 1 (81)
2	387	1083	-.64	.07	.92	-3.0	.88	-3.0	a .49	HA 1 (20)
MEAN	325.	1083.	.00	.09	1.00	.0	1.02	.0		
S.D.	213.	0.	1.43	.04	.06	2.3	.12	2.3		

The results presented for the HA 1 sub-scale show that the items on the scale are not sensitive to low levels of the HA 1 construct. In addition the evidence presented for this scale shows that both the person separation and reliability values are extremely low; while item separation and reliability statistics are high. Finally the HA 1 scale functioned in a unidimensional manner, which means that the scale exclusively measures one construct. The unidimensionality of the scale supports both the construct and content validity of the scale.

4.4.2.3 Fear of uncertainty (HA 2)

The following items comprise the HA 2 sub-scale:

HA 2 (12) – I often feel tensed and worried in unfamiliar situations, even when others feel there is little to worry about.

HA 2 (26) – Most of the time I would prefer to do something a little risky (like driving a fast automobile over steep hills and sharp turns) – rather than having to stay quiet and inactive for a few hours.

HA 2 (67) – I usually stay calm and secure in a situation that most people would find physically dangerous.

HA 2 (129) – I often feel tense and worried in unfamiliar situations, even when others feel there is no danger at all.

HA 2 (154) – Most of the time I would prefer to do something risky (like hang-gliding or parachute jumping) – rather than having to stay quiet or inactive for a few hours.

HA 2 (189) – I am usually confident that I can easily do things that most people would consider dangerous (such as driving an automobile fast on a wet or icy road).

HA 2 (217) – I usually feel tense and worried when I have to do something new and unfamiliar.

The person item map presented below in Figure 13 illustrates that the majority of the item distribution overlaps with the respondent distribution; in addition the samples average standing on the construct is situated close to the item difficulty mean. This points out that the items comprising the HA 2 scale are relatively well suited to measure the construct level among the current sample. The person item map also demonstrates that the majority of the sample clusters around the respondent mean; hence the sample produces a relatively normal distribution with regards to their standing on the construct. Similar to the HA 1 scale a large number of participants are grouped towards the bottom end of this scale, which indicate that the scale is unable to differentiate between people with very low inherent levels of the construct. One way to correct this situation is to include items in this sub-scale to measure an even lower level of the HA 2 construct.

It is evident from the person item map that the items are spread out along a logit range that is narrower than the construct range of the sample. This item distribution provides motivation to alter the logit location of the items in order to differentiate between persons with more extreme construct levels. Despite this the current item spread can prove useful in a sample with a very constricted range of the HA 2 construct. If it is proven that the range of the construct is spread out in a similar fashion across enough samples, then the scale should be revised to apply its items on a more expanded range. This will mean that one item of a pair of items, like HA 2 (26) and HA 2 (189), which are located at a similar logit value should be revised to assess more extreme construct levels on the scale. The same recommendation is made with regards to the other two sets of items that are located at similar logit values.

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Figure 13: Person Item Map

Table 25: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	3.3	7.0	-.14	.87	1.00	.0	1.01	-.1
S.D.	1.5	.0	1.03	.12	.16	.7	.27	.8
MAX.	6.0	7.0	1.85	1.09	1.46	2.3	1.79	2.2
MIN.	1.0	6.0	-1.85	.78	.70	-1.8	.64	-1.8
REAL RMSE .91	ADJ.SD .49	SEPARATION .54	ADULT RELIABILITY .23					
MODEL RMSE .88	ADJ.SD .54	SEPARATION .62	ADULT RELIABILITY .28					
S.E. OF ADULT MEAN .03								
WITH 120 EXTREME ADULTS = 1144 ADULTS	MEAN -.30	S.D. 1.27						
REAL RMSE .98	ADJ.SD .80	SEPARATION .82	ADULT RELIABILITY .40					
MODEL RMSE .96	ADJ.SD .83	SEPARATION .87	ADULT RELIABILITY .43					

The respondent mean measure value (-0.14) in Table 25 shows that the average HA 2 construct level was not unusually low among the sample. The minimum, maximum and standard deviation measure values show that the construct has a range spanning just less than 4 logits. These values also indicate that excessive variation in the construct level of respondents is minimal. The low respondent reliability statistic (0.43) means that most of the respondents did not respond in a consistent fashion to the items of the scale. This means that not much confidence can be ascribed to the person distribution on the construct.

The respondent summary table shows a person separation value of 0.87, which means that the respondent clusters evident in the person item map are on average separated by a relatively small margin.

Table 26: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	484.4	1023.9	.00	.07	1.00	-.2	1.01	-.2
S.D.	83.1	.4	.41	.00	.10	3.8	.13	3.5
MAX.	575.0	1024.0	.59	.07	1.12	4.3	1.15	3.6
MIN.	365.0	1023.0	-.44	.07	.83	-6.9	.77	-6.9
REAL RMSE .07	ADJ.SD .40	SEPARATION 5.56	ITEM RELIABILITY .97					
MODEL RMSE .07	ADJ.SD .40	SEPARATION 5.69	ITEM RELIABILITY .97					
S.E. OF ITEM MEAN .17								

The average respondent measure (-0.14) indicated in Table 25 is very close to the item mean measure value of 0.00 (see Table 26), this implies that the HA 2 scale is relatively well matched to the construct level in the current sample. This scenario is also evidenced in the person item map, which shows that item and person distribution means are plotted close to each other. Item separation and reliability are high at 5.69 and 0.97 respectively; these two statistics are relatively higher than the equivalent respondent statistics. This means that despite the clustering of items at similar logit values and the narrow aggregate range of the items, they are more spread out on the construct than the respondents on average. In other words the seven HA 2 items are able to cover a greater area on the logit scale than a similar number of respondents. The high reliability statistic indicates that when administered to another sample the scale will probably render the same item hierarchy as illustrated in Figure 13.

Table 27 illustrates that all the items on this scale have the same error estimate (0.7). It is also shown that all the items have mnsq infit values that fall within the acceptable range of 0.6 and 1.4 mnsq. These fit statistics show that the HA 2 sub-scale functioned in a unidimensional manner. The point-biserial values for all the items are high (see Table 27).

Table 27: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
3	365	1024	.59	.07	1.10	3.3	1.15	3.2	A .42	HA2 (67)
1	540	1024	-.27	.07	1.12	4.3	1.14	3.6	B .45	HA2 (12)
7	372	1023	.55	.07	1.05	1.7	1.08	1.8	C .45	HA2 (217)
4	447	1024	.18	.07	1.05	1.8	1.06	1.5	D .47	HA2 (129)
6	570	1024	-.42	.07	.95	-1.8	.96	-1.2	c .55	HA2 (189)
2	575	1024	-.44	.07	.90	-3.9	.88	-3.3	b .59	HA2 (26)
5	522	1024	-.18	.07	.83	-6.9	.77	-6.9	a .62	HA2 (154)
MEAN	484.	1024.	.00	.07	1.00	-.2	1.01	-.2		
S.D.	83.	0.	.41	.00	.10	3.8	.13	3.5		

The evidence illustrated for this sub-scale suggest that several items of the HA 2 scale cluster together and could be modified to occupy the outer regions of the scale. Both the person separation and reliability are extremely low, which means that not much confidence can be ascribed to the person distribution on the construct. On the other hand item separation and reliability are high, which means that it is likely that a similar item hierarchy will be reproduced in future test administrations. Finally the items of the HA 2 scale functioned in a unidimensional manner, which support the construct-and content validity of the scale.

4.4.2.4 Shyness with Strangers (HA 3)

The following items comprise the HA 3 sub-scale:

HA 3 (27) – I often avoid meeting strangers because I lack confidence with people I do not know.

HA 3 (54) – When I have to meet a group of strangers, I am more shy than most people.

HA 3 (80) – I would probably stay relaxed and outgoing when meeting a group of strangers, even if I were told they are unfriendly.

HA 3 (100) – It is easy for me to organize my thoughts while talking to someone.

HA 3 (142) – I feel very confident and sure of myself in almost all social situations.

HA 3 (157) – I am not shy with strangers at all.

HA 3 (209) – I think I would stay confident and relaxed when meeting strangers, even if I were told they are angry at me.

HA 3 (231) – I usually stay away from social situations where I would have to meet strangers, even if I am assured that they will be friendly.

The person item map shows that the items of the HA 3 sub-scale are not perfectly suited to measure the construct across the sample, as the majority of respondent construct levels are located lower than the majority item locations (see Figure 14). This scenario is also evident in the difference between the means for the respondent construct level and item difficulty. The figure shows that the sample does not form a normal distribution, and is skewed towards the lower end of the scale. This skewing indicates that the scale is unable to differentiate between people with low inherent levels of the HA 3 construct. One way to correct this situation is to include items that can measure lower levels of the construct. At this stage the lower end of the scale is only populated by two items; the shortage of items at this end of the scale can increase the standard error of the scale.

The person item map shows that four items (HA 3 – 157, HA 3 – 27, HA 3 – 54, and HA 3 – 231) are located at a similar logit value; these items provide similar information about the sample. It is recommended that three of the four items be revised to occupy the lower less populated region of the scale. This will allow the scale to differentiate more accurately between people with a lower level of the HA 3 construct. Two items, HA 3 (142) and HA 3 (100) are located at the top end of the scale where very few respondent construct levels are plotted. These two items do not add considerable value in assessing the construct level among the current sample, but may prove to be useful when a sample with a higher average HA 3 construct level is assessed.

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ADULTS                         MAP OF ITEMS
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                       |  HA3(142)
                       |
                       |  HA3(100)
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    1                 Q+
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                       |
                       |  HA3(231)
    0            .### S+M HA3(54)
                       |  HA3(27)
                       |  HA3(157)
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                       |  HA3(209)
   -1                  +
                      M|S
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                       |
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                       |  HA3(80)
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   -2                  +
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   -3 .############    +
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Figure 14: Person Item Map

Table 28: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	2.5	8.0	-1.13	.94	.99	-.1	1.14	-.1
S.D.	1.4	.0	1.08	.14	.37	.8	1.19	.9
MAX.	7.0	8.0	2.33	1.13	2.01	2.7	6.48	2.6
MIN.	1.0	8.0	-2.32	.79	.47	-1.5	.29	-1.2

REAL RMSE	1.02	ADJ.SD	.33	SEPARATION	.33	ADULT	RELIABILITY	.10
MODEL RMSE	.95	ADJ.SD	.51	SEPARATION	.54	ADULT	RELIABILITY	.23
S.E. OF ADULT MEAN	.04							
WITH 329 EXTREME ADULTS = 1144 ADULTS				MEAN	-1.71	S.D.	1.29	
REAL RMSE	1.18	ADJ.SD	.52	SEPARATION	.44	ADULT	RELIABILITY	.16
MODEL RMSE	1.14	ADJ.SD	.61	SEPARATION	.54	ADULT	RELIABILITY	.22

The mean respondent measure value (-1.13) shows that the sample has a low inherent level of the HA 3 construct (Table 28). The minimum, maximum and standard deviation measure values indicates that the construct has a relatively narrow range of just more than four and a half logits, and that excessive variation in the construct level among the sample is minimal. The minimum infit mnsq value (0.47) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (2.01) point to participant response patterns that did not behave as the model predicted. The very high outfit mnsq value (6.48) points out that multiple respondents have unexpected response patterns towards items far removed from their inherent construct level.

The table also shows a person separation value of 0.54, which indicates that the different groupings of respondents distinguished in Figure 14 is on average separated by a very small margin. The low reliability statistic (0.22) implies that in general respondents did not respond in a consistent fashion to the sub-scale, which means that not much confidence can be ascribed to the person distribution on the construct..

Table 29: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	251.0	815.0	.00	.09	1.00	-.5	1.14	.1
S.D.	132.3	.0	1.05	.02	.12	2.3	.37	2.9
MAX.	516.0	815.0	1.60	.13	1.21	2.7	1.98	5.1
MIN.	77.0	815.0	-1.84	.08	.85	-4.1	.81	-3.6

REAL RMSE	.10	ADJ.SD	1.05	SEPARATION	10.57	ITEM	RELIABILITY	.99
MODEL RMSE	.10	ADJ.SD	1.05	SEPARATION	10.92	ITEM	RELIABILITY	.99
S.E. OF ITEM MEAN	.40							

The average respondent construct level (-1.13) indicated in Table 28 is far lower than the mean item measure value of 0.00 (see Table 29); this indicates that the scale is relatively difficult for the respondents to endorse in a manner that will give them a high rating on the construct. The mean mnsq infit and outfit values presented in Table 29 shows that on average the performance of the scale's items conform to the predictions made by the Rasch model; in other words most of the scale's items performed according to their predicted item difficulty.

Item separation and reliability for the HA 3 scale are high at 10.92 and 0.99 respectively, which means that despite the clustering of items at similar logit values, the items are more spread out on the construct range than the respondents on average. The high reliability value indicates that when this scale is administered to another sample it is probable that the same item hierarchy will be reproduced. Table 30 shows that all the items have infit mnsq values higher than 0.6 and lower than 1.4mnsq. This evidence supports the unidimensionality of the HA 3 scale.

Table 30: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD		PTBIS CORR.	ITEMS
4	88	815	1.43	.12	1.21	2.4	1.98	5.1	A	.21	HA3(100)
5	77	815	1.60	.13	1.04	.5	1.46	2.5	B	.29	HA3(142)
8	222	815	.07	.09	1.13	2.7	1.19	2.7	C	.44	HA3(231)
3	516	815	-1.84	.08	1.01	.4	1.01	.1	D	.65	HA3(80)
1	250	815	-.14	.09	.97	-.8	.96	-.6	d	.54	HA3(27)
7	359	815	-.87	.08	.94	-1.9	.92	-1.8	c	.62	HA3(209)
2	233	815	-.02	.09	.86	-3.5	.81	-3.1	b	.58	HA3(54)
6	263	815	-.24	.08	.85	-4.1	.81	-3.6	a	.61	HA3(157)
MEAN	251.	815.	.00	.09	1.00	-.5	1.14	.1			
S.D.	132.	0.	1.05	.02	.12	2.3	.37	2.9			

The evidence presented for this HA 3 scale suggest that several items should be modified to occupy the lower logit regions of the scale, which will enable the scale to measure even a lower level of the construct. Both the person separation and reliability are extremely low. On the other hand item separation and reliability are high, which mean that it is very probable that the same item hierarchy can be expected in future test administrations. The results also show that the HA 3 scale function in a unidimensional manner, with all the items rendering adequate infit mnsq values. The unidimensional functioning of the scale provides evidence for both its construct and content validity.

4.4.2.5 Fatigue vs. Rigour (HA 4)

The following items comprise the HA 4 sub-scale:

HA 4 (22) – I have less energy and get tired more quickly than most other people.

HA 4 (43) – I recover more slowly than most people from minor illnesses or stress.

HA 4 (63) – I often need naps or extra rest periods because I get tired so easily.

HA 4 (92) – I need much extra rest, support, or reassurance to recover from minor illnesses or stress.

HA 4 (113) – It is extremely difficult for me to adjust to changes in my usual way of doing things because I get so tense, tired, or worried.

HA 4 (147) – I am more energetic and tire less quickly than most people.

HA 4 (182) – I recover more quickly than most people from minor illnesses or stress.

HA 4 (202) – I usually can stay ‘on the go’ all day without having to push myself.

HA 4 (236) – I usually feel much more confident and energetic than most people even after minor illnesses or stress.

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       ADULTS             MAP OF ITEMS
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     2                +
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                      |S
                     Q|
                      |  HA 4 (182)
     1           .##  +
                      |  HA 4 (63)
                      |  HA 4 (113)   HA 4 (43)
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     0                +M
           .########  |  HA 4 (202)
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        .###########  |  HA 4 (147)
    -1               M+  HA 4 (92)
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    -2                +
                     S|
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            .#######  |Q
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    -3                +  HA 4 (236)
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    -4             .  +
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Figure 15: Person Item Map

The person item map illustrates that the HA 4 item distribution overlaps considerably with the respondent distribution (see Figure 15); however, the respondent mean is located one logit below the item difficulty level mean, which points to the fact that not all of the items are perfectly on target when measuring the construct in the current sample. The majority of the sample seems to form a normal distribution around the sample mean.

It is concerning that the bottom end of the scale is populated by only one item. The scarcity of items at this end of the scale can inflate the standard error associated with the scale and in turn decrease the scale's ability to differentiate accurately between respondents with a low level of the construct.

The figure also shows that two items (HA 4 – 113 and HA 4 - 43) are located at the same logit value; these items provide similar information about the sample. Another item (HA 4 - 63) is also located in the same vicinity as the aforementioned pair of items. It is recommended that two of these three items should be revised so that they can eventually occupy the lower less populated region of the logit scale. This recommendation is also made for items HA 4 (92) and HA 4 (147). Such alterations will allow the scale to differentiate more accurately between people with a lower level of the HA 4 construct.

Table 31: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	3.0	9.0	-1.01	.92	.95	-.1	1.07	-.2
S.D.	1.5	.0	1.11	.16	.47	1.0	1.34	1.0
MAX.	8.0	9.0	2.58	1.24	2.53	3.2	9.90	3.2
MIN.	1.0	9.0	-2.80	.76	.38	-1.9	.15	-1.4

```
REAL RMSE   1.00  ADJ.SD     .48  SEPARATION  .48  ADULT  RELIABILITY  .19
MODEL RMSE   .93  ADJ.SD     .60  SEPARATION  .65  ADULT  RELIABILITY  .30
S.E. OF ADULT MEAN    .03
WITH      2 EXTREME ADULTS  =  1144 ADULTS   MEAN   -1.01  S.D.   1.11
REAL RMSE   1.00  ADJ.SD     .49  SEPARATION  .49  ADULT  RELIABILITY  .19
MODEL RMSE   .93  ADJ.SD     .61  SEPARATION  .65  ADULT  RELIABILITY  .30
```

The low respondent mean measure value (-1.01) indicates that the sample has a low standing on the HA 4 construct (see Table 31). The minimum, maximum and standard deviation measure values show that the construct has a range of approximately 5 logits and that on average there is minimal variation among the construct level of respondents. The minimum infit mnsq value (0.38) indicate too well behaved response patterns for some participants, while the maximum infit mnsq (2.53) points to individual response patterns that did not behave as the model predicted. The very high outfit mnsq value (9.90) provides evidence that multiple individuals have unusual response patterns to items far removed from their inherent construct level. The relatively low person separation value (0.65) indicates that the respondent clusters in Figure 15 are on average separated by a relatively small difference in their respective ratings on the construct. The low person reliability statistic (0.30) means that the majority of the respondents did not respond in a consistent fashion to the items of the scale. This means that not much confidence can be ascribed to the person distribution on the construct.

Table 32: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	376.1	1142.0	.00	.08	.99	-.3	1.11	-.7
S.D.	254.5	.0	1.35	.01	.16	3.6	.81	4.4
MAX.	954.0	1142.0	1.60	.10	1.33	6.0	3.37	9.9
MIN.	118.0	1142.0	-3.00	.07	.86	-5.2	.69	-5.0

REAL RMSE .08	ADJ.SD 1.35	SEPARATION 16.02 ITEM	RELIABILITY 1.00
MODEL RMSE .08	ADJ.SD 1.35	SEPARATION 16.49 ITEM	RELIABILITY 1.00
S.E. OF ITEM MEAN .48			

Table 32 shows that the HA 4 scale is difficult for the current sample to endorse in manner that will give them a high rating on the construct. The average infit and outfit respondent values are within the acceptable range of 0.6 and 1.4 (see Table 32), this indicates that on average the performance of the scale's items conformed to the response patterns predicted by the Rasch model.

Unlike the low person separation and reliability statistics, item separation and reliability are high at 16.49 and 1.00 respectively. The high reliability value means that if this set of items are administered to another sample it is expected that the sample will render the same item hierarchy. The high separation value on the other hand indicates that despite the clustering and duplication of items at similar logit values, the HA 4 items are on average more spread out on the construct than respondents.

Table 33 illustrates that all the HA 4 items have mnsq infit values higher than 0.6 and lower than 1.4mnsq. The table shows that only one item HA 4 (236) rendered a low point-biserial correlation, this corresponds with the results rendered by the analysis of the entire HA scale, where the same item produced an even lower point-biserial value (see Section 4.4.2.1). This scoring problem might cause the item not to function in unison with the rest of the items on this scale; however, the adequate infit mnsq value of this item indicates that the most probable cause of this negative correlation is a coding error, which warrants further investigation. It should also be noted that this item rendered a high outfit mnsq value (3.37); this can be attributed to a small number of unexpected or random responses to the item that did not match the predictions of the model.

From the evidence presented it is argued that the HA 4 scale is unidimensional and that all the items associated with this scale possess a single line of inquiry.

Table 33: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
9	954	1142	-3.00	.09	1.33	6.0	3.37	9.9	A-.05	HA 4 (236)
8	377	1142	-.13	.07	1.15	4.6	1.08	1.6	B .33	HA 4 (202)
6	548	1142	-.91	.07	1.08	3.2	1.10	2.5	C .38	HA 4 (147)
7	174	1142	1.09	.09	.95	-1.0	.81	-2.0	D .40	HA 4 (182)
2	219	1142	.76	.08	.89	-2.5	.71	-3.7	E .48	HA 4 (43)
1	118	1142	1.60	.10	.89	-1.6	.70	-2.4	d .40	HA 4 (22)
3	203	1142	.87	.08	.89	-2.4	.75	-3.0	c .46	HA 4 (63)
4	564	1142	-.98	.07	.87	-5.2	.82	-5.0	b .56	HA 4 (92)
5	228	1142	.70	.08	.86	-3.3	.69	-4.1	a .50	HA 4 (113)
MEAN	376.	1142.	.00	.08	.99	-.3	1.11	-.7		
S.D.	254.	0.	1.35	.01	.16	3.6	.81	4.4		

The results presented for the HA 4 scale suggest that some items on the scale are not functioning optimally, as they cluster together or are located at the same logit value. Both the person separation and reliability are extremely low, while item separation and reliability are high. Only one item rendered a low, but negligible point-biserial correlation, this item should be scrutinised for a coding/scoring error. Finally the HA 4 scale functioned in a unidimensional manner; hence it could be argued that the scale exclusively measures a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

It is concluded that the primary harm avoidance scale and all four its sub-scales HA 1, HA 2, HA 3, and HA 4 are unidimensional, and possess a high degree of construct validity and item reliability, but low respondent reliability. This means that one of the core criteria of the Rasch model is met, which in turn allows the interpretation of other output statistics derived from the Rasch model.

4.4.3 Psychometric properties of the Reward Dependence Scale and its associated Sub-scales

The primary reward dependence scale consists of three sub-scales: sentimentality (RD 1); attachment vs. detachment (RD 3); and dependence vs. independence (RD 4). A Rasch item analysis was conducted on the data derived from the primary scale and each of the sub-scales. The results illustrating the psychometric properties for the primary scale is presented first (see Section 4.4.3.1), where after the psychometric properties of each sub-scale are discussed in designated sections (see Sections 4.4.3.2 - 4.4.3.4).

4.4.3.1 Reward Dependence Scale (RD)

The person item map presented in Figure 16 show that the respondent distribution is relatively normal and overlaps considerably with the item distribution on the right hand side of the figure. The large overlap between these two distributions points out that items are relatively well suited to measure the RD construct among the current sample.

Similar to the NS and HA scale, the RD scale rendered multiple item clusters along its item distribution, for instance the shared logit location of items RD 4 (156), RD 4 (193), and RD 4 (46). Duplication of items or overpopulated item clusters provide little extra information about a sample's standing on the construct and can artificially confound the standard error associated with the scale. It is recommended that some of these items should be altered to eventually appear in a logit range where little or no items are present. This will allow the scale to assess the construct with greater precision.

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    3                +
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                .##  |
                    Q|Q
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    2         .####  +
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            .######  |  RD 1 (181)
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                    S|
           .#######  |  RD 1 (55)   RD 3 (180)
                     |  RD 4 (156)  RD 4 (193)  RD 4 (46)
                     |
       ############  |S
    1                +
       .###########  |  RD 4 (131)
                    M|  RD 4 (14)
      .############  |
                     |  RD 3 (201)
                  .  |
        .##########  |
                     |  RD 3 (44)
         .#########  |
                     |  RD 3 (143)
    0       .###### S+M RD 1 (158)  RD 1 (28)
                     |  RD 1 (3)
             .#####  |
                                |
                 .#  |  RD 1 (120)
                     |  RD 3 (117)
                 ##  |  RD 1 (224)
                    Q|
                     |  RD 3 (226)
                 .#  |  RD 1 (102)  RD 4 (71)
   -1                +
                  .  |S RD 3 (68)
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                     |  RD 1 (210)  RD 3 (21)
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Figure 16: Person item Map

Table 34: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	15.2	24.0	.76	.49	1.00	-.1	1.00	-.1
S.D.	3.1	.0	.74	.05	.20	.9	.37	.9
MAX.	23.0	24.0	3.62	1.04	1.60	2.5	3.49	3.0
MIN.	5.0	23.0	-1.65	.46	.53	-3.0	.38	-2.7

REAL RMSE	.52	ADJ.SD	.53	SEPARATION	1.03	ADULT	RELIABILITY	.52
MODEL RMSE	.50	ADJ.SD	.55	SEPARATION	1.11	ADULT	RELIABILITY	.55
S.E. OF ADULT MEAN	.02							

The mean respondent measure value of 0.76 illustrates that the sample has a relatively high average standing on the RD construct (see Table 34). The minimum, maximum and standard deviation measure values show that the construct has a range of just more than five logits and that there is minimal variation in the construct level within the sample. The minimum infit mnsq value (0.53) indicates that the response patterns of several participants are too predictable, while the maximum infit mnsq value (1.60) point to individual response patterns that did not behave as the model expected. The high maximum respondent outfit mnsq value (3.49) points out that multiple individuals have atypical response patterns to items far removed from their inherent construct level (see Table 34).

Table 34 also shows a relatively low person separation statistic (1.11); this statistic reflects the sensitivity of the scale and indicates that on average the scale is able to differentiate between people who vary approximately one logit from one another. The respondent reliability of the RD scale is relatively low at 0.55. The low reliability indicates that the majority of the respondents did not respond in a consistent fashion to the items of the scale; which means that not much confidence can be ascribed to the person distribution on the construct.

Table 35: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	726.2	1144.0	.00	.07	1.00	-.1	1.00	-.1
S.D.	227.6	.0	1.09	.01	.06	2.0	.12	2.3
MAX.	1057.0	1144.0	1.71	.11	1.14	5.5	1.23	6.6
MIN.	340.0	1143.0	-1.96	.06	.88	-4.7	.68	-4.8

REAL RMSE	.08	ADJ.SD	1.09	SEPARATION	14.32	ITEM	RELIABILITY	1.00
MODEL RMSE	.08	ADJ.SD	1.09	SEPARATION	14.45	ITEM	RELIABILITY	1.00
S.E. OF ITEM	MEAN	.23						

The average respondent measure value (0.76) indicated in Table 34 is higher than the mean item measure value of zero (see Table 35 above). This implies that on average the items of the scale are relatively easy for the current sample to endorse in a manner that will increase their standing on the RD construct. The mean mnsq infit and outfit values in Table 35 show that the functioning of the RD items conforms to the patterns predicted by the Rasch model. In other words most of the items of the scale performed according to their estimated item difficulty level. The table also shows that the scale's item separation and reliability are high at 14.45 and 1.00 respectively. The high item reliability value means that when this set of items are administered to another sample it is likely that the item performance will be repeated and that the same item hierarchy will be established.

Table 36 shows that the individual infit mnsq values rendered by the items are all located within the acceptable mnsq infit value range, and that no items have negative point-biserial correlation values. It can be concluded from the individual item infit mnsq statistics that the primary RD scale does function in a unidimensional manner.

Table 36: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
8	340	1143	1.71	.07	1.06	2.0	1.12	2.8	.22	RD 1 (181)
3	405	1144	1.43	.07	1.14	5.5	1.23	6.6	.12	RD 1 (55)
16	407	1144	1.42	.07	.99	-.2	1.00	-.1	.32	RD 3 (180)
24	426	1144	1.34	.06	1.03	1.3	1.04	1.2	.12	RD 4 (193)
20	440	1144	1.28	.06	.96	-1.7	.95	-1.8	.37	RD 4 (46)
23	445	1144	1.26	.06	.97	-1.2	.96	-1.3	.36	RD 4 (156)
22	535	1144	.90	.06	.97	-1.6	.97	-1.2	.36	RD 4 (131)
19	565	1144	.78	.06	.93	-3.6	.93	-3.1	.41	RD 4 (14)
17	623	1144	.55	.06	.91	-4.7	.89	-4.8	.44	RD 3 (201)
12	683	1144	.31	.06	1.03	1.3	1.03	.9	.29	RD 3 (44)
15	746	1144	.05	.07	1.02	.9	1.01	.2	.29	RD 3 (143)
2	749	1144	.04	.07	.98	-.9	.96	-1.1	.34	RD 1 (28)
7	764	1144	-.03	.07	1.01	.3	1.04	1.0	.29	RD 1 (158)
1	791	1144	-.15	.07	1.06	1.9	1.06	1.4	.24	RD 1 (3)
6	850	1144	-.43	.07	1.02	.7	1.00	.1	.27	RD 1 (120)
14	872	1144	-.54	.07	.96	-1.0	.95	-1.0	.33	RD 3 (117)
10	892	1144	-.65	.07	1.08	2.0	1.17	2.8	.15	RD 1 (224)
18	912	1144	-.76	.08	.97	-.7	.97	-.4	.30	RD 3 (226)
21	934	1144	-.90	.08	1.03	.6	1.02	.3	.23	RD 4 (71)
5	941	1144	-.94	.08	1.04	.8	1.10	1.4	.20	RD 1 (102)
13	958	1144	-1.05	.08	.88	-2.4	.76	-3.5	.42	RD 3 (68)
11	1046	1144	-1.83	.11	.90	-1.3	.68	-3.1	.36	RD 3 (21)
9	1047	1144	-1.84	.11	1.00	.0	1.12	1.0	.17	RD 1 (210)
4	1057	1144	-1.96	.11	.99	-.1	.93	-.5	.20	RD 1 (83)
MEAN	726.	1144.	.00	.07	1.00	-.1	1.00	-.1		
S.D.	228.	0.	1.09	.01	.06	2.0	.12	2.3		

The evidence presented for the primary reward dependence scale shows that the scale has low respondent reliability and separation values. The results also show that this scale is unidimensional and exclusively measures a single construct. The unidimensionality of the scale supports both the construct-and content validity of the entire scale. The three sub-scales comprising the RD scale are discussed in turn below.

4.4.3.2 Sentimentality (RD 1)

The following items comprise the RD 1 sub-scale:

RD1 (3) – I am often moved deep by a fine speech or poetry.

RD1 (28) – I like to please other people as much as I can.

RD1 (55) – I am more sentimental than most people.

RD1 (83) – I feel it is more important to be sympathetic and understanding of other people than to be practical and tough-minded.

RD1 (102) – I am strongly moved by sentimental appeals (like when asked to help crippled children).

RD1 (120) – I find sad songs and movies pretty boring.

RD1 (158) – I often give in to the wishes of friends.

RD1 (181) – I am more likely to cry at a sad movie than most people.

RD1 (210) – People find it easy to come to me for help, sympathy and warm understanding.

RD1 (224) – I regularly take time to consider whether what I am doing is right or wrong.

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ADULTS                  MAP OF ITEMS
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    1                +
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                     |   RD 1 (158)  RD 1 (28)
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                    S|   RD 1 (3)
    0        .#####  +M
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                     |   RD 1 (120)
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                     |   RD 1 (224)
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                     |   RD 1 (102)
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                    Q|
   -1                +
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                     |S
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                     |   RD 1 (210)
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   -2                +
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Figure 17: Person Item Map

Figure 17 illustrates the person item map for the RD 1 scale. The figure shows that only a small section of the item distribution overlaps with the respondent distribution. This together with large difference between respondent and item difficulty means implies that the scale's items are not that well targeted to measure the construct level among the sample. The person item map shows that the sample clusters around the respondent mean to form a relatively normal distribution with regards to their standing on the construct.

The person item map also shows that items are relatively spread out along the logit range; however, three items are located at the bottom end of the scale where few respondent construct levels are plotted. Although these items could be altered to measure a higher level of the construct, their current location can prove useful when assessing a sample with a low average standing on the construct.

The figure illustrates that two items (RD 1 - 158 and RD 1 - 28) share a similar logit value. It is recommended that one of these items should be revised to measure a higher level of the RD 1 construct. The same argument is made for items RD 1 (83) and RD 1 (210) which are located at a similar logit location. A large gap is also observed in the item distribution between items RD 1 (55) and RD 1 (158); it is recommended that if any items are modified due to over representation or duplication at logit locations, that these items should be modified to relocate to gaps in the item distribution. This will increase the measurement precision and decrease any measurement error associated with the RD 1 scale.

Table 37: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	6.8	10.0	1.05	.83	1.00	-.1	.98	-.2
S.D.	1.5	.0	.96	.13	.37	.9	.68	.8
MAX.	9.0	10.0	2.77	1.14	2.09	2.9	8.46	2.8
MIN.	1.0	9.0	-2.70	.72	.42	-1.7	.26	-1.4

REAL RMSE	.91	ADJ.SD	.32	SEPARATION	.35	ADULT RELIABILITY	.11
MODEL RMSE	.84	ADJ.SD	.46	SEPARATION	.54	ADULT RELIABILITY	.23
S.E. OF ADULT MEAN	.03						
WITH 24 EXTREME ADULTS = 1144 ADULTS				MEAN	1.11	S.D.	1.02
REAL RMSE	.92	ADJ.SD	.43	SEPARATION	.47	ADULT RELIABILITY	.18
MODEL RMSE	.86	ADJ.SD	.54	SEPARATION	.63	ADULT RELIABILITY	.28

The mean respondent measure value (1.05) indicates that the sample possesses a high inherent level of the RD 1 construct (see Table 37). The minimum, maximum and standard deviation measure values illustrate that the construct has a range of just less than five and a halve logits, and that inconsistent variation among the measured construct levels of respondents is negligible. The minimum respondent infit mnsq value of 0.42 indicates too well behaved response patterns for some respondents, while the maximum infit mnsq value (2.09) indicate individual response patterns that did not behave as the model predicted. The large maximum outfit mnsq value (8.46) provides evidence for the fact that multiple individuals responded in an unexpected manner to items remote from their inherent construct level. Finally the small minimum mnsq outfit value of 0.26 points out that some participant's responses to items far removed from their construct level are too predictable.

The measure has a low reliability (0.28), which means that not much confidence can be ascribed to the person distribution on the construct. The person separation value of 0.63 indicates that the respondent clusters in Table 37 are on average separated by a relatively small difference.

Table 38: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	759.6	1119.9	.00	.08	1.00	.0	.98	.0
S.D.	229.5	.2	1.22	.02	.03	.8	.08	1.0
MAX.	1033.0	1120.0	2.16	.12	1.04	1.1	1.11	1.9
MIN.	316.0	1119.0	-1.78	.07	.95	-.9	.81	-1.4

REAL RMSE .08	ADJ.SD 1.22	SEPARATION 14.71	ITEM	RELIABILITY 1.00	
MODEL RMSE .08	ADJ.SD 1.22	SEPARATION 14.78	ITEM	RELIABILITY 1.00	
S.E. OF ITEM MEAN .41					

Table 38 presents a synopsis of the item statistics that characterizes the functioning of the RD 1 scale. The results illustrate that the scale is relatively easy for the sample to endorse in manner that will increase their standing on the construct, as the average construct level of 1.05 indicated in Table 37 is much higher than the mean item measure value of 0.0. The average infit and outfit mnsq values for the sub-scale are within the acceptable range of 0.6 and 1.4 and indicate that on average the performance of the RD 1 items conform to the performance predictions made by the Rasch model.

Contrasting to the low person separation and reliability values (see Table 37), item separation and reliability are high at 14.78 and 1.00 respectively. The high reliability value indicates that it is likely that the same item hierarchy will be established in future test administrations. The high separation value means that RD 1 items are on average more spread out on the construct than respondents.

Table 39 shows the individual item statistics and shows that item RD 1 (181) has the highest measure value. Participants with low inherent levels of the construct are expected to endorse this item in such a way that it would not increase their standing on the construct. The easiest item to endorse on the scale is RD 1 (83). The results indicate that all the items have mnsq infit values that fall between 0.6 and 1.4mnsq. These fit statistics offer enough evidence to support the unidimensionality of the RD 1 scale.

Table 39: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD		PTBIS CORR.	ITEMS
8	316	1119	2.16	.07	1.03	1.0	1.11	1.9	A	.39	RD 1 (181)
6	826	1120	-.17	.07	1.04	1.1	1.07	1.1	B	.33	RD 1 (120)
3	381	1120	1.84	.07	1.02	.8	1.04	1.0	C	.41	RD 1 (55)
10	868	1120	-.41	.08	1.02	.4	.96	-.6	D	.34	RD 1 (224)
1	767	1120	.13	.07	1.01	.4	1.00	.1	E	.37	RD 1 (3)
9	1023	1120	-1.65	.11	1.00	-.1	.90	-.8	e	.26	RD 1 (210)
2	725	1120	.33	.07	.98	-.9	.99	-.3	d	.41	RD 1 (28)
7	740	1120	.26	.07	.98	-.9	.97	-.7	c	.41	RD 1 (158)
5	917	1120	-.71	.08	.96	-.9	.94	-.8	b	.36	RD 1 (102)
4	1033	1120	-1.78	.12	.95	-.5	.81	-1.4	a	.28	RD 1 (83)
MEAN	760.	1120.	.00	.08	1.00	.0	.98	.0			
S.D.	230.	0.	1.22	.02	.03	.8	.08	1.0			

The results presented for the RD 1 scale suggest that some of the scale's items are problematic as they cluster together at similar logit values. These items should either be deleted or modified to occupy the gaps in the item distribution of the scale. Both the person separation and reliability are low, while item separation and reliability are high. Finally the RD 1 scale functioned in a unidimensional manner, which implies that the scale exclusively measured a single construct. The unidimensionality of the scale supports both the construct- and content validity of the scale.

4.4.3.3 Attachment vs. Detachment (RD 3)

The following items comprise the RD 3 sub-scale:

RD3 (21) – I like to discuss my experiences and feelings with openly with friends instead of keeping them to myself.

RD3 (44) – It wouldn't bother me to be alone all the time.

RD3 (68) – I like to keep my problems to myself.

RD3 (117) – I would like to have warm and close friends with me most of the time.

RD3 (143) – My friends find it hard to know my feelings because I seldom tell them about my private thoughts.

RD3 (180) – I usually like to stay cool and detached from other people.

RD3 (201) – Even when I am with friends, I prefer not to "open up" very much.

RD3 (226) – If I am feeling upset, I usually feel better around friends than when left alone.

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ADULTS                        MAP OF ITEMS
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    1                +
                    M|  RD 3 (201)
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               .###  |  RD 3 (226)
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   -1                +  RD 3 (68)
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                    Q|
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                     |  RD 3 (21)
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Figure 18: Person Item Map

The person item map presented in Figure 18 illustrates that the item distribution of the RD 3 scale overlaps considerably with the respondent distribution, which means that the items are well suited to measure the construct level present in the current sample. The figure demonstrates that the majority of the sample clusters around the respondent mean to form a relatively normal distribution with regards to their standing on the construct; however, the distribution is somewhat skewed towards the higher end of the logit scale. The large number of participants, which are grouped at the top end of the scale, indicates that the scale is unable to differentiate between people with high inherent levels of the RD 3 construct. One way to rectify this ceiling effect is to include items which are able to measure an even higher level of the construct. The scale’s items are distributed fairly well, with no duplication or clustering of items at similar logit values.

Table 40: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	5.3	8.0	.93	.93	1.00	-.1	.98	-.2
S.D.	1.5	.0	1.12	.13	.39	.9	.79	.8
MAX.	7.0	8.0	2.40	1.15	2.67	3.5	9.90	3.2
MIN.	1.0	8.0	-2.39	.80	.49	-1.9	.27	-1.6

REAL RMSE 1.01 ADJ.SD .49 SEPARATION .49 ADULT RELIABILITY .19
MODEL RMSE .93 ADJ.SD .62 SEPARATION .66 ADULT RELIABILITY .31
S.E. OF ADULT MEAN .03
WITH 102 EXTREME ADULTS = 1143 ADULTS MEAN 1.10 S.D. 1.29
REAL RMSE 1.06 ADJ.SD .73 SEPARATION .68 ADULT RELIABILITY .32
MODEL RMSE 1.00 ADJ.SD .81 SEPARATION .81 ADULT RELIABILITY .40

The mean respondent measure value (0.93) shows that the sample has a high inherent level of the RD 3 construct (see Table 40). The minimum, maximum and standard deviation measure values show that the construct has a range of just less than five logits, and that inconsistent variation in the construct level among the sample is minimal. The minimum infit mnsq value (0.49) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (2.67) point to individual response patterns that did not behave as the model expected. The high maximum outfit mnsq value (9.90) provides evidence that multiple individuals have unexpected response patterns towards items far removed from their inherent construct level.

The person separation value (0.80) presented in Table 40 indicates that the respondent clusters in Figure 18 are on average separated by a relatively small difference in their respective construct levels. The RD 3 scale has a low respondent reliability (0.40), which means that not much confidence can be ascribed to the person distribution on on the RD 3 construct.

Table 41: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	684.1	1041.0	.00	.08	.99	.0	.98	.1
S.D.	194.5	.0	1.16	.01	.10	2.6	.21	2.8
MAX.	949.0	1041.0	2.02	.12	1.11	3.2	1.29	4.0
MIN.	310.0	1041.0	-1.90	.07	.86	-4.4	.63	-3.6

REAL RMSE .08	ADJ.SD 1.15	SEPARATION 13.60	ITEM	RELIABILITY	.99
MODEL RMSE .08	ADJ.SD 1.15	SEPARATION 13.80	ITEM	RELIABILITY	.99
S.E. OF ITEM MEAN .44					

Table 41 presents a summary of the item statistics for the RD 3 sub-scale. The results illustrate that the average respondent construct level (0.93) indicated in Table 40 is higher than the mean item measure value (see Table 41). Hence the scale seems relatively easy for the sample to endorse in such a way that it will increase their standing on the construct. Table 41 also shows the average infit and outfit mnsq values for the scale. These values are both within the acceptable mnsq range, which indicates that the items of the RD 3 scale mostly conform to the item performance patterns predicted by the Rasch model. The results presented in the table also show that item separation and reliability are high at 13.80 and 0.99 respectively, which means that despite the clustering of items at similar logit values, the items comprising the RD 3 scale are more spread out on the construct than the respondents.

Table 42 illustrates that the item, which is the most difficult to endorse in order to increase one’s standing on the construct is RD 3 (180). Participants with low inherent levels of the construct are expected to endorse this item in such a way that it would not increase their standing on the construct.

The results in Table 41 and Table 42 indicate that all the RD 3 items produced mnsq infit values that fall within 0.6 and 1.4mnsq, and that no items produced low point-biserial correlations. The fit statistics rendered by this sub-scale offers enough evidence to prove that the RD 3 scale functions in a unidimensional manner.

Table 42: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
6	310	1041	2.02	.07	1.11	3.2	1.29	4.0	A .45	RD 3 (180)
4	775	1041	-.38	.08	1.08	1.8	1.17	2.3	B .40	RD 3 (117)
2	587	1041	.64	.07	1.07	2.5	1.14	3.2	C .46	RD 3 (44)
5	649	1041	.33	.07	1.05	1.5	1.07	1.4	D .46	RD 3 (143)
8	816	1041	-.65	.08	.98	-.5	.93	-.9	d .46	RD 3 (226)
7	526	1041	.94	.07	.89	-4.4	.86	-3.6	c .58	RD 3 (201)
3	861	1041	-.99	.09	.86	-2.8	.77	-2.6	b .50	RD 3 (68)
1	949	1041	-1.90	.12	.86	-1.8	.63	-2.7	a .45	RD 3 (21)
MEAN	684.	1041.	.00	.08	.99	.0	.98	.1		
S.D.	195.	0.	1.16	.01	.10	2.6	.21	2.8		

The results presented for this sub-scale suggest that the items constituting the scale are relatively well distributed. The clustering of respondents at the top end of the scale may warrant the inclusion of items that measure a higher level of the construct. Both the person separation and reliability are low, while item separation and reliability were found to be high. Finally the RD 3 scale is unidimensional, which means that the scale exclusively measures a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

4.4.3.4 Dependence vs. Independence (RD 4)

The following items comprise the RD 4 sub-scale:

RD4 (14) – I usually do things my own way – rather than giving in to the wishes of other people.

RD4 (46) – I don't care very much whether other people like me or the way I do things.

RD4 (71) – I do not think it is smart to help weak people who cannot help themselves.

RD4 (131) – Other people often think that I am too independent because I won't do what they want.

RD4 (156) – I don't go out of any way to please other people.

RD4 (193) – Individual right are more important than the needs of any group.

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ADULTS                         MAP OF ITEMS
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                     |  RD 4 (193)
                     |  RD 4 (156)   RD 4 (46)
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                     |  RD 4 (131)
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    0                +M RD 4 (14)
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Figure 19: Person Item Map

Figure 19 illustrates the person item map for the RD 4 sub-scale. The figure shows that the item distribution overlaps entirely with the respondent's distribution. This large overlap results in a relatively small difference between the sample and item mean, which implies that the items comprising the RD 4 scale is well suited to measure the construct among the current sample.

The person item map demonstrates that the majority of the sample clusters around the respondent mean to produce a relatively normal distribution with regards to their on the measured construct. The figure also shows that three items (RD 4 – 156, RD 4 – 46 and RD 4 - 193) share a similar logit value. It is recommended that two of these items should be revised to relocate to under populated areas or gaps in the item distribution.

Considerable gaps can be observed in the item distribution, for instance a large gap exists between item RD 4 (71) and RD 4 (14), another prominent gap is shown above RD 4 (193). It is recommended that if items need to be modified, that they should be modified to relocate to the logit values in these gaps. This will increase the measurement precision and decrease measurement error associated with this scale.

Table 43: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	2.9	6.0	-.05	.99	.99	-.1	1.02	-.1
S.D.	1.3	.0	1.15	.12	.38	.8	.81	.8
MAX.	5.0	6.0	1.85	1.23	2.00	2.9	8.49	2.5
MIN.	1.0	6.0	-1.90	.88	.39	-1.3	.23	-1.1

REAL RMSE 1.07 ADJ.SD .41 SEPARATION .38 ADULT RELIABILITY .13
MODEL RMSE 1.00 ADJ.SD .56 SEPARATION .56 ADULT RELIABILITY .24
S.E. OF ADULT MEAN .04
WITH 74 EXTREME ADULTS = 1144 ADULTS MEAN -.03 S.D. 1.31
REAL RMSE 1.11 ADJ.SD .70 SEPARATION .63 ADULT RELIABILITY .29
MODEL RMSE 1.04 ADJ.SD .79 SEPARATION .76 ADULT RELIABILITY .37

The minimum, maximum and standard deviation respondent measure values presented in Table 43 show that the construct has a range of just more than three and a half logits, and that inconsistent variation in the construct level among the sample is negligible. The minimum infit mnsq value (0.39) indicate too well behaved response patterns for some persons, while the maximum infit mnsq value (2.00) point to individual response patterns that did not behave as the model predicted. The large maximum outfit mnsq value (8.49) points out that multiple individuals have unexpected response patterns towards items far removed from their inherent construct level. Finally the small minimum mnsq outfit value (0.23) indicates that some participants responses to items far removed from their construct level are too predictable.

Table 43 also shows a relatively low person separation value (0.76), which means that the clusters of respondents depicted in Figure 19 are on average separated by a relatively small difference with regards to their respective construct levels. The scale has a low person reliability (0.37), which means that not much confidence can be ascribed to the person distribution on the RD 4 construct.

Table 44: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	516.5	1070.0	.00	.07	1.00	-.2	1.02	-.2
S.D.	176.1	.0	.96	.01	.05	1.3	.11	1.3
MAX.	893.0	1070.0	.69	.09	1.08	1.5	1.26	2.3
MIN.	385.0	1070.0	-2.06	.07	.94	-2.0	.93	-1.7

REAL RMSE	.08	ADJ.SD	.95	SEPARATION 12.70	ITEM	RELIABILITY .99
MODEL RMSE	.07	ADJ.SD	.95	SEPARATION 12.87	ITEM	RELIABILITY .99
S.E. OF ITEM MEAN	.43					

Table 44 shows a summary of the item statistics for the RD 4 scale. The results illustrate that the average respondent construct level (-0.05) indicated in Table 43 is very close to the mean item measure value (0.00). This scenario is also evident in the person item map, which shows the close proximity between the item and person distribution means. Table 44 shows that the scale’s average infit and outfit mnsq values are within the acceptable range of 0.6 and 1.4 mnsq. This indicates that on average, the performance of the items conform to the performance patterns expected by the Rasch model.

Item separation and reliability are high at 12.87 and 0.99 respectively (see Table 44). This means that despite the clustering of items at a similar logit values, the items comprising the RD 4 scale are on average more spread out on the construct than the respondents.

Table 45 illustrates that item RD 4 (193) has the highest measure value; participants with a low inherent level of the construct are expected to endorse this item in such a way that it would decrease their standing on the construct. Table 45 also indicates that all the RD 4 items have mnsq infit values that fall within 0.6 and 1.4 mnsq. The table shows that no items produced low point-biserial correlations. The fit statistics for this sub-scale shows that the RD 4 scale functions in a unidimensional manner.

Table 45: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
3	893	1070	-2.06	.09	1.08	1.5	1.26	2.3	A .40	RD 4 (71)
5	404	1070	.59	.07	1.03	1.1	1.03	.6	B .49	RD 4 (156)
6	385	1070	.69	.07	1.02	.6	.99	-.1	C .50	RD 4 (193)
2	399	1070	.62	.07	.98	-.7	.98	-.5	c .52	RD 4 (46)
1	524	1070	.01	.07	.96	-1.3	.94	-1.4	b .54	RD 4 (14)
4	494	1070	.15	.07	.94	-2.0	.93	-1.7	a .55	RD 4 (131)
MEAN	517.	1070.	.00	.07	1.00	-.2	1.02	-.2		
S.D.	176.	0.	.96	.01	.05	1.3	.11	1.3		

The results presented throughout this section suggest that the items of the RD 4 scale are relatively well distributed over the logit range. Both the person separation and reliability are low, while item separation and reliability are high. The RD 4 scale functioned in a unidimensional manner, which offers support for both the construct-and content validity of the scale.

It is concluded that the primary RD scale and all three its sub-scales RD 1, RD 3, and RD 4 are unidimensional, and possess a high degree of construct validity and item reliability, but low respondent reliability. This means that one of the core criteria of the Rasch model is met, which in turn allows the interpretation of other output statistics derived from the Rasch model.

4.4.4 Psychometric properties of the Persistence Scale (PS)

Unlike the other primary scales of the TCI the persistence scale has no sub-scales. A Rasch item analysis was conducted on the data derived from the scale; the results illustrating the psychometric properties of scale are presented in the remainder of this section.

The following items comprise the Persistence scale:

PS (11) – I could probably accomplish more than I do, but I don't see the point in pushing myself harder than is necessary to get by.

PS (37) – I am usually so determined that I continue to work long after other people have given up.

PS (62) – I am more hard-working than most people.

PS (103) – I usually push myself harder than most people do because I want to do as well as I possibly can.

PS (128) – I am satisfied with my accomplishments, and have little desire to do better.

PS (166) – I often give up a job if it takes much longer than I thought it would.

PS (205) – I am more of a perfectionist than most people.

PS (218) – I often push myself to the point of exhaustion or try to do more than I really can.

```
ADULTS                 MAP OF ITEMS
             <frequ>|<less>
   3           .##  +
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                    |
                    |Q
         .########  |
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                    |
                   S|  PS (128)
                    |
   2                +
                    |
                    |
                    |
                    |
     .############  |
                    |
                    |S PS (205)
                    |
                   M|
   1                +  PS (11)
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                    |
         .########  |
                    |
                    |
                    |
                    |
                    |
                    |
   0        .##### S+M
                    |
                    |
                    |  PS (218)
                    |  PS (62)
                    |
                    |
               .##  |  PS (37)
                    |
                    |
  -1               Q+  PS (166)
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                    |
                    |S
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                .#  |
                    |
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                    |
  -2                +  PS (103)
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                 .  |
                    |Q
                    |
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                    |
  -3                +
              <rare>|<more>
```

Figure 20: Person Item Map

Figure 20 illustrates the person item map for the persistence scale; and shows a large difference between the sample and item mean. This implies that the items comprising the persistence scale are not that well suited to measure the construct level within the current sample. The person item map also demonstrates that the majority of the sample clusters around the respondent mean, which indicates that the sample produces a relatively normal distribution with regards to their standing on the construct.

Although the item distribution on the right hand side of the figure shows that the scale's items are relatively spread out along the logit range, a large gap can still be observed between items PS (218) and PS (11). It is also evident from the item distribution that two items (PS - 218 and PS - 62) share a similar logit value. It is recommended that one of these items should be revised to relocate to the gap higher up on the scale. This will increase the measurement precision associated with this scale.

Table 46: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	5.4	8.0	1.11	.95	.99	-.1	.99	-.2
S.D.	1.3	.0	1.06	.12	.43	.9	.97	.8
MAX.	7.0	8.0	2.53	1.18	2.73	2.8	9.90	2.8
MIN.	1.0	7.0	-2.48	.83	.39	-1.9	.26	-1.5

REAL RMSE	1.04	ADJ.SD	.24	SEPARATION	.23	ADULT RELIABILITY	.05
MODEL RMSE	.96	ADJ.SD	.46	SEPARATION	.48	ADULT RELIABILITY	.19
S.E. OF ADULT MEAN	.03						
WITH 79 EXTREME ADULTS = 1125 ADULTS		MEAN	1.27	S.D.	1.18		
REAL RMSE	1.08	ADJ.SD	.48	SEPARATION	.44	ADULT RELIABILITY	.16
MODEL RMSE	1.01	ADJ.SD	.61	SEPARATION	.61	ADULT RELIABILITY	.27

The mean respondent measure value (1.11) shows that the sample has a high inherent level of the measured construct (see Table 46). The minimum, maximum and standard deviation measure values show that the construct has a range of five logits, and that inconsistent variation among the construct level of respondents is negligible. The minimum infit mnsq value (0.39) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (2.73) point to individual response patterns that do not behave as the model expected. The large maximum outfit mnsq value (9.90) provides evidence for the fact that some individuals have unexpected response patterns to items far removed from their inherent construct level. Finally the small minimum mnsq outfit value (0.26) points out that a number of participant responses to items far removed from their construct level are too predictable.

The respondent summary table shows a low person separation value (0.61), which means that the respondent clusters depicted in Figure 20 is on average separated by a relatively small difference in terms of construct levels. The scale rendered a low reliability statistic (0.27), which means that not much confidence can be ascribed to the person distribution on the construct.

Table 47: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	711.1	1045.9	.00	.09	.99	.0	1.00	.3
S.D.	217.1	.3	1.30	.02	.09	2.2	.23	3.1
MAX.	978.0	1046.0	2.19	.13	1.12	3.5	1.50	7.0
MIN.	311.0	1045.0	-2.05	.07	.84	-3.9	.71	-4.3
REAL RMSE .09	ADJ.SD 1.29	SEPARATION 14.48	ITEM	RELIABILITY 1.00				
MODEL RMSE .09	ADJ.SD 1.29	SEPARATION 14.67	ITEM	RELIABILITY 1.00				
S.E. OF ITEM MEAN .49								

Table 47 presents a synopsis of the item statistics for the persistence scale; and shows that the scale is relatively easy for the sample to endorse in a manner that will increase their standing on the construct, as the mean respondent level (1.11) indicated in Table 46 is considerably higher than the mean item measure value (0.00). Table 47 also lists the average infit and outfit mnsq values for the scale, these values are within the acceptable range of 0.6 and 1.4. These values point out that on average the performance of the items of the persistence scale conformed to the average performance patterns predicated by the model. Contrasting to the low person separation and reliability values reported earlier, reliability (1.00) and item separation (14.67) are high. The high reliability statistic indicates that if this scale is in future administered to another sample it is likely that the same item hierarchy will be established.

The results in Table 48 points out that all the items rendered mnsq infit values that fall between 0.6 and 1.4mnsq, which points out that the persistence scale functions in a unidimensional manner.

Table 48: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.		ITEMS
5	311	1046	2.19	.07	1.12	3.5	1.50	7.0	A	.40	PS (128)
8	799	1046	-.31	.08	1.05	1.1	1.12	1.7	B	.38	PS (218)
1	553	1046	.99	.07	1.05	2.0	1.07	1.9	C	.45	PS (11)
6	891	1046	-1.00	.09	1.04	.7	.96	-.3	D	.34	PS (166)
7	488	1046	1.30	.07	.97	-1.0	.99	-.2	d	.51	PS (205)
2	851	1045	-.68	.09	.92	-1.6	.87	-1.6	c	.44	PS (37)
4	978	1046	-2.05	.13	.90	-1.0	.75	-1.5	b	.33	PS (103)
3	818	1046	-.44	.08	.84	-3.9	.71	-4.3	a	.52	PS (62)
MEAN	711.	1046.	.00	.09	.99	.0	1.00	.3			
S.D.	217.	0.	1.30	.02	.09	2.2	.23	3.1			

The results presented for the primary persistence scale suggest that two items are problematic as they cluster together at a similar logit value. One of these items could either be deleted or modified to occupy the gap higher up in the item distribution. Both the person separation and reliability are extremely low, while item separation and reliability are high. The item statistics show that the persistence scale is unidimensional, which means that the scale exclusively measured a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

4.4.5 Psychometric properties of the Self-Directedness Scale and its associated Sub-scales

The primary self-directedness scale consists of five sub-scales: responsibility vs. blaming (SD 1), purposefulness vs. lack of goal direction (SD 2), resourcefulness vs. inertia (SD 3), self-acceptance vs. self-striving (SD 4), and congruent second nature vs. bad habits (SD 5). The results illustrating the psychometric properties for the primary scale are presented first (see Section 4.4.5.1), where after the psychometric properties of each sub-scale are discussed in designated sections (see Sections 4.4.5.2 - 4.4.5.6).

4.4.5.1 Self-Directedness Scale (SD)

The person item map presented in Figure 21 shows that the respondent distribution is relatively normal and overlaps considerably with the item distribution, which means that most of the scale's items are relatively well suited to measure the construct level among the current sample. Relatively few gaps exist along the participant distribution, which illustrates that the SD scale is well suited to assess the relatively narrow range of the construct.

It is concerning that multiple item clusters exist along the item distribution, for instance the shared logit location of the following items SD 1 (169), SD 3 (197), SD 4 (229), SD 4 (32) and SD 4 (94) (see Figure 21). It is recommended that some of these items should be altered to eventually appear in a logit range where little or no items are present. This will allow the scale to assess the construct with greater precision.

```
ADULTS                   MAP OF ITEMS
                  <frequ>|<less>
    5                   . +
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                        . |
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                          |
                          |
    4                     +
                        . |
                          |
                          |
                       .# |  SD 4 (179)
                          |
    3                 .### +Q
                         Q|
                      ### |  SD 1 (24)
                          |
                   .##### |
                  .###### S|  SD 4 (60)
    2            .####### +
              .########## |
               .######### |  SD 4 (85)   SD 5 (115)
              .########## |S SD 4 (150)  SD 5 (184)
              .########## M|  SD 4 (74)
             .########### |
    1          .######### +  SD 2 (9)    SD 4 (214)
               .######### |  SD 1 (121   SD 4 (136)
                  .###### S|  SD 1 (169   SD 3 (197)   SD 4 (229)   SD 4 (32)   SD 4 (94)
               .######### |
                     .### |  SD 1 (4)    SD 2 (105)
                      .## |  SD 1 (58)   SD 2 (159)   SD 4 (107)
    0                 .## +M SD 3 (171)  SD 5 (135)   SD 5 (162)   SD 5 (39)
                       ## Q|
                        . |  SD 2 (30)   SD 5 (104)
                        . |  SD 1 (198)  SD 3 (40)
                          |
                        . |  SD 1 (86)   SD 5 (36)
   -1                   . +
                          |  SD 3 (106)
                          |
                          |S SD 2 (126)
                          |
                          |  SD 1 (151)  SD 2 (177)
   -2                     +  SD 3 (233)  SD 5 (17)   SD 5 (90)
                          |
                          |  SD 5 (196)
                          |
                          |
                          |
   -3                     +Q SD 2 (223)
                          |  SD 2 (59)
                          |
                          |
                          |
                          |
   -4                     +
                   <rare>|<more>
```

Figure 21: Person item Map

Table 49: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	30.0	42.0	1.35	.41	1.00	-.1	1.07	-.1
S.D.	4.5	.0	.75	.06	.21	1.1	.75	1.0
MAX.	41.0	42.0	4.60	1.05	1.89	4.3	7.75	5.2
MIN.	14.0	42.0	-.94	.36	.59	-3.2	.11	-2.0

```
 REAL RMSE    .43  ADJ.SD     .61  SEPARATION  1.41  ADULT  RELIABILITY  .67
MODEL RMSE    .42  ADJ.SD     .62  SEPARATION  1.50  ADULT  RELIABILITY  .69
 S.E. OF ADULT  MEAN    .02
 WITH     1 EXTREME ADULTS  =  1137 ADULTS    MEAN    1.36  S.D.     .76
 REAL RMSE    .44  ADJ.SD     .62  SEPARATION  1.43  ADULT  RELIABILITY  .67
MODEL RMSE    .42  ADJ.SD     .63  SEPARATION  1.51  ADULT  RELIABILITY  .70
```

The high mean respondent measure value (1.35) illustrates that the sample has a relatively high standing on the entire self-directedness (SD) construct (see Table 49). The minimum, maximum and standard deviation measure values show that the construct has a range of just more than five and a half logits and that there is minimal variation in the construct level among respondents. The minimum infit mnsq value (0.59) indicate that the response patterns for some participants are too predictable, while the maximum infit mnsq value (1.89) point to individual response patterns that did not behave as the model predicted. The high outfit mnsq maximum value (7.75) provides evidence that several individuals has atypical response patterns to items far removed from their inherent construct level. The low minimum outfit mnsq value (0.11) show that some participants response patterns to items removed from their inherent construct levels are too predictable.

The respondent summary table shows a relatively high person separation value (1.51), which means that the respondent clusters indicated in Figure 21 are on average separated by a relatively small margin in terms of their respective construct levels. The scale rendered high person reliability (0.70), which indicates that most of the respondents did respond in a relatively reliable fashion to the scale's items. This means that high confidence can be assigned to findings based on the person distribution on the construct.

Table 50: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	810.1	1136.0	.00	.09	1.00	-.3	1.07	.2
S.D.	238.3	.0	1.46	.05	.07	2.7	.21	2.9
MAX.	1121.0	1136.0	3.31	.26	1.15	7.3	1.71	6.5
MIN.	166.0	1136.0	-3.21	.06	.86	-7.6	.81	-7.0

REAL RMSE .10	ADJ.SD 1.46	SEPARATION 13.96 ITEM	RELIABILITY .99
MODEL RMSE .10	ADJ.SD 1.46	SEPARATION 14.12 ITEM	RELIABILITY 1.00
S.E. OF ITEM MEAN .23			

Table 50 shows that the mean item measure value (0.00) is considerably lower than the mean respondent measure value (1.4) (see Table 49). This shows that on average the items of the self-directedness scale are relatively easy for the sample to endorse in a manner that will increase their standing on the construct. The mean infit and outfit mnsq values show that on average the scale's items performed according to the predictions made by the Rasch model (see Table 50). In other words most of the SD items performed according to their predicted item difficulty. The scale also rendered high item separation (14.12) and reliability (1.00) values. These values indicate that when this scale is administered to another sample it is likely that items will perform in a similar fashion, which will result in the same item hierarchy.

Table 51 shows that the individual infit mnsq values for all items are located within the acceptable mnsq fit value range. It is also evident several of the scale's items rendered low point-biserial correlations, with item SD 5 (90), producing the lowest value. The acceptable item infit mnsq statistics prove that the SD scale and all its items have a uniform line of enquiry; which shows that the scale functions in a unidimensional manner.

The results presented for the primary SD scale suggests that several items on the scale are problematic as they are clustered together at similar logit values. These items should either be deleted or modified to occupy the gap in the item distribution; however, this should be done with caution as it can influence the functioning of the items within their respective sub-scales.

The scale rendered acceptable person reliability and separation values, these values were also high for items. Item statistics produced by the scale show that the SD scale is unidimensional, which means that the scale exclusively measured a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

Table 51: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
30	166	1136	3.31	.09	1.07	1.3	1.32	3.6	.15	SD 4 (179)
2	268	1136	2.66	.07	1.05	1.3	1.11	2.0	.24	SD 1 (24)
23	375	1136	2.14	.07	.88	-4.4	.85	-4.5	.48	SD 4 (60)
38	482	1136	1.69	.06	.94	-2.9	.94	-2.2	.40	SD 5 (115)
25	491	1136	1.65	.06	.91	-4.4	.91	-3.5	.44	SD 4 (85)
29	510	1136	1.57	.06	.86	-7.6	.83	-7.0	.51	SD 4 (150)
41	518	1136	1.54	.06	.92	-4.2	.90	-4.2	.43	SD 5 (184)
24	553	1136	1.40	.06	1.02	1.2	1.02	.7	.30	SD 4 (74)
9	666	1136	.95	.06	1.08	3.7	1.10	3.3	.22	SD 2 (9)
31	666	1136	.95	.06	1.15	7.3	1.20	6.5	.12	SD 4 (214)
5	678	1136	.90	.06	1.02	1.2	1.05	1.8	.28	SD 1 (121)
28	685	1136	.88	.06	1.13	5.9	1.18	5.6	.15	SD 4 (136)
7	720	1136	.73	.06	.96	-1.7	.95	-1.5	.36	SD 1 (169)
22	725	1136	.71	.07	.94	-2.5	.92	-2.4	.38	SD 4 (32)
32	730	1136	.69	.07	.87	-5.6	.82	-5.6	.47	SD 4 (229)
26	736	1136	.66	.07	1.08	3.4	1.11	3.0	.20	SD 4 (94)
20	746	1136	.62	.07	.96	-1.5	.98	-.7	.34	SD 3 (197)
1	816	1136	.30	.07	1.00	.1	1.00	-.1	.29	SD 1 (4)
12	826	1136	.26	.07	.97	-.8	.99	-.3	.31	SD 2 (105)
3	829	1136	.24	.07	1.00	.1	1.01	.2	.28	SD 1 (58)
14	840	1136	.19	.07	1.05	1.5	1.13	2.5	.20	SD 2 (159)
27	852	1136	.13	.07	.96	-1.0	.96	-.8	.32	SD 4 (107)
39	869	1136	.04	.07	1.12	3.2	1.27	4.5	.09	SD 5 (135)
19	874	1136	.01	.07	1.00	.0	1.01	.1	.27	SD 3 (171)
35	888	1136	-.07	.07	.95	-1.1	.91	-1.5	.33	SD 5 (39)
40	890	1136	-.08	.07	.91	-2.3	.86	-2.4	.38	SD 5 (162)
10	923	1136	-.27	.08	1.00	.0	1.02	.3	.24	SD 2 (30)
37	944	1136	-.41	.08	.94	-1.2	.86	-2.0	.32	SD 5 (104)
17	948	1136	-.43	.08	.99	-.2	.94	-.8	.26	SD 3 (40)
8	953	1136	-.47	.08	.95	-.9	.84	-2.2	.31	SD 1 (198)
34	994	1136	-.78	.09	1.08	1.2	1.40	3.8	.06	SD 5 (36)
4	1007	1136	-.90	.10	.97	-.4	.90	-1.1	.25	SD 1 (86)
18	1039	1136	-1.23	.11	.95	-.6	.81	-1.7	.26	SD 3 (106)
13	1057	1136	-1.46	.12	1.00	.0	1.17	1.2	.14	SD 2 (126)
15	1080	1136	-1.84	.14	1.05	.4	1.53	2.8	.01	SD 2 (177)
6	1082	1136	-1.88	.14	1.00	.0	1.03	.2	.13	SD 1 (151)
21	1085	1136	-1.94	.15	1.02	.2	1.18	1.0	.08	SD 3 (233)
36	1086	1136	-1.96	.15	1.05	.4	1.71	3.3	-.01	SD 5 (90)
33	1088	1136	-2.00	.15	1.04	.3	1.54	2.5	.02	SD 5 (17)
42	1101	1136	-2.34	.17	1.03	.2	1.39	1.6	.02	SD 5 (196)
16	1117	1136	-2.97	.23	1.00	.0	1.09	.3	.09	SD 2 (223)
11	1121	1136	-3.21	.26	1.02	.1	1.19	.5	.03	SD 2 (59)
MEAN	810.	1136.	.00	.09	1.00	-.3	1.07	.2		
S.D.	238.	0.	1.46	.05	.07	2.7	.21	2.9		

4.4.5.2 Responsibility vs. Blaming (SD 1)

The following items comprise the SD 1 sub-scale:

SD 1 (4) – I often feel that I am the victim of circumstances.

SD 1 (24) – I seldom feel free to choose what I want to do.

SD 1 (58) – My attitudes are largely determined by influences outside of my control.

SD 1 (86) – Other people control me too much.

SD 1 (121) – Circumstances often force me to do things against my will.

SD 1 (151) – I usually am free to choose what I will do.

SD 1 (169) – My actions are determined largely by influences outside of my control.

SD 1 (198) – Other people and conditions are often to blame for my problems.

Figure 22 illustrates that the sample and item distribution overlaps only partially, which points out that the items are only suited to a certain degree to measure the construct within the current sample. It is evident from the figure that a large number of participants are grouped towards the top end of the scale, which indicates that the scale is unable to differentiate between respondents with very high ratings on the SD 1 construct. One way to rectify this is to include items that can measure an even higher level of the SD 1 construct.

Most of the items comprising the SD 1 scale are fairly well distributed over the construct range. Only one pair of items (SD 1-4 and SD 1-58) occupies a similar logit value, it is recommended that one of these items should be altered to eventually relocate to a logit location where there is an underrepresentation of items. A large gap can be observed in the item distribution between one and three logits. If any items are revised the revisions should be done in such a way that the items would relocate to this space; this will allow the scale to assess the construct with greater precision.

```
ADULTS                         MAP OF ITEMS
              <frequ>|<less>
    3          .###  +Q SD 1  (24)
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        .##########  |
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                    S|
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    2                +
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      .############  |S
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                     |
                    M|
    1                +
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                     |  SD 1  (121)
         .#########  |
                     |  SD 1  (169)
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                     |
                     |  SD 1  (4)
    0               S+M SD 1  (58)
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   -1                +
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                     |  SD 1  (86)
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                     |
                     |
   -2                +
                     |
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                     |  SD 1  (151)
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                     |
   -3             .  +Q
               <rare>|<more>
```

Figure 22: Person Item Map

Table 52: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	5.4	8.0	1.15	.99	.97	-.2	1.01	-.2
S.D.	1.3	.0	1.12	.16	.52	.9	1.20	.8
MAX.	7.0	8.0	2.68	1.25	2.66	2.9	9.90	3.1
MIN.	1.0	8.0	-2.60	.83	.35	-1.7	.15	-1.0

```
 REAL RMSE   1.10  ADJ.SD     .24  SEPARATION   .22  ADULT  RELIABILITY  .05
MODEL RMSE   1.00  ADJ.SD     .51  SEPARATION   .51  ADULT  RELIABILITY  .21
 S.E. OF ADULT  MEAN    .03
 WITH    78 EXTREME ADULTS  =  1144 ADULTS   MEAN     1.30  S.D.    1.27
 REAL RMSE   1.14  ADJ.SD     .56  SEPARATION   .49  ADULT  RELIABILITY  .19
MODEL RMSE   1.05  ADJ.SD     .71  SEPARATION   .68  ADULT  RELIABILITY  .31
```

The mean respondent measure (1.15) indicates that the sample has a relatively high average rating on the SD 1 construct. The minimum, maximum and standard deviation measure values show that the construct has a range of just more than five and a half logits, and that inconsistent variation in the measured construct level of respondents is minimal. The minimum infit mnsq value (0.35) indicate too well behaved response patterns for some respondents, while the maximum infit mnsq value (2.66) points towards individual response patterns that did behave as the model expected. The large maximum outfit mnsq value (9.90) show that multiple individuals have uncharacteristic response patterns towards items far removed from their inherent construct level. The small minimum mnsq outfit value of (0.15) indicates that some participant responses to items far removed from their construct level are too predictable.

The results presented in the respondent summary table shows a relatively low person separation value (0.68), which means that respondent clusters depicted in Figure 22 are on average separated by a very small margin with regards to their respective construct levels. The measure has low reliability (0.31), which points out that the majority of the respondents did not respond in a consistent fashion to the items of the SD 1 scale. This means that not much confidence can be ascribed to the person distribution on the construct.

Table 53: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	724.9	1066.0	.00	.09	1.00	-.2	1.04	-.4
S.D.	237.6	.0	1.49	.02	.08	2.2	.27	2.7
MAX.	1013.0	1066.0	2.97	.15	1.18	3.7	1.60	5.2
MIN.	199.0	1066.0	-2.35	.07	.88	-4.4	.74	-4.4

REAL RMSE	.09	ADJ.SD	1.48	SEPARATION 15.83	ITEM	RELIABILITY 1.00
MODEL RMSE	.09	ADJ.SD	1.48	SEPARATION 16.10	ITEM	RELIABILITY 1.00
S.E. OF ITEM	MEAN	.56				

Table 53 provides a summary of the item statistics for the SD 1 scale, and shows that the scale is relatively easy for the sample to endorse, as the mean respondent measure value (1.15) is much higher than the mean item measure value (0.00) (see Table 52 and Table 53). Table 53 also shows that the average infit and outfit mnsq values are within the acceptable mnsq value range of 0.6 and 1.4, which indicate that the items functioned in manner which the Rasch model predicted. The scale rendered high item separation and reliability statistics, 16.1 and 1.00 respectively.

Table 54 illustrates the individual items statistics and points out that the item, which is the most difficult to endorse is SD 1 (24); participants with low inherent levels of the construct are expected to endorse this item in such a way that it would not increase their standing on the construct. The table also shows that all the scale’s items have mnsq infit values that fall within the acceptable range of 0.6 and 1.4 mnsq. These mnsq fit statistics provides sufficient evidence that the SD 1 sub-scale functions in a unidimensional manner.

Table 54: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
2	199	1066	2.97	.08	1.18	3.7	1.60	5.2	A .40	SD 1 (24)
6	1013	1066	-2.35	.15	1.03	.3	1.33	1.3	B .21	SD 1 (151)
1	746	1066	.09	.07	1.05	1.4	1.03	.5	C .42	SD 1 (4)
5	609	1066	.79	.07	1.00	.0	.99	-.2	D .49	SD 1 (121)
4	938	1066	-1.28	.10	.97	-.4	.94	-.5	d .35	SD 1 (86)
3	760	1066	.01	.08	.96	-1.2	.88	-2.0	c .48	SD 1 (58)
8	885	1066	-.81	.09	.95	-.9	.74	-2.8	b .42	SD 1 (198)
7	649	1066	.59	.07	.88	-4.4	.82	-4.4	a .56	SD 1 (169)
MEAN	725.	1066.	.00	.09	1.00	-.2	1.04	-.4		
S.D.	238.	0.	1.49	.02	.08	2.2	.27	2.7		

The results presented throughout this section suggests that only two items of the SD 1 sub-scale cluster together at a similar logit value. One of these items could be modified to occupy the gap higher up in the item distribution. Both the person separation and reliability are low. On the other hand item separation and reliability are high, which means that it is likely that the same item hierarchy can be expected in future test administrations. The results also show that the SD 1 scale functions in a unidimensional manner, which means that the scale exclusively measures a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

4.4.5.3 Purposefulness vs. Lack of Goal Direction (SD 2)

The following items comprise the SD 2 sub-scale:

SD 2 (9) – Often I feel that my life has little purpose or meaning.

SD 2 (30) – Usually I am not able to do things according to their priority of importance to me because of lack of time.

SD 2 (59) – Each day I try to take another step toward my goals.

SD 2 (105) – I have too little time to look for long-term solutions for my problems.

SD 2 (126) – I do not think I have a real sense of purpose in my life.

SD 2 (159) – I spend most of my time doing things that seem necessary but not really important to me.

SD 2 (177) – My behavior is strongly guided by certain goals that I have set for my life.

SD 2 (223) – I know what I want to do in my life.

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ADULTS                        MAP OF ITEMS
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   3      .########   +
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      .############   |
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                      |  SD 2 (9)
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                     M|
   2                  +
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                      |
          .########   |
                      |S
                      |
                      |  SD 2 (105)
                      |  SD 2 (159)
                     S|
                      |
   1                  +
                .###  |
                      |  SD 2 (30)
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                      |
                     Q|
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   0                .  +M
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                      |  SD 2 (126)
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  -1                  +
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                      |S
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  -2                  +
                      |  SD 2 (223)
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                      |  SD 2 (59)
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  -3                  +
                  <rare>|<more>
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Figure 23: Person Item Map

The person item map for the SD 2 scale indicates that the overlap between the sample and item distribution is limited (see Figure 23). This means the items are not ideally targeted to measure the construct in the current sample. The figure shows that a large number of participants are grouped at the top end of the scale, which indicates that the scale is unable to differentiate between people with very high levels of the SD 2 construct. One way to rectify this situation is to include items, which are able to measure an even higher level of the construct.

Although most of the items comprising the SD 2 scale are fairly well distributed over the construct range, four items are located to the bottom end of the logit scale where almost no respondent construct levels are plotted (see Figure 23). Three of these four items (SD 2 - 59, SD 2 - 223, SD 2 -177, and SD 2 - 126) might not add value in assessing the construct level among the current sample; however, these items may prove to be useful when a sample with a lower construct level is assessed. Only one pair of items occupies a similar logit value; these two items are SD 2 (105) and SD 2 (159). It is recommended that one of these items should be altered to eventually appear at a higher logit range to differentiate between respondent with a very high standing on the construct. This will allow the scale to assess the construct with greater precision.

Table 55: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	6.3	8.0	2.05	1.05	1.00	-.1	.94	-.2
S.D.	.9	.0	.82	.11	.39	.8	1.27	.6
MAX.	7.0	8.0	2.75	1.16	3.46	3.1	9.90	3.1
MIN.	3.0	8.0	-.78	.90	.34	-1.8	.28	-1.5

REAL RMSE 1.13 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00
MODEL RMSE 1.05 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00
S.E. OF ADULT MEAN .03
WITH 288 EXTREME ADULTS = 1144 ADULTS MEAN 2.44 S.D. .98
REAL RMSE 1.24 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00
MODEL RMSE 1.19 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00

The mean respondent measure value (1.05) shows that the sample has a relatively high standing on the SD 2 construct. The minimum, maximum and standard deviation measure values indicate that the construct has a range of just more than three and a half logits, and that inconsistent variation in the construct level of respondents are negligible. The minimum infit mnsq value (0.34) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (3.46) point to individual response patterns that did not behave as the model predicted. The large maximum outfit mnsq value (9.90) points out that multiple individuals responded in an unpredictable manner to items far removed from their inherent construct level. Finally the small minimum mnsq outfit value (0.28) indicates that some participants responses to items far removed from their construct level are too predictable.

It is concerning that the measure rendered a reliability statistic of zero; this indicates that almost none of the participants responded in a reliable fashion to the items of the SD 2 scale. This means that not much confidence can be ascribed to the person distribution on the construct.

Table 56: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	673.3	856.0	.00	.13	1.00	.0	1.00	.0
S.D.	155.8	.0	1.62	.07	.04	1.2	.12	1.3
MAX.	841.0	856.0	2.31	.26	1.04	1.4	1.13	1.4
MIN.	386.0	856.0	-2.36	.07	.91	-3.0	.74	-3.0

REAL RMSE	.15	ADJ.SD	1.61	SEPARATION	10.53	ITEM	RELIABILITY	.99
MODEL RMSE	.15	ADJ.SD	1.61	SEPARATION	10.60	ITEM	RELIABILITY	.99
S.E. OF ITEM	MEAN	.61						

Table 56 indicates that the SD 2 scale is relatively easy for the sample to endorse in such a way that it will increase their standing on the construct, as the mean respondent measure value (1.05) is considerably higher than the mean item measure value (0.00). Table 56 also shows the average infit and outfit mnsq values for the sub-scale. These values are within the acceptable range, which indicates that on average the functioning of the SD 2 items conform to the functioning predicted by the Rasch model.

Contrasting to the extremely low person separation and reliability statistics reported earlier, item separation and reliability are high at 10.6 and 0.99 respectively. The high reliability value indicates that if this scale is administered to another sample it is likely that a similar item hierarchy will be established.

Table 57 illustrates that item SD 2 (9) has the highest measure value; participants with low inherent levels of the construct are expected to endorse this item in such a way that it would not increase their standing on the construct. The results in Table 57 indicate that all the SD 2 items produced mnsq infit values that fall between 0.6 and 1.4 mnsq. The scale's fit statistics provides enough evidence to prove that it functions in a unidimensional manner.

Table 57: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD		PTBIS CORR.	ITEMS
3	841	856	-2.36	.26	1.02	.1	1.13	.4	A	.12	SD 2 (59)
6	560	856	1.34	.08	1.04	1.3	1.05	1.3	B	.46	SD 2 (159)
1	386	856	2.31	.07	1.03	1.4	1.05	1.4	C	.55	SD 2 (9)
7	798	856	-.89	.14	1.03	.2	1.04	.3	D	.24	SD 2 (177)
5	777	856	-.53	.12	.99	-.1	1.04	.3	d	.29	SD 2 (126)
2	643	856	.80	.08	1.01	.2	1.02	.4	c	.42	SD 2 (30)
8	837	856	-2.11	.24	.98	-.1	.74	-.9	b	.19	SD 2 (223)
4	544	856	1.44	.08	.91	-3.0	.89	-3.0	a	.55	SD 2 (105)
MEAN	673.	856.	.00	.13	1.00	.0	1.00	.0			
S.D.	156.	0.	1.62	.07	.04	1.2	.12	1.3			

The evidence presented for SD 2 scale suggests that only two of the sub-scale's items cluster together at a similar logit value. One of these items could be modified to occupy the higher logit region of the scale; this will enable the scale to measure an even a higher level of the construct. Both the person separation and reliability are zero, which is concerning. On the other hand item separation and reliability are high. The results also show that the SD 2 scale is unidimensional and therefore measures a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

4.4.5.4 <u>Resourcefulness vs. Inertia (SD 3)</u>

The following items comprise the SD 3 sub-scale:

SD 3 (40) – I often wait for someone else to provide a solution to my problems.

SD 3 (106) – I often cannot deal with problems because I just don't know what to do.

SD 3 (171) – I prefer to wait for someone else to take the lead in getting things done.

SD 3 (197) – Most people seem more resourceful than I am.

SD 3 (233) – I usually look at a difficult situation as a challenge or opportunity.

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    ADULTS            MAP OF ITEMS
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                  |  SD 3 (197)
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                 M|S
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 1                +
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                  |  SD 3 (171)
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                 S|
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                  |  SD 3 (40)
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 0                +M
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                  |  SD 3 (106)
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-1                +
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                  |  SD 3 (233)
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Figure 24: Person Item Map

The sample and item distribution on the SD 3 scale only overlaps to a minimum degree (see Figure 24); this indicates that the scale's items are not perfectly suited to measure the construct level among the current sample. Although most of the items comprising the SD 3 scale are fairly well distributed over the construct range, the majority of the items are located towards the bottom end of the scale were almost no respondent construct levels are plotted.

It is also evident from the figure that a large number of participants are clustered together at the top end of the scale; this ceiling effect indicates that the scale is unable to differentiate between participants with very high levels of the SD 3 construct. One way to rectify this situation is to include items, which measures a higher level of the construct. The SD 3 scale has relatively few items, and large gaps are evident between these items. It is recommended that additional items should be created to enable the scale to measure logit areas where these gaps exists.

Table 58: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	3.5	5.0	1.15	1.15	.99	-.2	1.07	-.2
S.D.	.7	.0	.84	.08	.47	.9	1.25	.8
MAX.	4.0	5.0	1.76	1.22	2.67	2.4	6.45	2.4
MIN.	1.0	5.0	-1.76	1.04	.45	-1.5	.35	-1.2

```
 REAL RMSE   1.27  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00
MODEL RMSE   1.15  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00
 S.E. OF ADULT  MEAN    .03
 WITH   494 EXTREME ADULTS  =  1144 ADULTS   MEAN    1.80  S.D.    1.01
 REAL RMSE   1.40  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00
MODEL RMSE   1.35  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00
```

The mean respondent measure value (1.15) in Table 58 shows that the sample has a relatively high average rating on the SD 3 construct. The minimum, maximum and standard deviation measure values show that the construct has a range of just more than three and a half logits, and that inconsistent variation in the measured construct level of respondents is negligible. The minimum infit mnsq value of 0.45 indicates too well behaved response patterns for some persons, while the maximum infit mnsq value of 2.67 point to individual response patterns that are behaving as the model predicted. The large maximum outfit mnsq value (6.45) provides evidence for the fact that multiple individuals have unpredicted response patterns towards items far removed from their inherent construct level. Finally the small minimum mnsq outfit value of 0.35 indicates that some participant responses to items far removed from their construct level are too predictable.

Table 58 shows that the SD 3 scale has a no reliability, which means that respondents did not respond in a reliable fashion to the items of the scale. This means that not much confidence can be ascribed to the person distribution on the construct.

Table 59: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	454.0	650.0	.00	.11	1.00	-.3	1.07	.1
S.D.	120.8	.0	1.16	.03	.07	1.4	.22	1.8
MAX.	600.0	650.0	1.65	.15	1.12	1.0	1.47	2.4
MIN.	261.0	650.0	-1.67	.08	.90	-2.9	.87	-2.7

REAL RMSE	.11	ADJ.SD	1.16	SEPARATION	10.19	ITEM	RELIABILITY	.99
MODEL RMSE	.11	ADJ.SD	1.16	SEPARATION	10.45	ITEM	RELIABILITY	.99
S.E. OF ITEM MEAN	.58							

The SD 3 sub-scale is relatively easy for the sample to endorse in a manner that will increase their rating on the construct, as the mean respondent measure value (1.15 indicated) is considerably higher than the mean item measure value (0.00) (see Table 58 and Table 59). The average infit and outfit mnsq values for the sub-scale are both within the acceptable mnsq range (see Table 59); this indicates that on average the performance of the SD 3 items conformed to the performance patterns predicted by the Rasch model.

Contrasting to the extremely low person separation and reliability reported earlier, item separation and reliability are high at 10.45 and 0.99 respectively. The high reliability value indicates that if this scale is administered to another sample it is likely that the item difficulty spread will be repeated. Table 60 illustrates that item SD 3 (197) has the highest measure value, which means that it also is the most difficult to endorse in a manner that will increase a participant's standing on the construct.

The results in Table 60 indicate that all the SD 3 items have infit values that fall between 0.6 and 1.4 mnsq; these fit statistics provides enough evidence to assume that the SD 3 sub-scale functions in a unidimensional manner.

Table 60: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
5	600	650	-1.67	.15	1.12	1.0	1.47	2.4	A .25	SD 3 (233)
4	261	650	1.65	.08	1.03	1.0	1.07	1.5	B .65	SD 3 (197)
1	464	650	.14	.09	1.01	.2	1.02	.4	C .51	SD 3 (40)
2	555	650	-.85	.12	.96	-.6	.87	-1.2	b .44	SD 3 (106)
3	390	650	.73	.09	.90	-2.9	.90	-2.7	a .63	SD 3 (171)
MEAN	454.	650.	.00	.11	1.00	-.3	1.07	.1		
S.D.	121.	0.	1.16	.03	.07	1.4	.22	1.8		

The evidence presented for this sub-scale suggests that the scale is comprised of too small a number of items to assess the intended construct with enough precision. It is recommended that additional items should be added to the sub-scale. Some of the scale's items should be modified to occupy the higher logit regions of the scale, which will enable the scale to measure an even a higher level of the construct. Both the person separation and reliability are zero, while item separation and reliability are high. The results also show that the SD 3 scale is unidimensional and measures a single construct. The unidimensionality of the scale offers support for both the construct-and content validity of the scale.

4.4.5.5 Self-acceptance vs. Self-Striving (SD 4)

The following items comprise the SD 4 sub-scale:

SD 4 (32) – I often wish that I was smarter than everyone else.

SD 4 (60) – I often wish I was stronger than everyone else.

SD 4 (74) – I often wish I could stay young forever.

SD 4 (85) – I often wish I had special powers like Superman.

SD 4 (94) – I don't want to be richer than everyone else.

SD 4 (107) – I often wish I could stop the passage of time.

SD 4 (136) – I don't mind the fact that other people often know more than I do about something.

SD 4 (150) – I often wish I was more powerful than everyone else.

SD 4 (179) – I often wish I could live forever.

SD 4 (214) – I don’t want to be more admired than everyone else.

SD 4 (229) – I wish I were better looking than everyone else.

```
ADULTS                                MAP OF ITEMS
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     3            .#  +
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               .####  |
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                     Q|
                      |  SD 4 (179)
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     2                +Q
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     1                +S  SD 4 (60)
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                      |  SD 4 (85)
                      |  SD 4 (150)
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                     M|  SD 4 (74)
     0                +M
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                      |  SD 4 (214)
                      |  SD 4 (136)
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       .############  |  SD 4 (229)  SD 4 (32)   SD 4 (94)
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    -1                +S
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                      |  SD 4 (107)
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    -3             .  +
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Figure 25: Person Item Map

Figure 25 illustrates that the items of the SD 4 sub-scale is relatively well suited to measure the construct in the sample, as the item difficulty mean and the sample's average standing on the construct is plotted very close to each other. The participants seem to form a relatively normal distribution with regards to their standing on the construct. Some items seem to cluster together between -0.5 and 0.5 logits, if this same item difficulty distribution is retrieved from other samples it is suggested that some of these items should be redesigned to re-locate to both the higher and lower logit regions; this will enable the scale to measure the construct with greater precision.

Items SD 4 (229), SD 4 (32), and SD 4 (94) share the same logit location, only one of these items are necessary at this logit location to differentiate between people with either higher or lower levels of the construct. In addition overpopulated item clusters provide little extra information about the samples standing on the construct and can artificially confound or decrease the standard error associated with the scale. It is recommended that where items cluster together that excessive items should either be removed from the scale or re-designed to occupy under represented logit regions.

Table 61: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	5.7	11.0	.07	.75	.99	-.1	1.04	-.1
S.D.	2.4	.1	1.23	.12	.27	.8	.64	.9
MAX.	10.0	11.0	2.73	1.13	1.94	2.6	6.19	2.8
MIN.	1.0	9.0	-2.61	.66	.51	-2.1	.19	-1.7

```
REAL RMSE    .80  ADJ.SD     .94  SEPARATION  1.17  ADULT  RELIABILITY  .58
MODEL RMSE   .76  ADJ.SD     .97  SEPARATION  1.28  ADULT  RELIABILITY  .62
S.E. OF ADULT  MEAN   .04
WITH     17 EXTREME ADULTS  =  1144 ADULTS    MEAN     .10  S.D.     1.29
REAL RMSE    .81  ADJ.SD    1.00  SEPARATION  1.24  ADULT  RELIABILITY  .60
MODEL RMSE   .77  ADJ.SD    1.03  SEPARATION  1.34  ADULT  RELIABILITY  .64
```

Table 61 shows that the inherent level of the SD 4 construct among the current sample is relatively low (0.07). The minimum, maximum and standard deviation measure values shows that the construct's range span just more than five and a halve logits. These values indicate that excessive variation in the construct level of respondents is minimal. The minimum infit mnsq value (0.51) indicates that the response patterns for most persons are too predictable, in turn the maximum infit mnsq value of 1.96 point to individual response patterns that did not behave as the model expected. The high maximum outfit mnsq value (6.19) provides evidence for the fact that some individuals have atypical response patterns towards items far removed from their ability level.

The respondent summary table also shows a relatively high person separation value (1.34), which means that the respondent clusters differentiated in Figure 25 are on average separated by a relatively large difference with regards to their standing on the construct. The reliability figure (0.64) means that most respondents did not respond in a consistent fashion to the items of the SD 4 scale. This indicates that not much confidence can be ascribed to the person distribution on the construct.

Table 62: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	582.0	1126.8	.00	.07	1.00	-.5	1.04	-.3
S.D.	188.1	.2	.98	.01	.20	6.4	.30	5.6
MAX.	845.0	1127.0	2.38	.09	1.30	9.5	1.43	7.5
MIN.	156.0	1126.0	-1.35	.07	.71	-9.9	.62	-9.8

REAL RMSE	.08	ADJ.SD	.98	SEPARATION	12.86	ITEM	RELIABILITY	.99
MODEL RMSE	.07	ADJ.SD	.98	SEPARATION	13.47	ITEM	RELIABILITY	.99
S.E. OF ITEM MEAN	.31							

Table 62 provides a summary of the item statistics for the SD 4 scale; the table shows that the scale is relatively easy for the sample to endorse, as the mean respondent measure value (0.07) is only slightly higher than the mean item measure value (0.00) (see Table 61 and Table 62).

Table 62 points out that the average infit and outfit mnsq values for the sub-scale are both within the acceptable range of 0.6 and 1.4, which indicates that on average the items of the SD 4 sub-scale performed as expected by the Rasch model. Item separation and reliability are high at 13.47 and 0.99 respectively (see Table 62). The high reliability value indicates that if this sub-scale is administered to another sample it is likely that the same item hierarchy will be established.

Table 63 illustrates that item SD 4 (179) is the most difficult to endorse; only participants with extremely high levels of the construct are expected to endorse this item in a way that will increase their standing on the construct. The easiest item to endorse on the scale is SD 4 (107). All the items rendered mnsq infit values that fall within the acceptable range of 0.6 and 1.4, these fit statistics provide sufficient evidence that the SD 4 sub-scale functions in unidimensional manner.

Table 63: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.		ITEMS
6	845	1127	-1.35	.08	1.18	4.5	1.43	4.7	A	.29	SD 4 (107)
7	676	1127	-.47	.07	1.30	9.5	1.42	7.5	B	.27	SD 4 (136)
10	660	1127	-.39	.07	1.20	6.5	1.29	5.5	C	.34	SD 4 (214)
9	156	1127	2.38	.09	1.12	1.9	1.29	2.1	D	.34	SD 4 (179)
5	726	1127	-.71	.07	1.07	2.2	1.19	3.2	E	.40	SD 4 (94)
3	545	1126	.14	.07	1.16	5.4	1.18	3.8	F	.39	SD 4 (74)
1	720	1127	-.68	.07	.84	-5.4	.82	-3.6	e	.56	SD 4 (32)
4	484	1127	.43	.07	.81	-7.0	.73	-6.4	d	.62	SD 4 (85)
11	722	1127	-.69	.07	.81	-6.9	.75	-5.0	c	.59	SD 4 (229)
2	365	1126	1.01	.07	.79	-6.5	.70	-5.7	b	.62	SD 4 (60)
8	503	1127	.34	.07	.71	-9.9	.62	-9.8	a	.69	SD 4 (150)
MEAN	582.	1127.	.00	.07	1.00	-.5	1.04	-.3			
S.D.	188.	0.	.98	.01	.20	6.4	.30	5.6			

The evidence illustrated for this sub-scale suggest that several items of the SD 4 sub-scale cluster together at the same logit values; these items can be modified to occupy the lower logit regions of the scale. Both person separation and reliability are low, while item separation and reliability are high. The fit statistics rendered by the scale shows that it functions in a unidimensional manner, which in turn offers support for both the construct-and content validity of the scale.

4.4.5.6 <u>Congruent Second Nature vs. Bad Habits (SD 5)</u>

The following items comprise the SD 5 sub-scale:

SD 5 (17) – In most situations my natural responses are based on good habits that I have developed.

SD 5 (36) – Repeated practice has given me good habits that are stronger than most momentary impulses or persuasion.

SD 5 (39) – I have many bad habits that I wish I could break.

SD 5 (90) – Repeated practice has allowed me to become good at many things that help me to be successful.

SD 5 (104) – I have so many faults that I don't like myself very much.

SD 5 (115) – I need a lot of help from other people to train me to have good habits.

SD 5 (135) – Good habits have become "second nature" to me – they are automatic and spontaneous actions nearly all the time.

SD 5 (162) – Many of my habits make it hard for me to accomplish worthwhile goals.

SD 5 (184) – I need much more practice in developing good habits before I will be able to trust myself in many tempting situations.

SD 5 (196) – Good habits make it easier for me to do things the way I want.

SD 5 (207) – I think my natural responses now are usually consistent with my principles and long-term goals.

SD 5 (221) – My will power is too weak to overcome very strong temptations, even if I know I will suffer as a consequence.

```
ADULTS                        MAP OF ITEMS
                <frequ>|<less>
    4          .#####   +
                        |
                        |
                       Q|
                        |
                        |
                        |
            .########   |
    3                   +
                        |
                        |Q
                       S|
                        |
                        |  SD 5 (115)
                        |  SD 5 (184)
        .############   |
    2                   +
                        |
                       M|
                        |
         .###########   |
                        |S
                        |
                        |
    1                   +
             .#######   |
                       S|  SD 5 (221)
                        |
                        |  SD 5 (135)
                 .###   |  SD 5 (162)   SD 5 (39)
                        |
                        |
    0              .#   +M SD 5 (104)
                       Q|
                        |
                        |  SD 5 (36)
                    .   |
                        |
                        |
                        |
   -1                   +  SD 5 (207)
                        |
                        |
                        |S
                    .   |
                        |  SD 5 (17)    SD 5 (90)
                        |
                        |
   -2                   +  SD 5 (196)
                 <rare>|<more>
```

Figure 26: Person Item Map

Figure 26 illustrates that only a small section of the item distribution overlaps with the respondent distribution, this is also evident in the large difference between the sample and the item difficulty means. This mismatch indicates that this scale is not ideally suited to measure the construct in the current sample.

The figure shows that the majority of the sample clusters around the respondent mean and produces a relatively normal distribution with regards to their standing on the construct; in addition the items are relatively spread out along the logit range. However, five items are located at the bottom end of the scale where few respondent construct levels are plotted (see Figure 26). Although this provides motivation to alter the current logit location of the items in order to differentiate between persons with higher levels of the construct, the current item spread can prove useful in a sample with a lower average standing on the SD 5 construct.

A large number of participants are grouped towards the top end of the person item map. This grouping pattern means that the scale is unable to differentiate between people with very high inherent levels of the SD 5 construct. One way to correct this situation is to include items on this sub-scale to measure an even higher level of the construct.

The person item map illustrates that, two sets of items (SD 5 – 162 and SD 5 – 39; SD 5 -17 and SD 5 - 90) share similar logit values. It is recommended that for both item pairs one item should be revised to measure a higher level of the construct. The same argument and recommendation is made for items SD 5 (184) and SD 5 (115), which also share a similar logit location.

Table 64: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	9.1	12.0	1.71	.85	1.00	-.2	1.04	-.2
S.D.	1.5	.0	.94	.15	.42	1.0	1.14	.9
MAX.	11.0	12.0	3.13	1.13	2.79	4.0	9.90	3.7
MIN.	3.0	12.0	-1.51	.68	.42	-2.1	.23	-1.5

```
REAL RMSE    .94  ADJ.SD     .10  SEPARATION   .10  ADULT  RELIABILITY  .01
MODEL RMSE   .86  ADJ.SD     .38  SEPARATION   .44  ADULT  RELIABILITY  .16
S.E. OF ADULT  MEAN    .03
WITH   124 EXTREME ADULTS  =  1144 ADULTS   MEAN    1.95  S.D.    1.13
REAL RMSE   1.01  ADJ.SD     .50  SEPARATION   .49  ADULT  RELIABILITY  .20
MODEL RMSE   .95  ADJ.SD     .61  SEPARATION   .64  ADULT  RELIABILITY  .29
```

The mean respondent measure value (1.71) in Table 64 indicates that the sample has a high inherent level of the SD 5 construct. The minimum, maximum and standard deviation measure values show that the construct has a range of just more than four and a half logits, and that inconsistent variation in the measured construct level of respondents is negligible. The minimum infit mnsq value of 0.42 indicates too well behaved response patterns for some persons, while the maximum infit mnsq value of 2.79 point to individual response patterns that did not behave as the model predicted. The large maximum outfit mnsq value (9.90) points out that multiple individuals have unexpected response patterns towards items far removed from their inherent construct level. Finally the small minimum mnsq outfit value of 0.23 indicates that some participant responses to items far removed from their construct level are too predictable.

Table 64 shows a relatively low person separation value (0.80), which means that the clusters of respondents evident in Figure 26 are on average separated by a relatively small difference in their respective construct levels. The measure rendered a low reliability statistic (0.29), which means that not much confidence can be ascribed to the person distribution on the construct.

Table 65: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	776.8	1020.0	.00	.10	1.00	-.3	1.05	.3
S.D.	198.4	.0	1.37	.04	.06	1.3	.18	1.8
MAX.	985.0	1020.0	2.42	.18	1.11	2.8	1.29	3.7
MIN.	363.0	1020.0	-2.03	.07	.90	-2.1	.76	-3.2

REAL RMSE .11	ADJ.SD 1.37	SEPARATION 12.61	ITEM	RELIABILITY .99
MODEL RMSE .11	ADJ.SD 1.37	SEPARATION 12.75	ITEM	RELIABILITY .99
S.E. OF ITEM MEAN .41				

Table 65 presents a synopsis of the item statistics for the SD 5 scale; and shows that this scale is relatively easy for the current sample to endorse in a manner that will increase their standing on the construct, as the mean respondent measure value (1.79) is much higher than the mean item measure value (0.00) (see Table 64 and Table 65). Table 65 also shows the average infit and outfit mnsq values for the sub-scale. These values are both within the acceptable mnsq range, which means that on average the items of the SD 5 scale performed as the Rasch model expected.

Contrasting to the low person separation and reliability values reported earlier, item separation and reliability are high at 12.75 and 0.99 respectively. The high reliability value indicates that if this scale is administered to another sample it is likely that the same item hierarchy will be established.

Table 66 illustrates that item SD 5 (184) has the highest measure value, which means that it is the most difficult to endorse in a manner that will increase a participants standing on the construct.

The results in Table 66 indicate that all the SD 5 items have mnsq infit values that fall between 0.6 and 1.4 mnsq; and that several items have low point-biserial correlations (SD 5 90, SD 5 207, SD 5 36, SD 5 17, and SD 5 196). It can be concluded from the fit statistics, that the SD 5 scale functions in a unidimensional manner.

Table 66: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD		PTBIS CORR.	ITEMS
4	968	1020	-1.60	.15	1.06	.5	1.29	1.3	A	.14	SD 5 (90)
11	928	1020	-.94	.11	1.02	.3	1.24	1.6	B	.22	SD 5 (207)
7	749	1020	.51	.08	1.11	2.8	1.23	3.7	C	.31	SD 5 (135)
2	877	1020	-.40	.10	1.05	.8	1.21	1.9	D	.26	SD 5 (36)
1	972	1020	-1.68	.15	1.02	.1	1.18	.8	E	.16	SD 5 (17)
12	702	1020	.77	.07	1.00	.0	1.05	1.0	F	.41	SD 5 (221)
6	363	1020	2.42	.07	.99	-.4	1.03	.7	f	.54	SD 5 (115)
10	985	1020	-2.03	.18	1.00	.0	.77	-1.0	e	.17	SD 5 (196)
9	401	1020	2.23	.07	.95	-1.7	.96	-.9	d	.55	SD 5 (184)
3	772	1020	.37	.08	.95	-1.3	.93	-1.2	c	.41	SD 5 (39)
8	775	1020	.35	.08	.92	-2.0	.90	-1.6	b	.43	SD 5 (162)
5	829	1020	-.01	.09	.90	-2.1	.76	-3.2	a	.42	SD 5 (104)
MEAN	777.	1020.	.00	.10	1.00	-.3	1.05	.3			
S.D.	198.	0.	1.37	.04	.06	1.3	.18	1.8			

The results presented for the SD 5 sub-scale suggests that some items on the scale might be problematic as they cluster together at similar logit values. These items should either be deleted or modified to occupy the higher logit regions of the scale. Both the person separation and reliability statistics are extremely low, while item separation and reliability are high. The scale rendered enough evidence to prove that it functions in a unidimensional manner, which implies that it exclusively measures a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

It is concluded that the primary self-directedness scale and all five its sub-scales SD 1, SD 2, SD 3, SD4 and SD 5 functions in a unidimensional manner. This means that one of the core criteria of the Rasch model is met, which in turn allows the interpretation of other output statistics derived from the Rasch model. It was also shown that all these scales possess a high degree of construct validity and item reliability, but low person reliability.

4.4.6 Psychometric properties of the Cooperativeness Scale and its associated Sub-scales

The primary Cooperativeness scale consists of five sub-scales: social acceptance vs. social intolerance (C 1); empathy vs. social disinterest (C 2); helpfulness vs. unhelpfulness (C 3); compassion vs. revengefulness (C 4); and integrated conscience vs. self-serving (C 5). A Rasch item analysis was conducted on the data derived from the primary scale and each of the sub-scales. The results illustrating the psychometric properties for the primary scale is presented first (see Section 4.4.6.1), where after the psychometric properties of each sub-scale are discussed (see sections 4.4.6.2-4.4.6.6).

4.4.6.1 Cooperativeness Scale (C)

The person item map in Figure 27 shows that the respondent distribution on the construct is normal; however, the sample and item distributions only overlap to a limited extent with most of the items located towards the lower end of the scale. This implies that the set of items are not that well suited to measure the inherent construct level among the current sample. Only one major gap, between item C 2 (227) and C 1 (234), is evident along the item distribution.

Also it is concerning that multiple item clusters exist along the item distribution, for instance the shared logit location of the following clusters of items: C 3 (153), C 4 (98), C 5 (18), C 5 and (235); C 1 (48), C 2 (137), and C 3 (64); as well as C 4 (124), C 4 (146), and C 5 (93). As mentioned throughout this chapter the duplication of items at similar logit values provides little extra information about the sample's standing on the construct and can artificially confound the standard error associated with the scale. It is recommended that some of these items should be altered to eventually appear in a logit area where little or no items are present, for instance the gap between item C 2 (227) and C 1 (234). This will allow the scale to assess the construct with greater precision.

```
ADULTS             MAP OF ITEMS
               <frequ>|<less>
    5                 +
                      |
                      |
                      |
K2                      |
                      |
                   .  |
    4                 +
                      |
                      |
                   .  |
                      |
                   #  |
                      |Q C 3 (47)
    3                 +
                  .#  |
                     Q|
                 .##  | C 3 (153)  C 4 (98)   C 5 (18)   C 5 (235)
              .#####  | C 2 (227)  C 3 (216)  C 5 (206)
                      |
            .####### S|
    2                 +
          .#########  |
       .############  |
       #############  |S
                     M| C 1 (234)  C 4 (57)
       .############  |
        ############  | C 2 (185)
    1     .#########  + C 5 (138)
             .######  |
             .###### S| C 5 (160)
               .####  |
                      |
                 .##  | C 5 (50)   C 5 (72)
                 .##  | C 1 (48)   C 2 (137)  C 3 (64)
    0             .# Q+M C 2 (49)
                   .  | C 1 (122)  C 4 (33)
                   .  | C 2 (25)
                   .  | C 4 (124)  C 4 (146)  C 5 (93)
                   .  | C 1 (133)  C 2 (161)
                   .  | C 1 (16)   C 4 (168)
                   .  | C 3 (178)
   -1                 +
                      | C 2 (73)   C 4 (199)
                      | C 4 (78)
                      | C 4 (7)
                      |S
                      | C 1 (5)    C 4 (222)
                      | C 5 (186)
   -2                 +
                      | C 1 (172)  C 3 (87)
                      | C 3 (127)
                      | C 3 (10)
                      |
                      | C 1 (89)
                      |
   -3                 +
                <rare>|<more>
```

Figure 27: Person item Map

Table 67: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	30.1	42.0	1.40	.44	.99	-.1	1.00	-.2
S.D.	3.7	.0	.68	.04	.28	1.2	.59	1.0
MAX.	40.0	42.0	4.09	.77	2.22	4.6	4.93	4.0
MIN.	16.0	42.0	-.79	.38	.40	-3.2	.21	-2.5

REAL RMSE .46	ADJ.SD .50	SEPARATION 1.10	ADULT	RELIABILITY .55	
MODEL RMSE .44	ADJ.SD .52	SEPARATION 1.20	ADULT	RELIABILITY .59	
S.E. OF ADULT MEAN .02					

The mean measure value of 1.40 in Table 67 illustrates that the sample has a relatively high standing on the cooperativeness construct. The minimum, maximum and standard deviation measure values show that the construct has a range of just less than five logits and that there is minimal variation in the construct level among respondents. The minimum infit mnsq value of 0.40 points out that the response patterns for some of the participants are too predictable, while the maximum infit mnsq value (2.22) point to individual response patterns that did not behave as the model expected. The high outfit mnsq maximum value (4.93) provides evidence for the fact that multiple individuals have atypical response patterns to items far removed from their construct level. Finally the small minimum outfit mnsq value (0.21) indicates that some participants responses to items removed from their construct levels are too predictable.

Table 68 shows a relatively low person separation statistic (1.2), which means that on average the respondent clusters, illustrated in the person-item map are on average only separated from each other by a relatively small margin. The cooperativeness scale's reliability is 0.59, which is relatively low. This means that not much confidence can be ascribed to the person distribution on the construct.

Table 68: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	818.2	1143.0	.00	.10	.99	.0	1.00	.1
S.D.	292.3	.0	1.60	.04	.06	1.8	.14	2.3
MAX.	1120.0	1143.0	3.12	.21	1.26	7.9	1.48	9.9
MIN.	195.0	1143.0	-2.70	.06	.88	-3.5	.77	-4.2

REAL RMSE .10	ADJ.SD 1.60	SEPARATION 15.45	ITEM	RELIABILITY 1.00
MODEL RMSE .10	ADJ.SD 1.60	SEPARATION 15.54	ITEM	RELIABILITY 1.00
S.E. OF ITEM MEAN .25				

The mean respondent measure (1.4) is considerably higher than the mean item measure value of 0.00 (see Table 67 and Table 68); this difference implies that on average the items of the cooperativeness scale is relatively easy for the current sample to endorse in such a manner that it will increase their standing on the construct.

The mean respondent mnsq infit and outfit values show that on average responses to the items of the cooperativeness scale conformed to the performance patterns predicted by the Rasch model. The table also shows that item separation and reliability are high at 15.54 and 1.00 respectively. The high reliability indicates that if this scale and set of items are administered to another sample it is likely that the item performance will be repeated.

Table 69 shows that item C 3 (47) has the highest item measure value, and is therefore the item, which is the most difficult to endorse in manner that will increase a participant's standing on the construct. The results show that only one item (C 2 - 227) rendered a large negative point-biserial correlation of -0.13. This negative correlation could mean that a coding error has occurred on the scoring of this item. This scoring problem might cause the item not to function in unison with the rest of the items on the cooperativeness scale. Due to the adequate fit value of the item, it is argued that the most probable cause of this negative correlation is a coding error. The individual infit mnsq values are all located within the acceptable fit value range.

It can be concluded from the individual item infit mnsq statistics that all the items have a uniform line of enquiry, which supports the notion that this scale measures a single factor of personality.

The evidence presented for the primary cooperativeness scale indicates that the scale is relatively unreliable. The scale rendered infit mnsq values which indicate that the scale and its items function in a unidimensional manner. The unidimensionality of the scale supports both the construct-and content validity of the scale. Only one item has a large negative point-biserial correlation, which should be examined for a scoring irregularity.

Table 69: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
17	195	1143	3.12	.08	.94	-1.3	.89	-1.7	.23	C 3 (47)
28	279	1143	2.64	.07	.93	-2.1	.93	-1.5	.37	C 4 (98)
42	284	1143	2.61	.07	1.03	.7	1.11	2.3	.22	C 5 (235)
34	300	1143	2.53	.07	1.05	1.4	1.10	2.2	.20	C 5 (18)
21	302	1143	2.52	.07	1.04	1.1	1.12	2.6	.20	C 3 (153)
23	311	1143	2.48	.07	1.02	.7	1.07	1.5	.24	C 3 (216)
41	313	1143	2.47	.07	1.01	.3	1.04	.9	.26	C 5 (206)
15	331	1143	2.38	.07	1.26	7.9	1.48	9.9	-.13	C 2 (227)
26	551	1143	1.48	.06	1.00	.0	1.00	.0	.31	C 4 (57)
8	558	1143	1.45	.06	.94	-3.5	.94	-2.8	.39	C 1 (234)
14	647	1143	1.10	.06	1.02	1.1	1.03	1.4	.27	C 2 (185)
38	669	1143	1.02	.06	.96	-2.0	.94	-2.5	.36	C 5 (138)
39	745	1143	.71	.06	1.02	1.0	1.04	1.3	.25	C 5 (160)
35	832	1143	.32	.07	1.05	1.6	1.07	1.6	.20	C 5 (50)
36	850	1143	.23	.07	1.01	.3	.99	-.1	.26	C 5 (72)
3	867	1143	.14	.07	.88	-3.4	.80	-4.2	.44	C 1 (48)
18	870	1143	.13	.07	1.08	2.1	1.10	1.9	.15	C 3 (64)
12	874	1143	.11	.07	1.08	2.1	1.11	2.1	.14	C 2 (137)
10	886	1143	.04	.07	.99	-.2	1.02	.4	.26	C 2 (49)
5	919	1143	-.14	.08	.95	-1.2	.90	-1.8	.33	C 1 (122)
25	930	1143	-.21	.08	.90	-2.1	.82	-3.1	.39	C 4 (33)
9	946	1143	-.31	.08	1.01	.3	1.02	.2	.22	C 2 (25)
37	958	1143	-.39	.08	1.10	1.8	1.31	4.0	.05	C 5 (93)
30	963	1143	-.43	.08	.92	-1.5	.85	-2.2	.35	C 4 (146)
29	966	1143	-.45	.08	.94	-1.1	.89	-1.5	.31	C 4 (124)
6	990	1143	-.63	.09	.98	-.4	.97	-.4	.24	C 1 (133)
13	990	1143	-.63	.09	.99	-.1	.95	-.6	.23	C 2 (161)
31	997	1143	-.68	.09	.96	-.7	.97	-.4	.27	C 4 (168)
2	1007	1143	-.77	.09	.95	-.8	.88	-1.4	.29	C 1 (16)
22	1020	1143	-.89	.10	.98	-.2	.87	-1.4	.24	C 3 (178)
32	1040	1143	-1.09	.11	.94	-.8	.85	-1.5	.29	C 4 (199)
11	1047	1143	-1.17	.11	1.02	.2	1.08	.7	.13	C 2 (73)
27	1054	1143	-1.26	.11	.93	-.8	.77	-2.1	.29	C 4 (78)
24	1062	1143	-1.36	.12	.94	-.6	.82	-1.5	.27	C 4 (7)
33	1084	1143	-1.71	.14	.97	-.3	.84	-1.1	.21	C 4 (222)
1	1087	1143	-1.77	.14	.99	-.1	1.10	.6	.14	C 1 (5)
40	1090	1143	-1.83	.14	.99	.0	.95	-.3	.15	C 5 (186)
19	1102	1143	-2.10	.16	.99	-.1	.95	-.3	.14	C 3 (87)
7	1104	1143	-2.15	.16	.99	-.1	.97	-.2	.14	C 1 (172)
20	1109	1143	-2.30	.18	1.01	.0	1.14	.7	.08	C 3 (127)
16	1115	1143	-2.50	.19	1.01	.0	1.29	1.2	.06	C 3 (10)
4	1120	1143	-2.70	.21	1.00	.0	1.05	.2	.08	C 1 (89)
MEAN	818.	1143.	.00	.10	.99	.0	1.00	.1		
S.D.	292.	0.	1.60	.04	.06	1.8	.14	2.3		

4.4.6.2 Social Acceptance vs. Social Intolerance (C 1)

The following items comprise the C 1 sub-scale:

C 1 (5) – I can usually accept other people as they are, even when they are very different from me.

C 1 (16) – I generally don't like people who have different ideas than me.

C 1 (48) – I have no patience with people who don't accept my views.

C 1 (89) – I often learn a lot from people.

C 1 (122) – It is hard for me to tolerate people who are different from me.

C 1 (133) – It is usually easy for me to like people who have different values from me.

C 1 (172) – I usually respect the opinions of others.

C 1 (234) – People involved with me have to learn how to do things my way.

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ADULTS                       MAP OF ITEMS
                  <frequ>|<less>
    4     .##########   +
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                        |Q
    3                   +   C 1 (234)
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    2                   +
                       M|
                        |
                        |S
             .#######   |
                        |
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                        |   C 1 (48)
    1                   +
                       S|
                 .###   |   C 1 (122)
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                        |   C 1 (133)
    0                   +M  C 1 (16)
                   .# Q|
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                        |
   -1                   +
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                        |   C 1 (5)
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                    .   |S  C 1 (172)
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   -2                   +
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                        |   C 1 (89)
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   -3                   +
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Figure 28: Person Item Map

The person item map shows that the sample and item distribution only overlaps to a very limited extent (see Figure 24), which means that the C 1 items are not ideally suited to measure the construct among the current sample. It is also evident from the figure that a large number of participants are clustered towards the top end of the scale; this indicates that the scale is unable to differentiate between people with very high standings on the C 1 construct. One way to correct this situation is to include items in this sub-scale that can measure an even higher level of the construct.

Most of the items comprising the C 1 scale are fairly well distributed over the construct range. Only one pair of items occupies a similar logit value, these items are C 1 (16) and C 1 (133). It is recommended that one of these items should be altered to relocate to the top end of the scale, which will allow the scale to assess the higher end of the construct with greater precision.

Table 70: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	6.2	8.0	1.89	1.10	.97	-.2	1.06	-.2
S.D.	1.0	.0	1.02	.16	.62	1.0	1.55	.7
MAX.	7.0	8.0	2.78	1.26	2.94	3.3	9.90	3.1
MIN.	1.0	8.0	-2.69	.86	.37	-1.8	.16	-1.0

```
 REAL RMSE   1.25  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00
MODEL RMSE   1.11  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00
 S.E. OF ADULT  MEAN    .04
 WITH   330 EXTREME ADULTS  =  1144 ADULTS   MEAN    2.43  S.D.    1.21
 REAL RMSE   1.37  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00
MODEL RMSE   1.27  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00
```

The mean respondent measure value (1.89) indicates that on average the sample has a very high standing on the C 1 construct, this observation is also evident in the person item map were the majority of the sample are clustered in groups towards the top end of the scale. The minimum, maximum and standard deviation measure values show that the construct has a range of just less than five and a half logits, and that inconsistent variation in the construct level among the respondents is minimal. The minimum infit mnsq value (0.37) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (2.94) point to individual response patterns that did not behave as the model predicted. The very large maximum outfit mnsq value (9.90) shows that multiple individuals have uncharacteristic response patterns towards items far removed from their inherent construct level. The small minimum mnsq outfit value of 0.16 indicates that several participants responses to items far removed from their construct level are too predictable.

The C 1 scale rendered a person separation value of 0.00, a similar reliability value was produced. Hence, the measure has a no reliability, which implies that respondents did not respond in a reliable fashion to the items of the C 1 scale. This means that no confidence can be ascribed to the person distribution on the construct.

Table 71: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	627.5	814.0	.00	.12	.99	-.3	1.10	.4
S.D.	172.3	.0	1.59	.05	.08	1.9	.23	2.9
MAX.	791.0	814.0	3.05	.22	1.11	3.1	1.58	6.4
MIN.	229.0	814.0	-2.22	.08	.87	-3.1	.80	-3.5

REAL RMSE .13	ADJ.SD 1.58	SEPARATION 11.71	ITEM	RELIABILITY	.99
MODEL RMSE .13	ADJ.SD 1.58	SEPARATION 11.90	ITEM	RELIABILITY	.99
S.E. OF ITEM MEAN .60					

The C 1 scale is relatively easy for the current sample to endorse in a manner that will increase their standing on the construct, as the mean respondent measure value (1.89) is much higher than the mean item measure value (0.00) (see Table 70 and Table 71). This scenario is also evident in the person item map, which shows that a large number of respondents are grouped at the top end of the logit scale.

Table 71 also shows the average infit and outfit mnsq values for the sub-scale, these values are within the acceptable mnsq fit range, which indicates that on average the items of the C 1 sub-scale conformed to the functioning predicted by the Rasch model. Contrasting to the extremely low person separation and reliability reported earlier, item separation and reliability are high at 11.9 and 0.99 respectively. The high reliability value points out that if the scale is administered to another sample it is likely that the item difficulty spread will be repeated.

Table 72 illustrates that item C 1 (234) has the highest item measure value, which means that it is the most difficult item to endorse in a manner that will increase a participant's standing on the construct. In other words respondents with low inherent levels of the construct are expected to endorse this item in such a way that it would decrease their standing on the construct. Table 72 also points out that all the C 1 items rendered mnsq infit values that fall between 0.6 and 1.4 mnsq. These fit statistics provide sufficient evidence that the C 1 sub-scale is functioning in a unidimensional manner.

Table 72: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
8	229	814	3.05	.08	1.11	3.1	1.58	6.4	A .61	C 1 (234)
1	758	814	-1.19	.15	1.06	.6	1.17	.9	B .26	C 1 (5)
6	661	814	.14	.10	1.04	.8	1.17	1.8	C .40	C 1 (133)
4	791	814	-2.22	.22	1.04	.2	1.17	.5	D .18	C 1 (89)
7	775	814	-1.62	.17	1.01	.0	1.16	.7	d .24	C 1 (172)
2	678	814	-.03	.10	.94	-1.0	.94	-.6	c .44	C 1 (16)
3	538	814	1.12	.08	.88	-3.1	.85	-3.1	b .59	C 1 (48)
5	590	814	.75	.09	.87	-3.0	.80	-3.5	a .57	C 1 (122)
MEAN	628.	814.	.00	.12	.99	-.3	1.10	.4		
S.D.	172.	0.	1.59	.05	.08	1.9	.23	2.9		

The evidence presented for this sub-scale show that only two items cluster together at a similar logit value. One of these items could be modified to occupy the higher logit region of the scale. Both the person separation and reliability are zero, which means that not much confidence can be ascribed to the person distribution on the construct. On the other hand item separation and reliability are high, which means that it is likely that the same item hierarchy can be expected in future test administrations.

The results show that the C 1 scale is unidimensional and exclusively measures a single construct. The unidimensionality of the scale supports both the construct-and content validity of the C 1 scale.

4.4.6.3 Empathy vs. Social Disinterest (C 2)

The following items comprise the C 2 sub-scale:

C 2 (25) – I often consider another person's feelings as much as my own.

C 2 (49) – I don't seem to understand other people very well.

C 2 (73) – People will usually tell me how they feel.

C 2 (137) – I usually try to imagine myself "in other people's shoes", so I can really understand them.

C 2 (161) – I often try to put aside my own social judgment so that I can better understand what other people are experiencing.

C 2 (185) – I wish other people didn't talk as much as they do.

C 2 (227) – I don't think it is possible for one person to share feelings with someone else who hasn't had the same experiences.

The person item map illustrates that only a small section of the item distribution overlaps with the respondent distribution, as a result there is large difference between the sample and item means (see Figure 29). Hence, the items comprising the C 2 scale are not ideally suited to assess the construct among the current sample. The person item map demonstrates that the majority of the sample clusters around the respondent mean to form a relatively normal distribution with regards to their standing on the construct. The figure also shows that three of the C 2 items are plotted at the bottom end of the scale, where few respondent construct levels are situated. Although this provides motivation to alter the current logit location of these items in order to differentiate between persons with higher levels of the construct, the current item distribution can prove useful in a sample with a low average of the C 2 construct. Only two items (C 2 – 49 and C 2 - 137) share a similar logit location. It is recommended that one of these items should be revised to measure a higher level of the construct.

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ADULTS                    MAP OF ITEMS
                <frequ>|<less>
   3                .# Q+
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                       |Q C 2  (227)
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   1                   +
                       |  C 2  (185)
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            .#######  S|
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                       |
   0                   +M
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                       |  C 2  (137)
                       |  C 2  (49)
                       |
                 .##   |
                       |
                       |  C 2  (25)
                      Q|
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                       |
                       |  C 2  (161)
  -1                   +
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                       |
                       |  C 2  (73)
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  -2                   +
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Figure 29: Person Item Map

Table 73: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	4.9	7.0	1.15	1.02	.97	-.1	.97	-.2
S.D.	1.0	.0	.91	.14	.52	1.0	.83	.9
MAX.	6.0	7.0	2.31	1.23	2.46	2.7	6.74	2.7
MIN.	2.0	7.0	-1.22	.85	.42	-1.5	.20	-1.2

REAL RMSE 1.13 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00
MODEL RMSE 1.03 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00
S.E. OF ADULT MEAN .03
WITH 57 EXTREME ADULTS = 1144 ADULTS MEAN 1.26 S.D. 1.00
REAL RMSE 1.16 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00
MODEL RMSE 1.07 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00

The mean respondent measure value (1.15) indicates that the sample has a relatively high average standing on the construct (see Table 73). The minimum, maximum and standard deviation measure values show that the construct has a range of just more than three and a half logits, and that inconsistent variation in the construct level among respondents is negligible. The minimum infit mnsq value (0.42) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (2.46) point to individual response patterns that did not behave as the model predicted. The large maximum outfit mnsq value (6.74) indicates that multiple individuals have unexpected response patterns towards items far removed from their inherent construct level. Finally the small minimum mnsq outfit value (0.20) points to the fact that some participant responses to items far removed from their construct level are too predictable.

Table 73 shows that the scale rendered extremely low person separation (0.00) and reliability statistics (0.00). The measure's total lack of reliability points to the fact that the respondents did not respond in a reliable fashion at all to the items of the C2 scale. This means that no confidence can be ascribed to the person distribution on the construct.

Table 74: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	760.7	1087.0	.00	.08	1.00	.1	.97	-.2
S.D.	230.6	.0	1.22	.01	.08	2.0	.21	3.0
MAX.	991.0	1087.0	2.43	.11	1.18	4.8	1.47	6.8
MIN.	275.0	1087.0	-1.51	.07	.93	-1.4	.80	-2.3

REAL RMSE .08 ADJ.SD 1.21 SEPARATION 14.34 ITEM RELIABILITY 1.00
MODEL RMSE .08 ADJ.SD 1.21 SEPARATION 14.49 ITEM RELIABILITY 1.00
S.E. OF ITEM MEAN .50

The mean respondent measure (1.15) is considerably higher than the mean item measure value of 0.00 (see Table 73 and Table 74); this difference implies that on average the items of the C 2 scale is relatively easy for the majority of the current sample to endorse in such a manner that it will increase their standing on the construct. Table 74 also shows the average infit and outfit mnsq values for the sub-scale. These values are both within the acceptable range of 0.6 and 1.4 which indicates that on average the function of the items of the C 2 sub-scale conformed to the functioning predicted by the Rasch model.

Contrasting to the extremely low person separation and reliability reported earlier, item separation and reliability are high at 14.49 and 1.00 respectively. The high reliability of the scale indicates that if this scale is administered to another sample it is likely that this item difficulty distribution will be repeated. Table 75 illustrates that the item C 2 (227) has the highest measure value and is therefore expected to be the item, which will be the most difficult to endorse in a manner that will increase a participant standing on the construct.

Table 75 shows that only two of the scale's items (C 2 227 and C 2 73) has low point-biserial values. The table also shows that all the C 2 items rendered mnsq infit values that fall between 0.6 and 1.4. These fit statistics provides sufficient evidence to assume that the scale is unidimensional and measures only one construct.

Table 75: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
7	275	1087	2.43	.07	1.18	4.8	1.47	6.8	A .29	C 2 (227)
6	590	1087	.96	.07	1.01	.4	1.02	.7	B .43	C 2 (185)
3	991	1087	-1.51	.11	.99	-.1	.82	-1.5	C .27	C 2 (73)
4	818	1087	-.15	.08	.97	-.9	.92	-1.3	D .40	C 2 (137)
2	829	1087	-.21	.08	.95	-1.3	.89	-1.8	c .41	C 2 (49)
5	933	1087	-.93	.09	.95	-.9	.80	-2.3	b .36	C 2 (161)
1	889	1087	-.59	.08	.93	-1.4	.86	-1.9	a .39	C 2 (25)
MEAN	761.	1087.	.00	.08	1.00	.1	.97	-.2		
S.D.	231.	0.	1.22	.01	.08	2.0	.21	3.0		

The evidence presented for C 2 scale suggests that only two items of the sub-scale cluster together at a similar logit value; one of these items could be modified to occupy the higher logit region of the scale, which will enable the scale to measure an even a higher level of the construct. The scale rendered extremely low person separation and reliability values. On the other hand item separation and reliability are high. Finally the results proved that the scale functions in a unidimensional manner, which in turn supports both the construct-and content validity of the scale.

4.4.6.4 Helpfulness vs. Unhelpfulness (C 3)

The following items comprise the C 3 sub-scale:

C 3 (10) – I like to help find a solution to problems so that everyone comes out ahead

C 3 (47) – I usually try to get just what I want for myself because it is not possible to satisfy everyone anyway.

C 3 (64) – I like to be of service to others.

C 3 (87) – I like to share what I have learned with other people.

C 3 (127) – I try to cooperate with others as much as possible.

C 3 (153) – Members of a team rarely get their fair share.

C 3 (178) – It is usually foolish to promote the success of other people.

C 3 (216) – Most people I know look out only for themselves, no matter who else gets hurt.

```
        ADULTS                  MAP OF ITEMS
               <frequ>|<less>
     4             .  +
                 .##  |
                      |  C 3 (47)
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                      |
                      |
                      |
     3                +
                     S|  C 3 (153)   C 3 (216)
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           .########  |S
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                      |
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     2                +
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                     M|
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     1                +
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                     S|
     0                +M C 3 (64)
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    -1                +
                     Q|  C 3 (178)
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    -2                +
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                      |S C 3 (87)
                      |  C 3 (127)
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    -3                +  C 3 (10)
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    -4                +
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Figure 30: Person Item Map

It is evident from the person item map illustrated in Figure 30 that most of the items comprising the C 3 scale are located towards the lower logit range of the scale (between 0 and -4 logits), while the majority of respondents construct level are plotted towards the top end of the logit scale (between 1 and 4 logits). These two non-overlapping item and person distributions resulted in an item difficulty and construct level mean that differs with more than one logit. The relative mismatch between the item and sample indicates that the items are not ideally suited to measure the construct level among the current sample.

The person item map shows that the majority of the sample clusters around the respondent mean to form a relatively normal distribution with regards to their standing on the construct. Figure 30 also points out that four items are located towards the bottom end of the scale where very few respondent construct levels are plotted. Although this provides motivation to alter the current logit location of the items, in order to differentiate between persons with higher levels of the construct within the current range, the current item spread can prove useful in a sample with a lower average standing on the C 3 construct.

The figure also shows that two items (C 3 – 153 and C 3 - 256) are plotted at the same logit value; in addition C 3 (87) and C 3 (127) are also located at a similar logit value. It is recommended that the surplus items should be modified to measure a higher level of the construct.

Table 76: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	5.2	8.0	1.48	1.19	.98	-.3	.94	-.3
S.D.	.9	.0	1.31	.06	.90	1.1	1.82	.7
MAX.	7.0	8.0	3.90	1.24	7.44	3.6	9.90	2.8
MIN.	1.0	8.0	-3.61	1.01	.18	-1.5	.11	-.9

```
 REAL RMSE    1.38  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00
MODEL RMSE    1.19  ADJ.SD     .54  SEPARATION   .45  ADULT  RELIABILITY  .17
 S.E. OF ADULT   MEAN    .04
 WITH     17 EXTREME ADULTS  =  1144 ADULTS    MEAN      1.53  S.D.     1.36
 REAL RMSE    1.39  ADJ.SD     .00  SEPARATION   .00  ADULT  RELIABILITY  .00
MODEL RMSE    1.19  ADJ.SD     .64  SEPARATION   .54  ADULT  RELIABILITY  .23
```

The mean respondent measure value (1.48) shows that the sample has a relatively high rating on the C 3 construct (see Table 76). The minimum, maximum and standard deviation measure values show that the construct has a range of just more than seven and a halve logits, and that inconsistent variation in the construct level of respondents is negligible. The minimum respondent infit mnsq value (0.18) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (7.44) point to individual response patterns that did not behave as the model predicted. The large maximum outfit mnsq value (9.90) indicates that multiple individuals have unexpected response patterns towards items far removed from their inherent construct level. Finally the small minimum mnsq outfit value (0.11) indicates that some participants' responses to items far removed from their construct level were too predictable (see Table 76).

Table 76 also points out that the scale rendered a relatively low person separation value (0.54) which means that the clusters of respondents illustrated in the scales person item map are on average separated by a very small margin. The table also shows that the scale's reliability is very low (0.23), which means that not much confidence can be ascribed to the person distribution on the construct.

Table 77: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	736.4	1127.0	.00	.12	.98	-.2	1.12	.6
S.D.	383.5	.0	2.60	.05	.03	.7	.21	1.5
MAX.	1099.0	1127.0	3.65	.20	1.05	1.2	1.51	3.8
MIN.	178.0	1127.0	-2.97	.08	.95	-1.3	.89	-.8

REAL RMSE .13	ADJ.SD 2.60	SEPARATION 19.90	ITEM	RELIABILITY 1.00
MODEL RMSE .13	ADJ.SD 2.60	SEPARATION 19.93	ITEM	RELIABILITY 1.00
S.E. OF ITEM MEAN .98				

Table 77 provides a summary of the item statistics of the C 3 scale. This table shows that the sub-scale is relatively easy for the sample to endorse, because the average construct level of 1.48 indicated in Table 76 is much higher than the mean item measure. Table 77 also shows the average infit and outfit mnsq values for the sub-scale. These values are both within the acceptable range of 0.6 and 1.4. Hence the average responses to the items of the sub-scale conformed to the expected response pattern.

Contrasting to the low person separation and reliability values, item separation and reliability are high at 19.93 and 1.00 respectively. This means that despite the clustering and duplication of items at a similar logit values, the items comprising the C 3 scale are more spread out on the construct than the respondents on average. The high reliability value means that if this scale is administered to another sample it is likely that the same item hierarchy will be produced. Table 78 illustrates that the item which is the most difficult to endorse is C 3 (47). Participants with low inherent levels of the construct are expected to endorse this item in such a way that it would not increase their standing on the construct. The easiest item to endorse on the sub-scale is C 3 (64). The highest error estimate associate with an item is 0.20 (C 3 – 10).

The results in Table 78 indicate that all the C 3 items have mnsq infit values that fall within 0.6 and 1.4 logits. The table shows that no items have large negative point-biserial correlations. The fit statistics indicate that the C 3 sub-scale is unidimensional in nature.

Table 78: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
5	1092	1127	-2.72	.18	.99	-.1	1.51	1.3	A .18	C 3 (127)
6	285	1127	2.92	.08	1.05	1.2	1.38	3.8	B .44	C 3 (153)
1	1099	1127	-2.97	.20	.98	-.1	1.18	.4	C .18	C 3 (10)
3	854	1127	-.01	.08	1.01	.2	1.10	1.1	D .43	C 3 (64)
4	1086	1127	-2.54	.17	1.00	.0	1.03	.1	d .22	C 3 (87)
2	178	1127	3.65	.09	.96	-.8	.91	-.7	c .46	C 3 (47)
8	294	1127	2.86	.08	.95	-1.3	.93	-.8	b .51	C 3 (216)
7	1003	1127	-1.19	.10	.95	-.8	.89	-.7	a .38	C 3 (178)
MEAN	736.	1127.	.00	.12	.98	-.2	1.12	.6		
S.D.	383.	0.	2.60	.05	.03	.7	.21	1.5		

The evidence presented for the C 3 sub-scale suggests that some items on the scale might be problematic as they cluster together or are located at the same logit value. These items should either be deleted or modified to occupy the higher logit regions of the scale. Both the person separation and reliability are extremely low. On the other hand item separation and reliability are high, which means that it is likely that the same item hierarchy can be expected in future test administrations. Finally the C 3 scale is proven to be unidimensional which means that the scale exclusively measured a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

4.4.6.5 Compassion vs. Revengefulness (C 4)

The following items comprise the C 4 sub-scale:

C 4 (7) – I enjoy getting revenge on people who hurt me.

C 4 (33) – It gives me pleasure to see my enemies suffer.

C 4 (57) – When someone hurts me in anyway, I usually try to get even.

C 4 (78) – I try to be considerate of other people's feelings, even when they have been unfair to me in the past.

C 4 (98) – I usually enjoy being mean to anyone who has been mean to me.

C 4 (124) – I would rather be kind than to get revenge when someone hurts me.

C 4 (146) – I like to imagine my enemies suffering.

C 4 (168) – Most of the time I quickly forgive anyone who does me wrong.

C 4 (199) – It gives me pleasure to help others, even if they have treated me badly.

C 4 (222) – I hate to see anyone suffer.

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                       |  C 4  (57)
                       |
    2  .############   +
                      M|
                       |
                       |S
                       |
                       |
                       |
                       |
    1          .#####  +
                       |
                       |
                       |
                      S|
                 .###  |
                       |
                       |  C 4  (33)
    0                  +M
                       |  C 4  (146)
                   .#  |  C 4  (124)
                       |
                       |  C 4  (168)
                       |
                    . Q|
                       |
   -1                  +  C 4  (199)
                       |
                       |  C 4  (78)
                    .  |  C 4  (7)
                       |
                       |S
                       |  C 4  (222)
                       |
   -2               .  +
                       |
                       |
                       |
                       |
                       |
                       |
                    .  |
   -3               .  +
                <rare>|<more>
```

Figure 31: Person Item Map

The person item map demonstrates that the majority of the sample clusters around the respondent mean, to form a relatively normal distribution with regards to their standing on the construct (see Figure 31). The figure illustrates that most of the C 4 items are located in the lower logit region of the scale, between 0 and -2 logits. Contrasting to this the majority of the respondent construct levels are plotted towards the top end of the logit scale, between one and four logits. This results in a difference of just less than 2 logits between the item difficulty and respondent means. Although the mismatch between items and respondents provides motivation to alter the current logit location of the items, to shift towards the upper end of the scale, the current item spread will be useful in a sample with a low average standing on the C 4 construct.

It is evident from the figure that two pairs of items (C 4 – 7 and C 4 – 78; C 4 - 124 and C 4 - 146) occupy similar logit values. It is recommended that one item of each pair should be modified to measure a higher level of the construct.

Table 79: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	7.6	10.0	1.87	1.07	.96	-.3	1.05	-.3
S.D.	1.5	.0	1.32	.20	.73	1.1	1.63	.9
MAX.	9.0	10.0	3.41	1.34	3.46	3.0	9.90	3.7
MIN.	1.0	10.0	-2.87	.73	.29	-1.7	.11	-1.2

REAL RMSE 1.25 ADJ.SD .41 SEPARATION .33 ADULT RELIABILITY .10
MODEL RMSE 1.09 ADJ.SD .73 SEPARATION .67 ADULT RELIABILITY .31
S.E. OF ADULT MEAN .04
WITH 100 EXTREME ADULTS = 1144 ADULTS MEAN 2.09 S.D. 1.47
REAL RMSE 1.29 ADJ.SD .72 SEPARATION .55 ADULT RELIABILITY .24
MODEL RMSE 1.15 ADJ.SD .92 SEPARATION .80 ADULT RELIABILITY .39

The mean respondent measure value (1.87) shows that the sample has a high average standing on the C 4 construct (see Table 79). The minimum, maximum and standard deviation measure values show that the construct has a range of just more than six logits, and that inconsistent variation among the construct level of respondents is negligible (see Table 79). The minimum infit mnsq value (0.29) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (3.46) point to individual response patterns that did not behave as the model predicted. The large maximum outfit mnsq value (9.90) provides evidence that multiple individuals have unexpected responses on items far removed from their inherent construct level. Finally the small minimum mnsq outfit value (0.11) indicates that several participant responses to items far removed from their construct level are too predictable.

The results presented in the respondent summary table shows a low person separation value (0.80), which means that the respondent clusters illustrated in Figure 31 are on average separated by a very small difference, with regards to their respective construct levels. The measure has low person reliability (0.39), which means that not much confidence can be ascribed to the person distribution on the C 4 construct.

Table 80: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	795.6	1044.0	.00	.11	.99	-.2	1.10	.5
S.D.	250.8	.0	1.68	.02	.07	1.4	.36	2.5
MAX.	987.0	1044.0	3.89	.15	1.09	1.8	2.02	5.5
MIN.	182.0	1044.0	-1.78	.07	.87	-2.7	.70	-3.4

REAL RMSE	.11	ADJ.SD	1.67	SEPARATION 15.23	ITEM	RELIABILITY 1.00
MODEL RMSE	.11	ADJ.SD	1.67	SEPARATION 15.44	ITEM	RELIABILITY 1.00
S.E. OF ITEM MEAN	.56					

Table 80 presents a synopsis of the item statistics for the C 4 scale. The results in this table points out that the C 4 scale is relatively easy for the current sample to endorse, in a manner that will increase their standing on the construct; as the mean respondent measure value (1.87) is considerably higher than the mean item measure value (0.00) (see Table 79 and Table 80). Table 80 also shows that the scale's average infit and outfit mnsq values are within the acceptable range of 0.6 and 1.4, which indicates that in general the items actual functioning conformed to the predictions made by the Model. The scale rendered high item separation (15.44) and reliability (1.00) statistics. The high reliability value points to the fact that if this scale is administered to another sample it is likely that the same item hierarchy will be established.

Table 81 illustrates that item C 4 (98) has the highest measure value; participants with low inherent levels of the construct are expected to endorse this item in such a way that it would not increase their standing on the construct. The table also indicates that all the C 4 items rendered mnsq infit values that fall within the acceptable mnsq range; and that no items rendered significantly low point-biserial correlations. These fit statistics offers enough evidence to assume that the C 4 scale functions is a unidimensional manner.

Table 81: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
5	182	1044	3.89	.09	1.09	1.8	2.02	5.5	A .47	C 4 (98)
10	987	1044	-1.78	.15	1.09	.7	1.24	.9	B .30	C 4 (222)
3	454	1044	2.28	.07	1.05	1.5	1.23	3.6	C .51	C 4 (57)
8	900	1044	-.51	.10	.99	-.2	1.23	1.6	D .42	C 4 (168)
4	957	1044	-1.22	.12	1.03	.4	1.09	.5	E .36	C 4 (78)
6	869	1044	-.21	.09	.98	-.3	.98	-.2	e .46	C 4 (124)
9	943	1044	-1.02	.12	.96	-.5	.79	-1.3	d .41	C 4 (199)
1	965	1044	-1.35	.13	.94	-.6	.93	-.3	c .39	C 4 (7)
7	866	1044	-.18	.09	.88	-2.2	.80	-1.9	b .51	C 4 (146)
2	833	1044	.09	.09	.87	-2.7	.70	-3.4	a .54	C 4 (33)
MEAN	796.	1044.	.00	.11	.99	-.2	1.10	.5		
S.D.	251.	0.	1.68	.02	.07	1.4	.36	2.5		

The results presented for the C 4 scale suggests that some of its items might be functioning in a problematic manner as they cluster together at similar logit values. These items could either be deleted or modified to occupy a higher logit location. Both the person separation and reliability are extremely low, while item separation and reliability are high, this means that it is likely that the same item hierarchy can be expected in future test administrations. Finally the C 4 scale functioned in a unidimensional manner, which implies that the scale exclusively measures a single construct. The unidimensionality of the scale supports both the construct-and content validity of the C 4 scale.

4.4.6.6 Integrated Conscience vs. Self-Serving (C 5)

The following items comprise the C 5 sub-scale:

C 5 (18) – I would do almost anything legal in order to become rich and famous, even if I would lose the trust of many old friends.

C 5 (50) – You don't have to be dishonest to succeed in business.

C 5 (72) – I cannot have any piece of mind if I treat other people unfairly, even if they are unfair to me.

C 5 (93) – I know there are principles for living that no one can violate without suffering in the long run.

C5 (138) – Principles like fairness and honesty have little role in some aspects of my life.

C 5 (160) – I don't think that religious or ethical principles about what is right and wrong should have much influence in business decisions.

C 5 (186) – Everyone should be treated with dignity and respect, even if they seem to be unimportant or bad.

C 5 (206) – Whether something is right or wrong is just a matter of opinion.

C 5 (235) – Dishonesty only causes problems if you get caught.

```
ADULTS                      MAP OF ITEMS
                <frequ>|<less>
    3                 .  +
                         |
                    .##  |
                         |
                        Q|
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                         |
                         |
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                         |
    2                    +
                         |  C 5 (235)
                .######  |  C 5 (18)    C 5 (206)
                         |
                        S|
                         |S
                         |
                         |
                         |
                         |
    1      ############  +
                         |
                         |
                         |
                        M|
                         |
          .############  |
                         |
                         |  C 5 (138)
                         |
    0                    +M
                         |
                         |  C 5 (160)
              .########  |
                        S|
                         |
                         |  C 5 (50)
                         |  C 5 (72)
                         |
                         |
   -1              .###  +
                         |
                         |
                         |
                         |  C 5 (93)
                        Q|S
                         |
                         |
                      #  |
                         |
   -2                    +
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                         |
                         |
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                         |
                         |
                         |
                         |
                      .  |  C 5 (186)
   -3                    +
                 <rare>|<more>
```

Figure 32: Person Item map

The person item map illustrates that the majority of the sample clusters around the respondent mean, to form a relatively normal distribution with regards to their standing on the construct (Figure 32). The figure shows that the respondent distribution is relatively well matched to C 5 item distribution, which suggests that the set of items is relatively well on target to measure the construct within the current sample.

Only two items, C 5 (18) and C 5 (206) are located at the same logit value, which indicate that they share the same difficulty level. This means that both items provide similar information regarding the sample's standing on the construct. It is recommended that one of these items should be revised to occupy any of the gaps in the item distribution. These gaps are evident in the middle and lower end of the item distribution. The previous recommendation is also made for items, C 5 (50) and C 5 (72), which are clustered together towards the lower logit region of scale. These alterations will allow the scale to differentiate more accurately between respondents whose construct level is located in the regions where no items are present.

Table 82: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	5.3	9.0	.58	.86	.99	-.2	1.04	-.2
S.D.	1.4	.0	1.03	.08	.45	1.1	1.03	.8
MAX.	8.0	9.0	2.84	1.20	3.17	3.4	9.90	3.4
MIN.	1.0	9.0	-2.89	.81	.35	-2.0	.28	-1.2

```
| REAL RMSE    .94  ADJ.SD      .42  SEPARATION   .45  ADULT  RELIABILITY  .17 |
|MODEL RMSE    .87  ADJ.SD      .56  SEPARATION   .64  ADULT  RELIABILITY  .29 |
| S.E. OF ADULT  MEAN     .03                                                 |
| WITH     4 EXTREME ADULTS  =  1144 ADULTS   MEAN      .60  S.D.     1.05     |
| REAL RMSE    .94  ADJ.SD      .45  SEPARATION   .47  ADULT  RELIABILITY  .18 |
|MODEL RMSE    .87  ADJ.SD      .58  SEPARATION   .66  ADULT  RELIABILITY  .31 |
```

The mean respondent measure value (0.58) indicates that the sample has a relatively high standing on the C 5 construct (see Table 82). The minimum, maximum and standard deviation measure values show that the construct has a range of just less than six logits and that there is minimal variation among respondents construct levels. The minimum infit mnsq value (0.35) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (3.17) point to individual response patterns that did not behave as the model expected (see Table 82). The high mnsq outfit value (9.90) indicates that multiple individuals have atypical responses to items far removed from their construct level. Finally the small minimum mnsq outfit value (0.28) indicates that some participants responses to items far removed from their construct level are too predictable.

The person separation value (0.31) presented in Table 82 indicates that the respondent clusters in Figure 18 are on average separated by a small difference in their respective construct levels. The C 5 scale rendered a low respondent reliability (0.40), this means that not much confidence can be ascribed to the person distribution on the construct.

Table 83: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	668.0	1140.0	.00	.08	.99	-.4	1.07	.5
S.D.	286.4	.0	1.54	.02	.04	1.3	.12	1.6
MAX.	1087.0	1140.0	1.94	.15	1.06	1.7	1.30	2.9
MIN.	280.0	1140.0	-2.89	.07	.92	-3.5	.89	-2.9

REAL RMSE	.09	ADJ.SD	1.54	SEPARATION	18.09	ITEM RELIABILITY	1.00
MODEL RMSE	.08	ADJ.SD	1.54	SEPARATION	18.20	ITEM RELIABILITY	1.00
S.E. OF ITEM MEAN	.55						

Table 83 presents a synopsis of the item statistics that characterizes the functioning of the C 5 scale. The results illustrate that the scale is relatively easy for the sample to endorse, in a manner that will increase their standing on the construct as the mean respondent measure value (0.58) indicated in Table 82 is higher than the mean item measure value (0.0). The average infit and outfit mnsq values for the sub-scale are within the acceptable range of 0.6 and 1.4; this indicates that on average the items of the scale functioned according to the model's expectations. In other words the items of the sub-scale performed according to their predicted item difficulty level.

Unlike the low person separation and reliability values, both item separation and reliability are high at 18.20 and 1.00 respectively. This means that despite the clustering and duplication of items at a similar logit values, the C 5 items are on average more spread out on the construct than respondents. The high reliability value indicates that when this scale is administered to another sample, that the same item hierarchy will likely be established. Table 84 illustrates that item C 5 (235) is the most difficult for participants to endorse in a manner that will increase their standing on the construct; participants with a low inherent level of the construct are expected to endorse this item in a way that it would not increase their standing on the construct. The easiest item to endorse on the scale is C 5 (186).

Table 84 also points out that all the scale's items have mnsq infit values that fall between 0.6 to 1.4 mnsq. These fit statistics indicate that this scale functions in a unidimensional manner.

Table 84: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
4	955	1140	-1.37	.09	1.06	1.1	1.30	2.9	A .24	C 5 (93)
1	297	1140	1.84	.07	1.06	1.7	1.17	2.6	B .34	C 5 (18)
7	1087	1140	-2.89	.15	.97	-.2	1.16	.7	C .21	C 5 (186)
9	280	1140	1.94	.08	.98	-.5	1.05	.8	D .40	C 5 (235)
8	309	1140	1.78	.07	.99	-.2	1.03	.6	E .40	C 5 (206)
2	829	1140	-.60	.07	.98	-.6	1.02	.3	d .39	C 5 (50)
6	742	1140	-.17	.07	.99	-.3	1.00	.0	c .41	C 5 (160)
3	847	1140	-.69	.07	.97	-.8	.96	-.7	b .40	C 5 (72)
5	666	1140	.17	.07	.92	-3.5	.89	-2.9	a .49	C 5 (138)
MEAN	668.	1140.	.00	.08	.99	-.4	1.07	.5		
S.D.	286.	0.	1.54	.02	.04	1.3	.12	1.6		

The results presented for the C 5 sub-scale suggests that some items on the scale might be problematic as they cluster together at the same logit value. These items could be modified to occupy unpopulated regions of the scale. Both the person separation and reliability are extremely low, while item separation and reliability are high. Furthermore the C 5 scale functions in a unidimensional manner, which supports both the construct-and content validity of the scale.

It is concluded that all five cooperativeness sub-scales (C 1, C 2, C 3, C 4 and C 5) are unidimensional, and have high degree of construct validity and item reliability, but low person reliability. This implies that one of the core criteria of the Rasch model is met, which allows the interpretation of other output statistics derived from the Rasch model.

4.4.7 Psychometric properties of the Self-Transcendence Scale and its associated Sub-scales

The Self-Transcendence scale (ST) consists of three sub-scales: creative self-forgetfulness vs. self-consciousness (ST 1); transpersonal identification vs. personal identification (ST 2); and spiritual acceptance vs. rational materialism (ST 3). A Rasch item analysis was conducted on the primary scale as well as each of the sub-scales. The results illustrating the psychometric properties for the primary scale is presented first (see section 4.4.7.1), where after the psychometric properties of each sub-scale are discussed in designated sections (see section 4.4.7.2-4.4.7.4).

4.4.7.1 Self-Transcendence Scale (ST)

```
ADULTS             MAP OF ITEMS
              <frequ>|<less>
    4                +
                     |
                     |
                     |  ST 1 (23)
                     |
                     |
                     |
                     |
    3                +
                  .  |
                     |
                     |Q
                 .#  |
                     |
               .### Q|
                     |
    2         .####  +
                     |  ST 1 (8)
            .######  |  ST 1 (228)
                    S|
         .#########  |  ST 1 (125)
                     |  ST 1 (152)  ST 3 (220)
       .###########  |S ST 1 (76)
        .##########  |  ST 3 (145)
    1                +
      .############ M|  ST 3 (123)  ST 3 (38)
        .##########  |  ST 1 (45)
                     |
          #########  |
            .######  |  ST 3 (97)
             .##### S|  ST 3 (116)
                     |  ST 2 (200)
    0          .###  +M ST 2 (31)   ST 3 (56)
                .##  |
                 .#  |  ST 3 (208)  ST 3 (77)
                 .#  |
                    Q|  ST 2 (132)  ST 2 (95)
                  .  |  ST 3 (194)
                 .#  |  ST 1 (195)  ST 2 (163)  ST 2 (232)  ST 3 (6)
                  .  |  ST 1 (215)  ST 3 (175)
   -1                +  ST 1 (96)
                  .  |  ST 2 (15)
                  .  |S
                     |
                  .  |  ST 2 (51)
                     |
                     |  ST 2 (84)
                     |
   -2                +
                     |
                     |
                     |
                     |  ST 1 (173)
                     |Q ST 3 (88)
                     |
                     |
   -3                +
               <rare>|<more>
```

Figure 33: Person item Map

The person item map in Figure 33 shows that the respondent distribution is relatively normal and overlaps considerably with the item distribution, this points out that most of the scale's items are relatively well suited to measure the inherent construct level in the sample. Despite the large overlap, eight items are plotted towards the lower end of the logit scale and do not overlap with the respondent distribution. The relatively few gaps along the participant distribution illustrates that the ST scale is well suited to assess the relatively narrow range of the construct.

It is concerning that multiple item clusters exist along the item distribution, for instance the shared logit location of items ST 1 (195), ST 2 (163), ST 2 (232), and ST 3 (6). Duplication of items or overpopulated item clusters provide little extra information about the sample's standing on the construct and can artificially confound the standard error associated with the scale. It is recommended that some of these items should be altered to eventually appear towards the higher logit region of the scale, where only one item is plotted. This will allow the scale to assess higher levels of the construct with greater precision.

Table 85: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	21.9	33.0	.91	.44	1.00	-.1	.98	-.1
S.D.	3.7	.0	.69	.04	.24	1.2	.42	1.0
MAX.	30.0	33.0	2.94	.67	1.97	4.7	2.94	4.0
MIN.	8.0	33.0	-1.50	.40	.48	-3.3	.31	-2.3

REAL RMSE .46	ADJ.SD .52	SEPARATION 1.12	ADULT	RELIABILITY .56	
MODEL RMSE .44	ADJ.SD .53	SEPARATION 1.21	ADULT	RELIABILITY .59	
S.E. OF ADULT MEAN .02					

The respondent mean measure value (0.91) points out that the sample has a relatively high average standing on the ST construct (see Table 85). The minimum, maximum and standard deviation respondent measure values indicates that the construct has a range of just less than four and a half logits and that there is minimal variation among the construct level among respondents. The minimum infit mnsq value (0.48) indicate that the response patterns for some of the participants are too predictable, while the maximum infit mnsq value (1.97) point to individual response patterns that did not behave as the model expected. The high outfit mnsq maximum value (2.94) indicate that multiple individuals have atypical response patterns to items far removed from their inherent construct level (see Table 85). Finally the small minimum outfit mnsq value (0.31) points out that some participant response patterns to items removed from their construct levels are too predictable.

The ST scale's reliability is 0.59, which is relatively low (see Table 85). This means that not much confidence can be ascribed to the person distribution on the construct. The person separation value of 1.21 indicates that the respondent clusters in Figure 32 are on average separated by a relatively small difference.

Table 86: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	757.6	1144.0	.00	.08	.99	.2	.98	.2
S.D.	252.6	.0	1.31	.02	.08	3.3	.14	3.5
MAX.	1103.0	1144.0	3.63	.16	1.23	9.9	1.37	9.9
MIN.	85.0	1144.0	-2.60	.06	.88	-4.7	.68	-4.6

REAL RMSE .08	ADJ.SD 1.30	SEPARATION 15.54 ITEM	RELIABILITY 1.00
MODEL RMSE .08	ADJ.SD 1.30	SEPARATION 15.66 ITEM	RELIABILITY 1.00
S.E. OF ITEM MEAN .23			

The average respondent measure of 0.91 (see Table 85) is almost one logit higher than the mean item measure value (see Table 86), this points out that on average the items of the scale is relatively easy for the current sample to endorse in such a manner that it will increase their standing on the construct. The mean mnsq infit and outfit values show that on average the performance of items of the scale conformed to the item functioning predicted by the Rasch model (see Table 86). This means that most of the items of the scale performed according to their estimated item difficulty.

The table also shows that item separation and reliability are high at 15.66 and 1.00 respectively (see Table 86). This means that the self-transcendence items are on average more spread out on the construct than respondents. The high reliability value indicates that when this scale is administered to another sample it is likely that the item performance will be repeated and that the same item hierarchy will be established.

Table 87 shows that ST 1 (23) and ST 1 (8) are the items, which participants found the most difficult to endorse, in a manner that will increase their rating on the scale. The table also shows that the individual infit mnsq values for all items are located within the acceptable fit value range. The results show that only one item, ST 3 (220), rendered a low, but negligible point-biserial correlation value. Due to the adequate fit value of this item, it is argued that the most probable cause of these low correlations is a coding error. The individual item infit statistics shows that all the items have a uniform line of enquiry; which in turn supports the notion that this scale functions in a unidimensional manner.

Table 87: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
2	85	1144	3.63	.11	1.00	.1	1.01	.1	.16	ST 1 (23)
1	345	1144	1.84	.07	1.01	.3	1.06	1.5	.26	ST 1 (8)
11	353	1144	1.80	.07	.99	-.2	1.00	-.1	.29	ST 1 (228)
6	433	1144	1.46	.06	.98	-1.1	.99	-.3	.33	ST 1 (125)
33	439	1144	1.44	.06	1.23	9.9	1.37	9.9	-.06	ST 3 (220)
7	450	1144	1.39	.06	1.01	.4	1.03	1.0	.28	ST 1 (152)
4	491	1144	1.23	.06	.97	-1.5	.98	-.9	.34	ST 1 (76)
29	519	1144	1.12	.06	1.18	9.5	1.25	9.9	.04	ST 3 (145)
22	567	1144	.93	.06	.99	-.7	.99	-.4	.32	ST 3 (38)
28	571	1144	.92	.06	1.17	9.3	1.22	9.5	.06	ST 3 (123)
3	599	1144	.81	.06	1.02	1.3	1.03	1.2	.28	ST 1 (45)
26	706	1144	.39	.06	.90	-4.7	.88	-4.6	.45	ST 3 (97)
27	750	1144	.20	.07	.96	-1.8	.94	-1.8	.36	ST 3 (116)
19	781	1144	.07	.07	.92	-3.0	.91	-2.6	.41	ST 2 (200)
23	786	1144	.05	.07	.98	-.6	.98	-.5	.32	ST 3 (56)
13	810	1144	-.06	.07	1.07	2.1	1.11	2.7	.19	ST 2 (31)
24	850	1144	-.25	.07	.89	-3.2	.82	-4.1	.44	ST 3 (77)
32	857	1144	-.29	.07	.93	-1.9	.88	-2.6	.38	ST 3 (208)
16	889	1144	-.46	.07	1.04	1.0	1.08	1.5	.21	ST 2 (95)
17	889	1144	-.46	.07	.91	-2.3	.87	-2.5	.40	ST 2 (132)
31	911	1144	-.58	.08	.88	-3.0	.78	-4.1	.45	ST 3 (194)
20	936	1144	-.73	.08	1.08	1.6	1.19	2.8	.13	ST 2 (232)
9	938	1144	-.75	.08	.93	-1.6	.87	-2.1	.36	ST 1 (195)
18	943	1144	-.78	.08	1.00	-.1	1.01	.1	.25	ST 2 (163)
21	947	1144	-.80	.08	.99	-.1	.95	-.8	.27	ST 3 (6)
10	949	1144	-.82	.08	.94	-1.3	.87	-2.1	.35	ST 1 (215)
30	955	1144	-.86	.08	.97	-.5	1.00	.0	.28	ST 3 (175)
5	970	1144	-.96	.09	.98	-.3	.96	-.5	.27	ST 1 (96)
12	992	1144	-1.13	.09	1.01	.1	1.06	.7	.21	ST 2 (15)
14	1036	1144	-1.54	.10	.96	-.5	.87	-1.3	.27	ST 2 (51)
15	1054	1144	-1.75	.11	.99	-.1	.94	-.5	.21	ST 2 (84)
8	1097	1144	-2.46	.15	.97	-.2	.80	-1.2	.21	ST 1 (173)
25	1103	1144	-2.60	.16	.97	-.2	.68	-1.9	.22	ST 3 (88)
MEAN	758.	1144.	.00	.08	.99	.2	.98	.2		
S.D.	253.	0.	1.31	.02	.08	3.3	.14	3.5		

The results presented for the primary ST scale suggests that several items on the scale are problematic as they cluster together at similar logit values. These items should either be deleted or modified to occupy the gap towards the top end of the item distribution; however, this should be done with caution as it can influence the functioning of the items within their respective sub-scales.

The evidence presented for the primary ST scale indicates that the scale rendered a low reliability and acceptable person separation statistics. The results also show that this scale is unidimensional, which means that the scale exclusively measures a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

4.4.7.2 Creative Self-Forgetfulness vs. Self-Consciousness (ST 1)

The following items comprise the ST 1 sub-scale:

ST 1 (8) – Often when I am concentrating on something, I lose awareness of the passage of time.

ST 1 (23) – I am often called "absent-minded" because I get so wrapped up in what I am doing that I lose track of everything else.

ST 1 (45) – Often I have unexpected flashes of insight or understanding while relaxing.

ST 1 (76) – Sometimes I have felt like I was part of something with no limits or boundaries in time and space.

ST 1 (96) – Even after thinking about something a long time, I have learned to trust my feelings more than my logical reasons.

ST 1 (125) – I often become so fascinated with what I am doing that I get lost in the moment – like I'm detached from time and place.

ST 1 (152) – Often I become so involved in what I am doing that I forget where I am for a while.

ST 1 (173) – I have had experiences that made my role in life so clear to me that I felt very excited and happy.

ST 1 (195) – I have had moments of great joy in which I suddenly had a clear, deep feeling of oneness with all that exists.

ST 1 (215) – Often when I look at an ordinary thing, something wonderful happens – I get the feeling that I am seeing it fresh for the first time.

ST 1 (228) – I often seem to other people like I am in another world because I am so completely unaware of things going on around me.

Figure 34 depicts that the sample and item distributions overlap to a large extent, it also shows that the item and sample means are plotted relatively close to each other. In other words the ST 1 scale is relatively well suited to measure the construct in the sample. The person item map shows that the respondents form a relatively normal distribution with regards to their standing on the construct.

Several items seem to bundle together between 0.5 and 1.5 logits as well as between -1.5 and -2 logits, if this same item difficulty distribution is retrieved from other samples, it is suggested that some of the these items should be redesigned to relocate to the three prominent gaps in the item distribution.

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ADULTS                         MAP OF ITEMS
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           .####### S|
                     |  ST 1 (8)
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    1  .###########  +  ST 1 (125)
                     |  ST 1 (152)
                     |  ST 1 (76)
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      .############  |
                    M|
                     |  ST 1 (45)
    0                +M
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   -1               S+
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              .####  |  ST 1 (195)
                     |  ST 1 (215)
                     |S ST 1 (96)
   -2                +
                     |
                    Q|
                .#   |
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                     |
   -3                +
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                     |
                  .  |  ST 1 (173)
                     |Q
                     |
   -4                +
               <rare>|<more>
```

Figure 34: Person Item Map

Table 88: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	5.9	11.0	.29	.82	.99	-.2	1.04	-.2
S.D.	1.9	.0	1.25	.09	.45	1.0	1.25	.7
MAX.	10.0	11.0	3.41	1.20	2.93	4.2	9.90	3.5
MIN.	1.0	11.0	-3.55	.76	.29	-2.1	.14	-1.2

REAL RMSE .90 ADJ.SD .87 SEPARATION .97 ADULT RELIABILITY .49
MODEL RMSE .83 ADJ.SD .94 SEPARATION 1.14 ADULT RELIABILITY .57
S.E. OF ADULT MEAN .04
WITH 2 EXTREME ADULTS = 1144 ADULTS MEAN .29 S.D. 1.26
REAL RMSE .90 ADJ.SD .89 SEPARATION .98 ADULT RELIABILITY .49
MODEL RMSE .83 ADJ.SD .95 SEPARATION 1.15 ADULT RELIABILITY .57

The mean respondent measure value (0.29) shows that the sample has a relatively low average standing on the ST 1 construct (see Table 88). The minimum, maximum and standard deviation measure values show that the construct spans across almost seven logits. These values also indicate that there is relative variation in the construct level among respondents. The minimum infit mnsq value (0.29) indicates that the response patterns for most persons are too predictable, in turn the maximum infit mnsq value (2.93) point to individual response patterns that did not behave as the model expected. The high maximum outfit mnsq value (9.90) points out that some individuals have atypical response patterns towards items far removed from their ability level.

Table 88 shows a person separation value of 1.15, this figure indicates that the clusters of respondents distinguished in Figure 34 are on average separated by a very small margin. The low reliability figure (0.57) indicates that the majority of the respondents did not respond in a consistent fashion to this set of items. This means that not much confidence can be ascribed to the person distribution on the construct.

Table 89: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	608.0	1142.0	.00	.09	.99	-.2	1.09	.6
S.D.	312.2	.0	1.89	.03	.03	.9	.22	1.3
MAX.	1095.0	1142.0	3.43	.16	1.04	.9	1.62	2.4
MIN.	83.0	1142.0	-3.54	.07	.93	-2.5	.70	-1.6

REAL RMSE .09 ADJ.SD 1.89 SEPARATION 20.56 ITEM RELIABILITY 1.00
MODEL RMSE .09 ADJ.SD 1.89 SEPARATION 20.64 ITEM RELIABILITY 1.00
S.E. OF ITEM MEAN .60

Table 89 shows a summary of the item statistics for the ST 1 scale. The mean respondent measure (0.29) is only slightly higher than the mean item measure value of 0.00 (see Table 88 and Table 89).This difference implies that on average the items of the ST 1 scale is relatively easy for the majority of the current sample to endorse in a manner that will increase their standing on the construct. This scenario is also evident in the person item map, which shows that the item and person distribution means are plotted close to each other. Table 89 shows that the average infit and outfit mnsq values for the sub-scale are both within the acceptable mnsq range (0.6 and 1.4), which indicates that these items functioned according to the model's expectations.

Table 89 also shows that item separation (20.64) and reliability (1.00) is high, which means that despite the clustering of items at a similar logit values, the items comprising the ST 1 scale are more spread out on the construct than the respondents on average. The high reliability value points out that if this scale is administered to another sample it is likely that the same item hierarchy will be established.

Table 90 illustrates that item ST 1 (23) is the most difficult to endorse in manner that will increase participants standing on the construct. The easiest item to endorse on the scale is ST 1 (173). The table indicates that all the ST 1 items have mnsq infit values that fall between 0.6 and 1.4 mnsq. These fit statistics points out that the ST 1 scale functions in a unidimensional manner.

Table 90: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
2	83	1142	3.43	.12	.98	-.2	.70	-1.5	.34	ST 1 (23)
1	343	1142	1.38	.07	.96	-1.2	.96	-.5	.47	ST 1 (8)
11	351	1142	1.33	.07	1.03	.8	1.14	2.0	.43	ST 1 (228)
6	431	1142	.93	.07	.93	-2.5	.91	-1.6	.51	ST 1 (125)
7	448	1142	.85	.07	1.00	-.2	1.06	1.1	.46	ST 1 (152)
4	489	1142	.66	.07	1.02	.9	1.03	.7	.45	ST 1 (76)
3	597	1142	.17	.07	1.01	.4	1.02	.4	.46	ST 1 (45)
9	936	1142	-1.63	.09	.96	-.7	1.14	1.3	.40	ST 1 (195)
10	947	1142	-1.71	.09	.99	-.3	1.08	.7	.39	ST 1 (215)
5	968	1142	-1.88	.09	1.04	.8	1.33	2.4	.32	ST 1 (96)
8	1095	1142	-3.54	.16	.99	-.1	1.62	1.8	.22	ST 1 (173)
MEAN	608.	1142.	.00	.09	.99	-.2	1.09	.6		
S.D.	312.	0.	1.89	.03	.03	.9	.22	1.3		

The results presented for the ST 1 scale suggests that some items on the scale might be problematic as they cluster together. The scale's person reliability is low, which means that not much confidence can be ascribed to the person distribution on the construct. On the other hand item separation and reliability are high, which means that it is likely that the same item hierarchy can be expected in future test administrations. Finally the ST 1 scale functioned in a unidimensional manner, which means that the scale exclusively measured a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

4.4.7.3 Transpersonal Identification vs. Personal Identification (ST 2)

The following items comprise the ST 2 sub-scale:

ST 2 (15) – I often feel so connected to the people around me that it is like there is no separation between us.

ST 2 (31) – I often do things to help protect animals and plants from extinction.

ST 2 (51) – I sometimes feel so connected to nature that everything seems to be part of one living organism.

ST 2 (84) – I often feel a strong sense of unity with all the things around me.

ST 2 (95) – I would gladly risk my own life to make the world a better place.

ST 2 (132) – I often feel a strong personal or emotional connection with all the people around me.

ST 2 (163) – I have made real personal sacrifices in order to make the world a better place – like trying to prevent war, poverty and injustice.

ST 2 (200) – I often feel like I am part of the spiritual force on which all life depends.

ST 2 (232) – I love the blooming of the flowers in the spring as much as seeing an old friend again.

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    ADULTS                MAP OF ITEMS
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       .#########  |Q
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 1                 +  ST 2 (200)
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           .#####  |  ST 2 (31)
                   |S
                   |
                  S|
                   |
             .###  |  ST 2 (132)  ST 2 (95)
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                   |
 0                 +M ST 2 (163)  ST 2 (232)
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                  Q|  ST 2 (15)
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                .  |
                   |  ST 2 (51)
-1                 +
                   |  ST 2 (84)
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-3              .  +
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Figure 35: Person Item Map

Figure 35 illustrates that the sample and item distributions only overlaps to a limited extent; this indicates that the items are not that well suited to measure the construct level among the sample. The figure also shows that a large number of participants cluster towards the top end of the scale; this clustering constitutes a ceiling effect, which implies that the scale is unable to differentiate between people with very high inherent levels of the construct. One way to correct this situation is to include items on the scale, which can measure an even higher level of the construct.

Three of the scale's items (ST 2 – 15, ST 2 – 51, and ST 2 – 84) are plotted towards the bottom end of the scale where almost no respondent construct levels are situated. These three items, only add limited value in assessing the construct level among the sample, but may prove useful if a sample with a lower average construct level is assessed.

It is evident from the item distribution that two pairs of items occupy similar logit values. Items ST 2 (163) and ST 2 (232) are both located at a similar logit location. It is recommended that one of these items should be altered to eventually appear in a higher logit range where little or no items are present. This will allow the scale to assess the construct with greater precision. The same recommendation is made for the second pair of items (ST 2 – 132 and ST 2 - 95).

Table 91: Summary of Respondent Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	6.7	9.0	1.35	.89	1.00	.0	.99	-.1
S.D.	1.4	.0	.90	.16	.18	.6	.49	.7
MAX.	8.0	9.0	2.25	1.09	1.72	2.7	3.42	2.7
MIN.	1.0	9.0	-2.26	.71	.64	-1.9	.48	-1.8

REAL RMSE .94 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00
MODEL RMSE .91 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00
S.E. OF ADULT MEAN .03
WITH 279 EXTREME ADULTS = 1144 ADULTS MEAN 1.75 S.D. 1.07
REAL RMSE 1.09 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00
MODEL RMSE 1.07 ADJ.SD .00 SEPARATION .00 ADULT RELIABILITY .00

The mean respondent measure value (1.35) points out that the sample has a high average level of the ST 2 construct (see Table 91). The minimum, maximum and standard deviation measure values show that the construct has a range of just more than four and a half logits, and that inconsistent variation in the measured construct level of respondents is limited. The minimum infit mnsq value (0.64) indicates that the response patterns of respondents are not too predictable, while the maximum infit mnsq value (1.72) points to individual response patterns that did not behave as the model expected. The maximum outfit mnsq value (3.42) indicates that multiple individuals have unexpected response patterns towards items far removed from their inherent construct level. Finally the small minimum mnsq outfit value (0.48) indicates that some participant responses to items far removed from their construct level are too predictable.

The ST 1 scale rendered a person separation value of 0.00, a similar reliability value was produced (see Table 91). Hence, the measure has a no reliability, this implies that not much confidence can be ascribed to the person distribution on the ST 2 scale.

Table 92: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	647.6	865.0	.00	.09	1.00	.0	.99	.0
S.D.	88.5	.0	.69	.01	.09	2.0	.14	2.1
MAX.	776.0	865.0	.99	.12	1.19	3.9	1.28	4.0
MIN.	503.0	865.0	-1.14	.07	.91	-1.7	.79	-2.0

REAL RMSE	.09	ADJ.SD	.68	SEPARATION	7.34	ITEM	RELIABILITY	.98
MODEL RMSE	.09	ADJ.SD	.68	SEPARATION	7.45	ITEM	RELIABILITY	.98
S.E. OF ITEM	MEAN	.24						

Table 92 shows that the ST 2 scale is relatively easy for the current sample to endorse, in a manner that will increase their standing on the construct; as the mean respondent measure value (1.35) is much higher than the mean item measure value (0.00) (see Table 91 and Table 92). Table 92 also shows that the scale's average infit and outfit mnsq values are both within the acceptable fit value range. This means that the average functioning of the items of the sub-scale conformed to the functioning predicted by the Rasch model.

Contrasting to the extremely low person separation and reliability reported earlier, item separation and reliability for the ST 2 scale are high at 7.45 and 0.98 respectively. These statistics points out that on average the ST 2 items are more spread out on the construct than the respondents. The high reliability value indicates that if this scale is administered to another sample it is likely that the item difficulty spread will be repeated.

Table 93 illustrates that item ST 2 (200) is the most difficult to endorse in a manner that will increase a participant's standing on the construct. Participants with low inherent levels of the construct are expected to endorse this item in such a way that it would not increase their standing on the construct. The results in Table 93 also points out that all the ST 2 items rendered infit values that fall between 0.6 and 1.4 mnsq. These fit statistics provides enough evidence to assume that the ST 2 scale functions in a unidimensional manner.

Table 93: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD		PTBIS CORR.	ITEMS
9	658	865	.02	.09	1.19	3.9	1.28	4.0	A	.32	ST 2 (232)
8	503	865	.99	.07	1.08	2.8	1.12	3.2	B	.48	ST 2 (200)
5	611	865	.34	.08	1.03	.9	1.04	.8	C	.45	ST 2 (95)
4	776	865	-1.14	.12	.96	-.4	1.02	.1	D	.34	ST 2 (84)
1	714	865	-.44	.10	.97	-.5	.92	-.9	E	.42	ST 2 (15)
2	532	865	.83	.08	.95	-1.7	.93	-1.8	d	.55	ST 2 (31)
6	611	865	.34	.08	.93	-1.7	.91	-1.8	c	.51	ST 2 (132)
7	665	865	-.04	.09	.93	-1.6	.88	-1.9	b	.48	ST 2 (163)
3	758	865	-.91	.11	.91	-1.2	.79	-2.0	a	.41	ST 2 (51)
MEAN	648.	865.	.00	.09	1.00	.0	.99	.0			
S.D.	88.	0.	.69	.01	.09	2.0	.14	2.1			

The evidence presented for this sub-scale suggests that only two pairs of items of the ST 2 scale cluster together at a similar logit values. One item of each pair could be modified to occupy the higher logit region of the scale, which will enable the scale to measure an even a higher level of the construct. Both the person separation and reliability are zero, which means that no confidence can be ascribed to the person distribution on the construct. On the other hand item separation and reliability are high, which means that it is likely that the same item hierarchy can be expected in future test administrations. The results also point out that the ST 2 scale is unidimensional. The unidimensionality of the scale supports both the construct-and content validity of the scale.

4.4.7.4 Spiritual Acceptance vs. Rational Materialism (ST 3)

The following items comprise the ST 3 sub-scale:

ST 3 (6) – I believe that miracles happen.

ST 3 (38) – I am fascinated by the many things in life that cannot be scientifically explained.

ST 3 (56) – I seem to have a “sixth sense” that sometimes allows me to know what is going to happen.

ST 3 (77) – I sometimes feel a spiritual connection to other people that I cannot explain in words.

ST 3 (88) – Religious experiences have helped me understand the real purpose of my life.

ST 3 (97) – Sometimes I have felt my life was being directed by a spiritual force greater than any human being.

ST 3 (116) – I think that extra-sensory perception (ESP like telepathy or precognition) is really possible.

ST 3 (123) – I think that most things that are called miracles are just chance.

ST 3 (145) – I think it is unwise to believe in things that cannot be explained scientifically.

ST 3 (175) – I believe that I have experienced extra-sensory perception myself.

ST 3 (194) – I have had personal experiences in which I felt in contact with a divine and wonderful spiritual power.

ST 3 (208) – I believe that all life depends on some spiritual order or power that cannot be completely explained.

ST 3 (220) – Reports of mystical experiences are probably just wishful thinking.

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         ADULTS                  MAP OF ITEMS
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     .############      |   ST 3 (220)
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                        |   ST 3 (145)
                        |S
   1 .############     M+   ST 3 (123)   ST 3 (38)
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                        |   ST 3 (97)
           .######      |   ST 3 (116)
                       S|   ST 3 (56)
   0                    +M
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                        |   ST 3 (208)   ST 3 (77)
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                        |   ST 3 (194)
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                       Q|   ST 3 (175)   ST 3 (6)
  -1                .#  +
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Figure 36: Person Item Map

Figure 36 illustrates that the scale's items are relatively well suited to measure the construct among the sample, as the majority of the item distribution overlaps considerably with the sample distribution. The respondents also cluster around the mean construct level to form a relatively normal distribution with regards to their standing on the construct.

The figure shows that three pairs of items occupy a similar logit location; these pairs are ST 3 (175) and ST 3 (6), ST 3 (208) and ST 3 (77), as well as ST 3 (123) and ST 3 (38). If the same item difficulty hierarchy is retrieved from other samples it is suggested that to improve the scale's precision, some of these items should be redesigned to re-locate to the two prominent gaps at the lower and higher regions of the item distribution.

Table 94: Summary of Respondent Statistics

```
+-----------------------------------------------------------------------------+
|          RAW                            MODEL         INFIT        OUTFIT    |
|         SCORE     COUNT     MEASURE     ERROR      MNSQ   ZSTD   MNSQ   ZSTD |
|-----------------------------------------------------------------------------|
| MEAN      8.7      13.0         .96       .69      1.00    -.1    .98    -.1 |
| S.D.      2.0        .0         .89       .10       .26     .9    .56     .8 |
| MAX.     12.0      13.0        2.88      1.13      1.92    3.1   6.46    3.4 |
| MIN.      1.0      13.0       -3.02       .61       .48   -2.2    .15   -1.7 |
|-----------------------------------------------------------------------------|
| REAL RMSE    .73  ADJ.SD     .51  SEPARATION  .70  ADULT  RELIABILITY  .33 |
|MODEL RMSE    .70  ADJ.SD     .55  SEPARATION  .79  ADULT  RELIABILITY  .39 |
| S.E. OF ADULT  MEAN    .03                                                  |
| WITH    13 EXTREME ADULTS  =  1144 ADULTS   MEAN      .99  S.D.      .93     |
| REAL RMSE    .74  ADJ.SD     .56  SEPARATION  .75  ADULT  RELIABILITY  .36 |
|MODEL RMSE    .71  ADJ.SD     .60  SEPARATION  .84  ADULT  RELIABILITY  .42 |
+-----------------------------------------------------------------------------+
```

The mean respondent measure value (0.96) points out that the sample has a high average standing on the construct (see Table 94). The minimum, maximum and standard deviation measure values show that the construct has a range of just less than six logits, and that any inconsistent variation in the construct level among respondents is limited. The minimum infit mnsq value (0.48) indicates too well behaved response patterns for some persons, while the maximum infit mnsq value (1.92) points out the existence of individual response patterns that did not behave as the model predicted. The large maximum outfit mnsq value (6.46) indicates that multiple individuals have unexpected response patterns towards items far removed from their inherent construct level. Finally the small minimum mnsq outfit value (0.15) indicates that some participant responses to items far removed from their construct level are too predictable.

The respondent summary table shows a low person separation value (0.84) which mean that the respondent clusters indicated in Figure 20 are on average separated by a relatively small difference in their respective construct levels. The measure rendered a low reliability statistic (0.36). This means that not much confidence can be ascribed to the person distribution on the construct.

Table 95: Summary of Item Statistics

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	753.2	1131.0	.00	.08	.99	.2	.98	.2
S.D.	189.8	.0	1.09	.03	.09	3.2	.16	3.4
MAX.	1090.0	1131.0	1.55	.16	1.17	6.7	1.34	8.0
MIN.	426.0	1131.0	-2.70	.06	.87	-5.2	.76	-4.3

REAL RMSE	.08	ADJ.SD	1.09	SEPARATION 13.07	ITEM	RELIABILITY .99
MODEL RMSE	.08	ADJ.SD	1.09	SEPARATION 13.22	ITEM	RELIABILITY .99
S.E. OF ITEM MEAN	.31					

Table 95 illustrates the items statistics for ST 3 scale. The table shows that the scale is relatively easy for the current sample to endorse in a manner that will increase their standing on the construct, as the mean respondent measure value (0.96) indicated in Table 94 is higher than the mean item measure value (0.00). Table 95 also shows the minimum, maximum and average infit and outfit mnsq values for the sub-scale. These values are all located within the acceptable mnsq range of 0.6 and 1.4. This indicates that on average the performance of the items of the ST 3 sub-scale conformed to the predictions made by the Rasch model.

Contrasting to the low person separation and reliability reported earlier, item separation and reliability are high at 13.22 and 0.99 respectively (see Table 95). This means that despite the clustering and duplication of items at a similar logit values, the ST 3 items are on average more spread out on the construct than respondents. The high reliability value points out that, if this scale is administered to another sample it is likely that the item difficulty spread will be repeated.

Table 96 illustrates that item ST 3 (220) rendered the highest measure value; participants with low inherent levels of the construct are expected to endorse this item in such a way that it would not increase their standing on the construct. This table also shows that all the ST 3 items have mnsq infit values that fall between 0.6 and 1.4, and that no items produced low point-biserial correlations. The fit statistics rendered by the scale provides enough evidence to assume that the scale functions in a unidimensional manner.

Table 96: Individual Item Statistics

ENTRY NUMBR	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBIS CORR.	ITEMS
13	426	1131	1.55	.07	1.17	6.7	1.34	8.0	A .19	ST 3 (220)
9	506	1131	1.21	.06	1.10	4.3	1.14	4.1	B .29	ST 3 (145)
8	558	1131	1.00	.06	1.09	4.0	1.13	4.1	C .29	ST 3 (123)
10	942	1131	-.88	.08	1.03	.5	1.05	.6	D .28	ST 3 (175)
3	773	1131	.07	.07	1.04	1.3	1.04	1.0	E .33	ST 3 (56)
7	737	1131	.24	.07	1.00	.1	1.03	.6	F .36	ST 3 (116)
2	554	1131	1.02	.06	1.01	.3	1.02	.6	G .38	ST 3 (38)
5	1090	1131	-2.70	.16	.98	-.1	.76	-1.2	f .22	ST 3 (88)
1	934	1131	-.83	.08	.95	-.9	.88	-1.6	e .37	ST 3 (6)
12	844	1131	-.28	.07	.94	-1.8	.90	-1.8	d .41	ST 3 (208)
4	837	1131	-.25	.07	.88	-3.5	.79	-4.1	c .48	ST 3 (77)
6	693	1131	.43	.07	.88	-5.2	.86	-4.3	b .50	ST 3 (97)
11	898	1131	-.59	.08	.87	-3.1	.79	-3.4	a .46	ST 3 (194)
MEAN	753.	1131.	.00	.08	.99	.2	.98	.2		
S.D.	190.	0.	1.09	.03	.09	3.2	.16	3.4		

The results presented for the ST 3 sub-scale suggests that three pairs of items might be problematic as each pair is located at a similar logit value; in each instance it is recommended that one item should be modified to relocate to either the lower or upper regions of the logit scale. Both the person separation and reliability are low, while the scale's item separation and reliability are high. The ST 3 scale's rendered fit statistics, which indicated that the scale is functioning in a unidimensional manner. This means that the scale exclusively measured a single construct. The unidimensionality of the scale supports both the construct-and content validity of the scale.

It is concluded that the primary self-transcendence scale and all three its sub-scales (ST 1, ST 2, and ST 3) are unidimensional, and have high degree of construct validity and item reliability, but low person reliability. This also implies that one of the core criteria of the Rasch model is met, which in turn allows the interpretation of other output statistics derived from the Rasch model.

4.5 RESULTS ILLUSTRATING THE DEGREE OF ITEM INVARIANCE ACROSS ETHNIC GROUP COMPARISONS

This section presents the results rendered by the invariance analyses, which compared the performance of the ethnic groups on the sub-scales of all the TCI's primary scales. Each invariance analysis shows whether a particular sub-scale and the items associated with it, functions invariantly across the ethnic groups under scrutiny. For example the performance of items of a particular sub-scale within in the Nguni group will be compared to the performance of the items in the Sotho group. This will indicate whether the sub-scale and items retains its measurement properties across the two groups.

Each invariance analysis in this chapter is conducted by using statistics derived from the initial Rasch analysis conducted on the data sets rendered by the various ethnic and gender groups on the respective primary and sub-scales (see Section 3.4.6.1.1).

During each invariance analysis the item difficulty measures of two comparative groups are plotted on a graph. The anchor group will always provide the x-coordinate for an item, while the comparison group will provide the y-coordinate. In the current study the Sotho sub-sample were selected as the anchor group for the ethnic group comparisons. This selection is based on the fact that this group rendered data that fits the predictions of the Rasch model better than any of the other ethnic groups.

The error estimates for each pair of items were used to generate 95% confidence bands, if items are plotted outside these bands it means that their measurement properties are not invariant across the groups (Bond & Fox, 2001). In the same way, if more than 5% of the sub-scale's items are located outside the confidence lines it indicates that the scale does not retain its measurement properties across both groups (Bond & Fox, 2001). In both cases it can be argued that the item or sub-scale does not function invariantly across groups and therefore might be biased. A biased item or scale implies that a respondent's score on an item is not a true representation of their standing on the construct, but rather a representation of a special interaction between the respondent's ethnicity and the item or scale.

The data table (e.g. Table 97) presented for each group comparison contains information derived from the item analysis conducted for each of the groups involved in the particular comparison. The table shows the item names, measure values (difficulty estimates), and the error estimates associated with each item for both groups (Bond and Fox, 2001). In the final column of every table a t-value is presented. When an item is located outside the 95% confidence band the t-value shows the degree of significance. It can be expected that the greater the distance outside the boundary the more significant the t-value will become. This t-value is calculated by applying the following formula to the relevant statistics in the data table (Bond and Fox, 2001) (see Table 97).

$$\boxed{t = \frac{m_1 - m_2}{\sqrt{{e_1}^2 + {e_2}^2}}}$$

If the t-value associated with an item exceeds the critical values of 1.96 or -1.96 then the item will be plotted outside the confidence boundary. In the data tables these values are highlighted pink. For every primary and sub-scale the following three invariance comparisons are made each one producing a data table and graph. Firstly an Nguni sub-sample is compared to the Sotho sub-sample. Secondly the Tsonga sub-sample is compared to the Sotho sub-sample, where after the Venda sub-sample is also compared to the Sotho sub-sample. The results of each of these comparisons for the sub-scales are discussed in the segments designated for each of the primary TCI scales. The evidence rendered by these analytic comparisons will test the following hypotheses:

H2: There will be no evidence of item bias between different ethnic groups on items of the different sub-scales of the TCI

H4: There will be no evidence of construct bias between different ethnic groups on the different sub-scales of each primary scale of the TCI

4.5.1 Results Illustrating the Degree of Item Invariance in Ethnic Group Comparisons for the sub-scales of the Primary Novelty Seeking Scale

4.5.1.1 NS 1 Item Functioning across Different Ethnic Groups

4.5.1.1.1 Nguni Respondents Compared to Sotho Respondents

Table 97 shows that the t-values for all the NS 1 items except one falls between -1.96 and 1.96. Figure 37 also shows that only one item is located outside the confidence intervals. Every blue dot on the figure represents one of the items listed in Table 97. Item NS 1 (99) (t =2.92) exceeds the critical value of 1.96 and does not retain its measurement properties across both ethnic groups. The NS 1 (99) item is considered to be biased (Bond & Fox, 2001). Despite the fact that ten of the eleven items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the confidence boundaries. According to Bond and Fox (2001) this means that the NS 1 sub-scale does not function invariantly across the two groups, and does seem to possess some degree of ethnic bias.

Table 97: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
NS 1 (1)	-0.65	-0.22	-0.22	0.11	0.21	-0.67	-0.20	-0.20	-0.67	-1.81
NS 1 (29)	0	0.14	0.14	0.1	0.2	-0.15	0.29	0.29	-0.15	-0.63
NS 1 (52)	2.26	2.27	2.27	0.11	0.22	2.02	2.51	2.51	2.02	-0.04
NS 1 (70)	-0.95	-1.31	-1.31	0.12	0.27	-1.43	-0.83	-0.83	-1.43	1.22
NS 1 (99)	2.5	1.82	1.82	0.12	0.2	1.93	2.39	2.39	1.93	2.92
NS 1 (114)	2.14	2.47	2.47	0.11	0.23	2.05	2.56	2.56	2.05	-1.29
NS 1 (144)	-0.73	-0.59	-0.59	0.11	0.22	-0.91	-0.41	-0.41	-0.91	-0.57
NS 1 (167)	-0.06	0.22	0.22	0.1	0.19	-0.13	0.29	0.29	-0.13	-1.30
NS 1 (191)	-2.08	-1.64	-1.64	0.17	0.3	-2.20	-1.52	-1.52	-2.20	-1.28
NS 1 (211)	-0.83	-0.97	-0.97	0.11	0.25	-1.17	-0.63	-0.63	-1.17	0.51
NS 1 (238)	-1.61	-2.2	-2.2	0.14	0.37	-2.30	-1.51	-1.51	-2.30	1.49

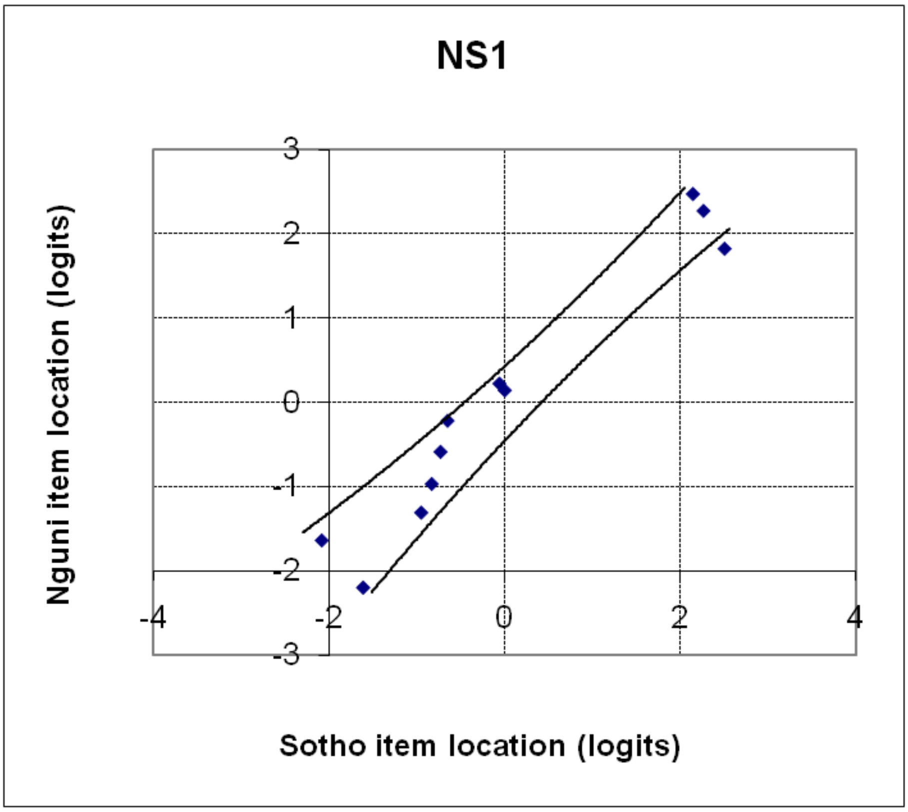

Figure 37: Differential Item Functioning for Nguni-Sotho Comparison

4.5.1.1.2 Tsonga Respondents Compared to Sotho Respondents

Table 98 illustrates that the t-values for two of the eleven items exceed the critical t value range of +/-1.96. Figure 38 depicts these two items, and show that they are located just outside the confidence intervals. NS 1 (99) (t=2.30) and NS 1 (1) (t=-2.28) both exceed the critical value of 1.96 and do not retain their measurement properties across the two ethnic groups (Bond & Fox, 2001). Both these items are considered to be biased, as the ethnicity of a respondent influences their score on each of the items. Nine of the eleven NS 1 items are located inside the 95% confidence bands. A simple division calculation[3] shows that more than 20% of the scale's items are located outside the 95% boundary. This means that the NS 1 sub-scale does not function invariantly across the two groups and can be considered biased (Bond & Fox, 2001).

[3] The percentage of items located outside the confidence boundaries are calculated by dividing the number of items outside the boundary with the total number of items of the sub-scale. The resulting figure is then multiplied by a 100 to calculate the percentage of items located outside the confidence bands.

Table 98: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
NS 1 (1)	-0.65	-0.19	-0.19	0.11	0.17	-0.62	-0.22	-0.22	-0.62	-2.28
NS 1 (29)	0.00	0.31	0.31	0.10	0.16	-0.03	0.34	0.34	-0.03	-1.65
NS 1 (52)	2.26	2.59	2.59	0.11	0.20	2.20	2.65	2.65	2.20	-1.45
NS 1 (70)	-0.95	-1.28	-1.28	0.12	0.22	-1.36	-0.86	-0.86	-1.36	1.31
NS 1 (99)	2.50	2.00	2.00	0.12	0.18	2.03	2.47	2.47	2.03	2.30
NS 1 (114)	2.14	2.00	2.00	0.11	0.18	1.86	2.28	2.28	1.86	0.66
NS 1 (144)	-0.73	-0.96	-0.96	0.11	0.20	-1.07	-0.62	-0.62	-1.07	1.00
NS 1 (167)	-0.06	-0.05	-0.05	0.10	0.17	-0.25	0.14	0.14	-0.25	-0.06
NS 1 (191)	-2.08	-2.35	-2.35	0.17	0.33	-2.59	-1.84	-1.84	-2.59	0.72
NS 1 (211)	-0.83	-0.68	-0.68	0.11	0.19	-0.97	-0.53	-0.53	-0.97	-0.69
NS 1 (238)	-1.61	-1.38	-1.38	0.14	0.23	-1.76	-1.22	-1.22	-1.76	-0.86

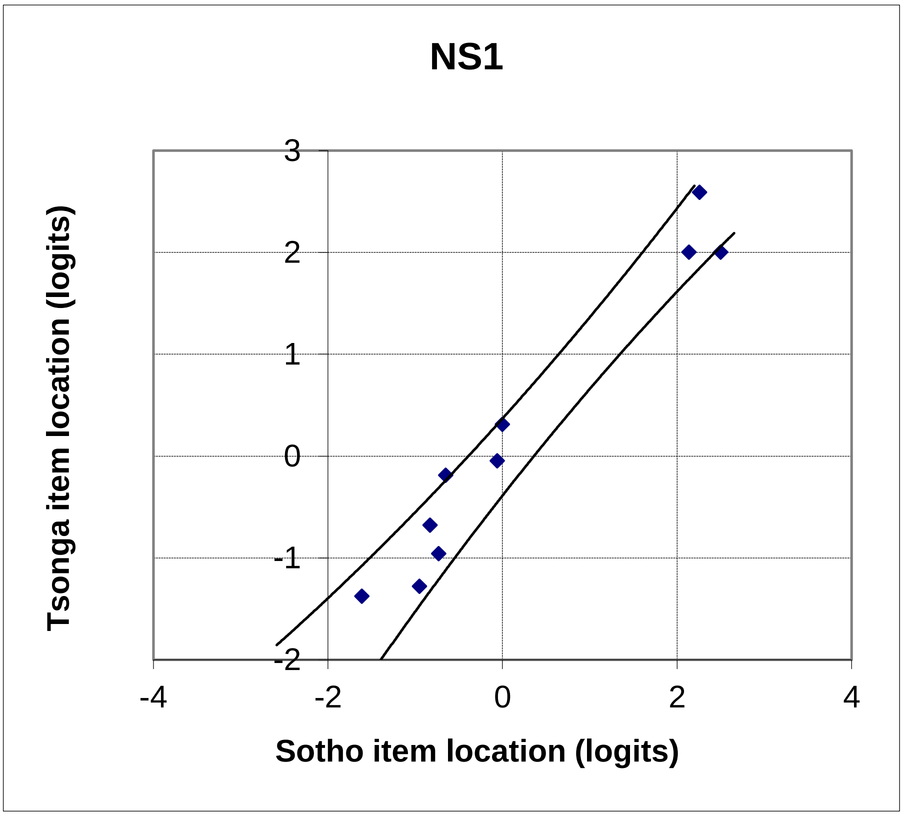

Figure 38: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.1.1.3 Venda Respondents Compared to Sotho Respondents

Table 99 shows that the t-values for all eleven NS 1 items fall within the critical t-value range of 1.96 and -1.96. The graph in Figure 39 depicts that no items are plotted outside the confidence intervals. This means that the NS 1 scale and its items functions invariantly across both the Sotho and Venda groups. This scale shows no evidence of ethnic bias towards any of the comparison groups.

Table 99: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
NS 1 (1)	-0.65	-0.57	-0.57	0.11	0.18	-0.82	-0.40	-0.40	-0.82	-0.38
NS 1 (29)	0.00	-0.35	-0.35	0.10	0.18	-0.38	0.03	0.03	-0.38	1.70
NS 1 (52)	2.26	2.25	2.25	0.11	0.18	2.04	2.47	2.47	2.04	0.04
NS 1 (70)	-0.95	-0.54	-0.54	0.12	0.18	-0.96	-0.53	-0.53	-0.96	-1.90
NS 1 (99)	2.50	2.31	2.31	0.12	0.18	2.19	2.62	2.62	2.19	0.87
NS 1 (114)	2.14	1.83	1.83	0.11	0.17	1.78	2.19	2.19	1.78	1.53
NS 1 (144)	-0.73	-1.14	-1.14	0.11	0.21	-1.17	-0.70	-0.70	-1.17	1.73
NS 1 (167)	-0.06	0.17	0.17	0.10	0.16	-0.13	0.24	0.24	-0.13	-1.22
NS 1 (191)	-2.08	-1.99	-1.99	0.17	0.27	-2.35	-1.72	-1.72	-2.35	-0.28
NS 1 (211)	-0.83	-0.54	-0.54	0.11	0.18	-0.90	-0.47	-0.47	-0.90	-1.38
NS 1 (238)	-1.61	-1.43	-1.43	0.14	0.23	-1.79	-1.25	-1.25	-1.79	-0.67

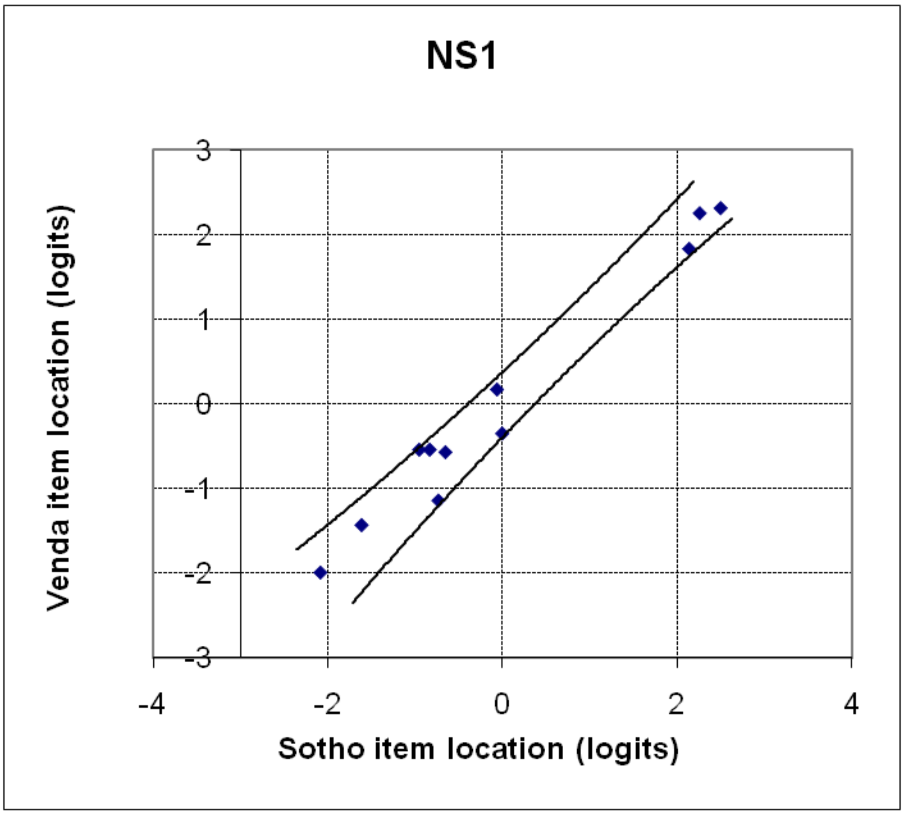

Figure 39: Differential Item Functioning for Venda-Sotho Comparison

4.5.1.2 NS 2 Item Functioning across Different Ethnic Groups

4.5.1.2.1 Nguni Respondents Compared to Sotho Respondents

Table 100 indicates that the t-values for half of the items on the NS 2 sub-scale fall between -1.96 and 1.96. Figure 40 shows that the other half of the items are located outside the confidence intervals. Items NS 2 (35) (t=-5.92), NS 2 (61) (t=-5.01), NS 2 (130) (t=-2.52), NS 2 (187) (t=-3.28) and NS 2 (203) (t=-2.82) all exceed the critical values of +/-1.96. This point out that these five items do not retain their measurement properties across the two ethnic groups, and is therefore considered to be biased (Bond & Fox, 2001). The fact that half of the NS 2 scale's items are located outside the 95% confidence bands means that more than 5% of the scale's items are located outside the boundary. This implies that the NS 2 sub-scale does not function invariantly across the two groups (Bond & Fox, 2001). The NS 2 scale functions in a biased manner in this particular case, as it measures the construct with varying measurement properties across the two groups.

Table 100: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni ;measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
NS 2 (13)	-1.22	-1.53	-1.06	0.10	0.20	-1.37	-0.92	-0.92	-1.37	-0.70
NS 2 (35)	-1.40	-0.49	-0.02	0.10	0.21	-0.94	-0.48	-0.48	-0.94	-5.92
NS 2 (61)	-0.05	1.13	1.60	0.11	0.31	0.44	1.10	1.10	0.44	-5.01
NS 2 (82)	2.80	4.67	5.14	0.32	1.42	2.51	5.42	5.42	2.51	-1.61
NS 2 (108)	-1.32	-1.64	-1.17	0.10	0.20	-1.47	-1.02	-1.02	-1.47	-0.66
NS 2 (130)	-0.52	-0.40	0.07	0.10	0.21	-0.46	0.01	0.01	-0.46	-2.52
NS 2 (148)	1.68	1.58	2.05	0.20	0.36	1.45	2.28	2.28	1.45	-0.89
NS 2 (187)	-2.72	-2.41	-1.94	0.11	0.21	-2.57	-2.09	-2.09	-2.57	-3.28
NS 2 (203)	0.52	0.95	1.42	0.13	0.29	0.65	1.29	1.29	0.65	-2.82
NS 2 (237)	2.23	2.81	3.28	0.25	0.60	2.10	3.40	3.40	2.10	-1.61

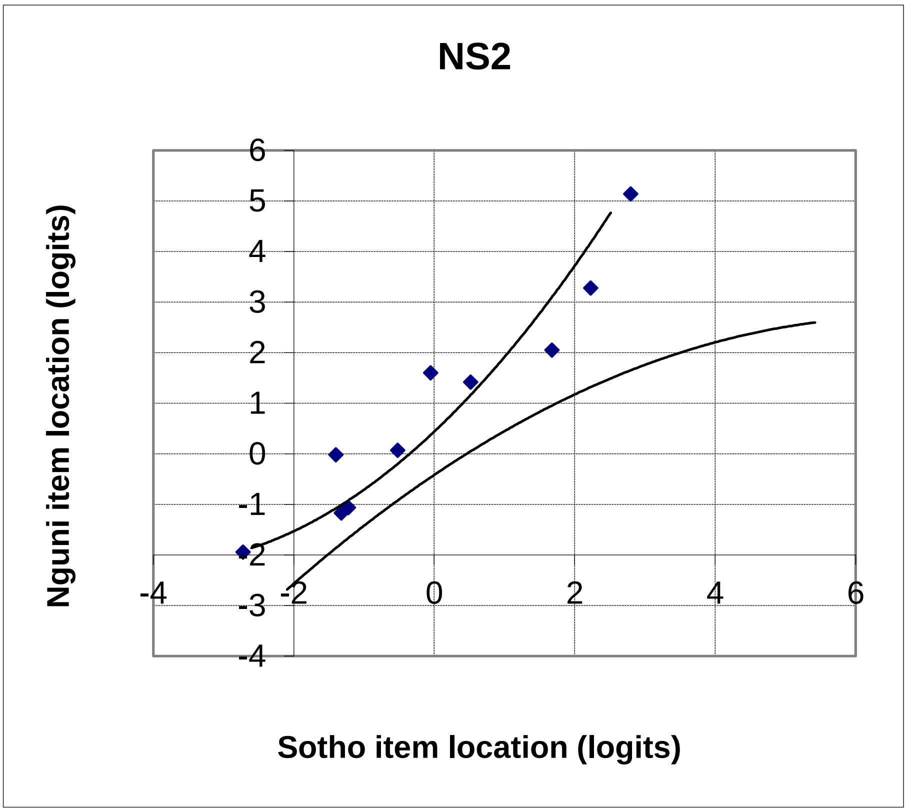

Figure 40: Differential Item Functioning for Nguni -Sotho Comparison

4.5.1.2.2 Tsonga Respondents Compared to Sotho Respondents

Table 101 shows that only one item has a t-value that exceeds the critical t-value range. Figure 41 shows that this item is plotted just outside the confidence intervals for the NS 2 scale. Item NS 2 (148) has a t-value of 2.26, which exceeds the critical value of 1.96. This means that the item does not function invariantly across the Tsonga and Sotho groups. This item is considered biased, as the nature of its function is apparently confounded by ethnicity. Only one of the NS 2 scale's items is plotted outside the 95% confidence bands. A simple division calculation shows that only 90% of the scale's items are located inside the boundary. According to Bond and Fox (2001) this means that the NS 2 sub-scale does not function invariantly across the two groups and can be considered biased, as it's functioning is mediated by the ethnicity of participants.

Table 101: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
NS 2 (13)	-1.22	-1.17	-1.17	0.10	0.17	-1.39	-1.00	-1.00	-1.39	-0.25
NS 2 (35)	-1.40	-1.14	-1.14	0.10	0.17	-1.47	-1.07	-1.07	-1.47	-1.31
NS 2 (61)	-0.05	0.26	0.26	0.11	0.21	-0.13	0.34	0.34	-0.13	-1.30
NS 2 (82)	2.80	2.47	2.47	0.32	0.47	2.07	3.20	3.20	2.07	0.58
NS 2 (108)	-1.32	-1.47	-1.47	0.10	0.16	-1.58	-1.21	-1.21	-1.58	0.80
NS 2 (130)	-0.52	-0.34	-0.34	0.10	0.18	-0.64	-0.22	-0.22	-0.64	-0.87
NS 2 (148)	1.68	0.94	0.94	0.20	0.26	0.98	1.64	1.64	0.98	2.26
NS 2 (187)	-2.72	-2.85	-2.85	0.11	0.19	-3.01	-2.57	-2.57	-3.01	0.60
NS 2 (203)	0.52	0.82	0.82	0.13	0.24	0.40	0.94	0.94	0.40	-1.10
NS 2 (237)	2.23	2.47	2.47	0.25	0.47	1.82	2.88	2.88	1.82	-0.45

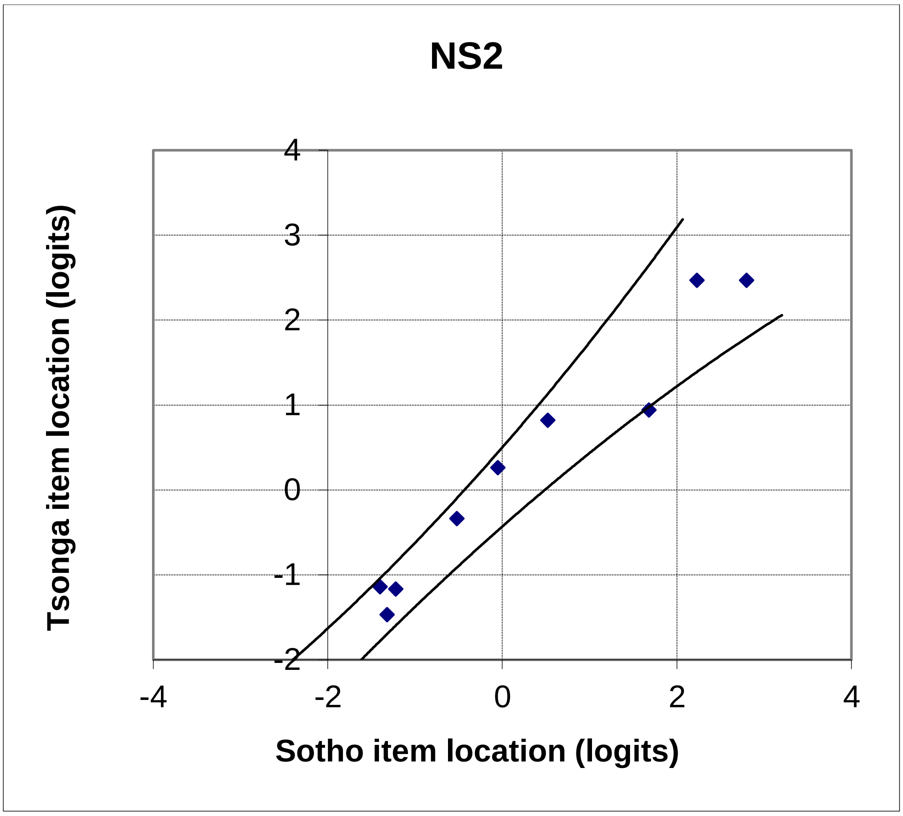

Figure 41: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.1.2.3 Venda Respondents Compared to Sotho Respondents

Table 102 illustrates that the t-values for two of the ten NS 2 items exceed the critical t-value range. Figure 42 shows the two items, which are located just outside the confidence intervals. Items NS 2 (13) (t=-2.16) and NS 2 (203) (t=2.21) both exceed the critical value of -1.96 and do not retain their measurement properties when applied across the Sotho and/or Venda group. Both these items are considered to possess a significant degree of ethnic bias when assessing the NS 2 construct (Bond & Fox, 2001). Eight of the ten NS 2 items are located inside the 95% confidence bands. A simple division calculation shows that only 80% of the scale's items are located inside the 95% confidence intervals. This means that the NS 2 sub-scale does not function invariantly across the two ethnic groups, which implies that in this case the scale is biased (Bond & Fox, 2001).

Table 102: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
NS 2 (13)	-1.22	-0.87	-0.73	0.10	0.16	-1.16	-0.78	-0.78	-1.16	-2.61
NS 2 (35)	-1.40	-1.55	-1.41	0.10	0.16	-1.59	-1.21	-1.21	-1.59	0.04
NS 2 (61)	-0.05	-0.16	-0.02	0.11	0.18	-0.24	0.18	0.18	-0.24	-0.16
NS 2 (82)	2.80	2.00	2.14	0.32	0.37	1.98	2.96	2.96	1.98	1.34
NS 2 (108)	-1.32	-1.35	-1.21	0.10	0.16	-1.45	-1.07	-1.07	-1.45	-0.60
NS 2 (130)	-0.52	-0.42	-0.28	0.10	0.17	-0.60	-0.20	-0.20	-0.60	-1.23
NS 2 (148)	1.68	1.75	1.89	0.20	0.34	1.39	2.18	2.18	1.39	-0.54
NS 2 (187)	-2.72	-2.53	-2.39	0.11	0.17	-2.76	-2.35	-2.35	-2.76	-1.64
NS 2 (203)	0.52	1.00	1.14	0.13	0.25	0.55	1.11	1.11	0.55	-2.21
NS 2 (237)	2.23	2.14	2.28	0.25	0.39	1.79	2.72	2.72	1.79	-0.11

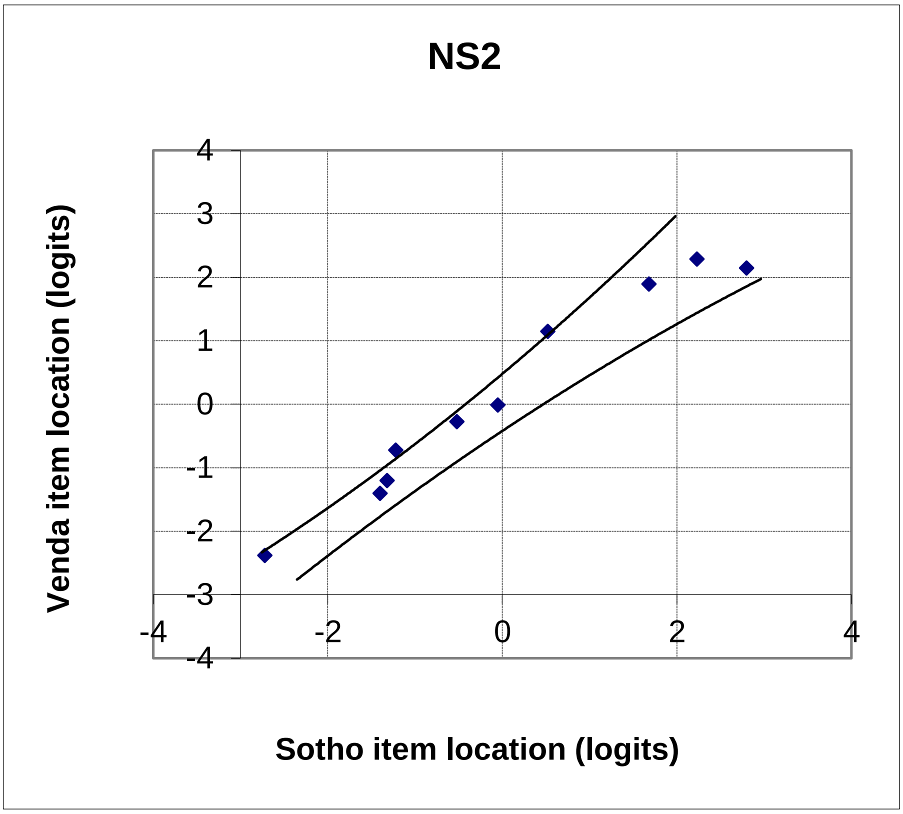

Figure 42: Differential Item Functioning for -Sotho Comparison

4.5.1.3 NS 3 Item Functioning across Different Ethnic Groups

4.5.1.3.1 Nguni Respondents Compared to Sotho Respondents

Table 103 illustrates that the t-values for three of the nine items exceed the critical t-values (-1.96 and 1.96). Figure 43 also depicts the three items which are located outside the confidence bands. Items NS 3 (19) (t=-2.58), NS 3 (174) (t=-6.84) and NS 3 (219) (t=2.63) all exceed the critical values and do not retain their measurement properties across the ethnic groups. According to Bond and Fox (2001) these items possess a significant degree of ethnic bias when assessing the NS 3 construct, as their measurement properties are significantly influenced by the ethnicity of respondents. Only six of the nine NS 3 items are located inside the 95% confidence bands. A simple calculation shows that only 67% of the scale's items are located inside the 95% confidence intervals. This means that the NS 3 sub-scale does not function invariantly across the two ethnic groups, which implies that the scale is functioning in a biased way when assessing the NS 3 construct across these groups (Bond & Fox, 2001).

Table 103: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Ngu error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
NS 3 (19)	0.54	-0.13	-0.13	0.12	0.23	-0.05	0.46	0.46	-0.05	2.58
NS 3 (41)	1.73	1.64	1.64	0.17	0.37	1.28	2.09	2.09	1.28	0.22
NS 3 (66)	-2.18	-2.00	-2.00	0.10	0.20	-2.31	-1.87	-1.87	-2.31	-0.81
NS 3 (109)	1.18	1.08	1.08	0.15	0.31	0.79	1.47	1.47	0.79	0.29
NS 3 (139)	-0.01	0.20	0.20	0.11	0.24	-0.17	0.36	0.36	-0.17	-0.80
NS 3 (155)	1.41	0.90	0.90	0.16	0.29	0.82	1.49	1.49	0.82	1.54
NS 3 (174)	-2.79	-1.23	-1.23	0.11	0.20	-2.24	-1.78	-1.78	-2.24	-6.84
NS 3 (192)	0.64	0.66	0.66	0.13	0.27	0.35	0.95	0.95	0.35	-0.07
NS 3 (219)	-0.52	-1.11	-1.11	0.10	0.20	-1.04	-0.59	-0.59	-1.04	2.63

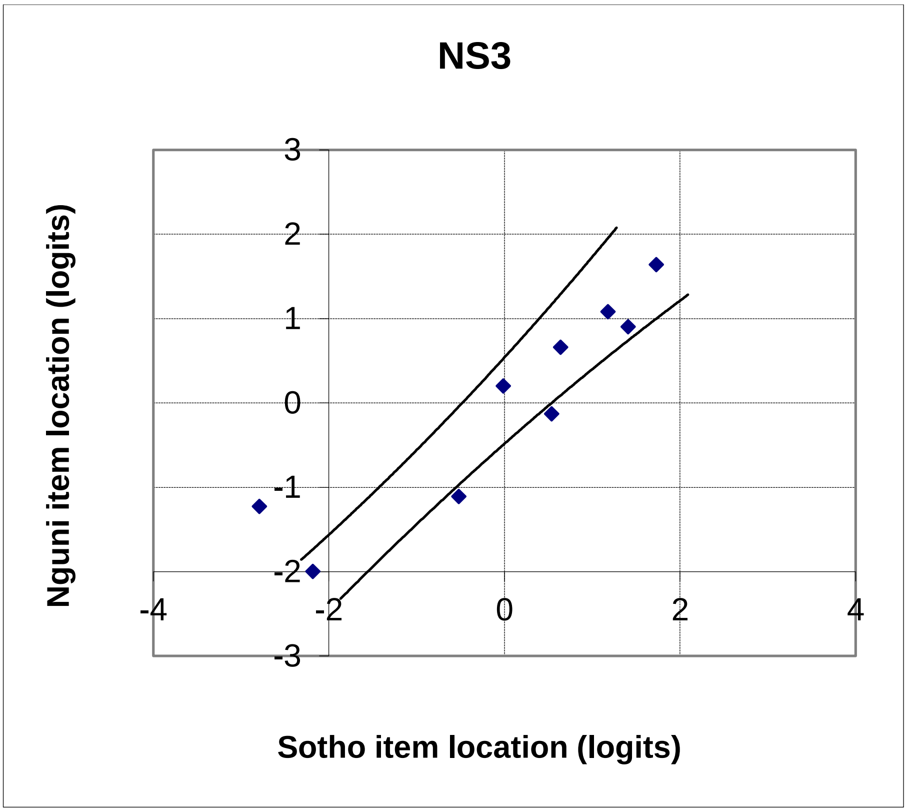

Figure 43: Differential Item Functioning for Nguni-Sotho Comparison

4.5.1.3.2 <u>Tsonga Respondents Compared to Sotho Respondents</u>

Table 104 illustrates that the t-values for two of the nine NS 3 items exceed the critical values of -1.96 and 1.96 (also see Figure 44). Items NS 3 (174) (t=-4.25) and NS 3 (219) (t=4.01) both exceed the critical value of +/-1.96, which means that both items do not retain their measurement properties across the two groups. Both these items are considered to possess a significant degree of bias when assessing the NS 3 construct, as their measurement properties are significantly influenced by the ethnicity of the respondents (Bond & Fox, 2001).

Seven of the nine NS 3 items are located inside the 95% confidence bands. This means that only 78% of the scale's items are located inside the 95% confidence intervals (Bond & Fox, 2001). This implies that the NS 3 sub-scale is biased as it does not function invariantly across the two ethnic groups.

Table 104: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
NS 3 (19)	0.54	0.18	0.18	0.12	0.20	0.13	0.59	0.59	0.13	1.54
NS 3 (41)	1.73	1.76	1.76	0.17	0.32	1.38	2.11	2.11	1.38	-0.08
NS 3 (66)	-2.18	-2.34	-2.34	0.10	0.18	-2.47	-2.05	-2.05	-2.47	0.78
NS 3 (109)	1.18	0.92	0.92	0.15	0.25	0.76	1.34	1.34	0.76	0.89
NS 3 (139)	-0.01	0.06	0.06	0.11	0.20	-0.20	0.25	0.25	-0.20	-0.31
NS 3 (155)	1.41	1.86	1.86	0.16	0.33	1.27	2.00	2.00	1.27	-1.23
NS 3 (174)	-2.79	-1.93	-1.93	0.11	0.17	-2.56	-2.16	-2.16	-2.56	-4.25
NS 3 (192)	0.64	0.80	0.80	0.13	0.24	0.45	0.99	0.99	0.45	-0.59
NS 3 (219)	-0.52	-1.31	-1.31	0.10	0.17	-1.11	-0.72	-0.72	-1.11	4.01

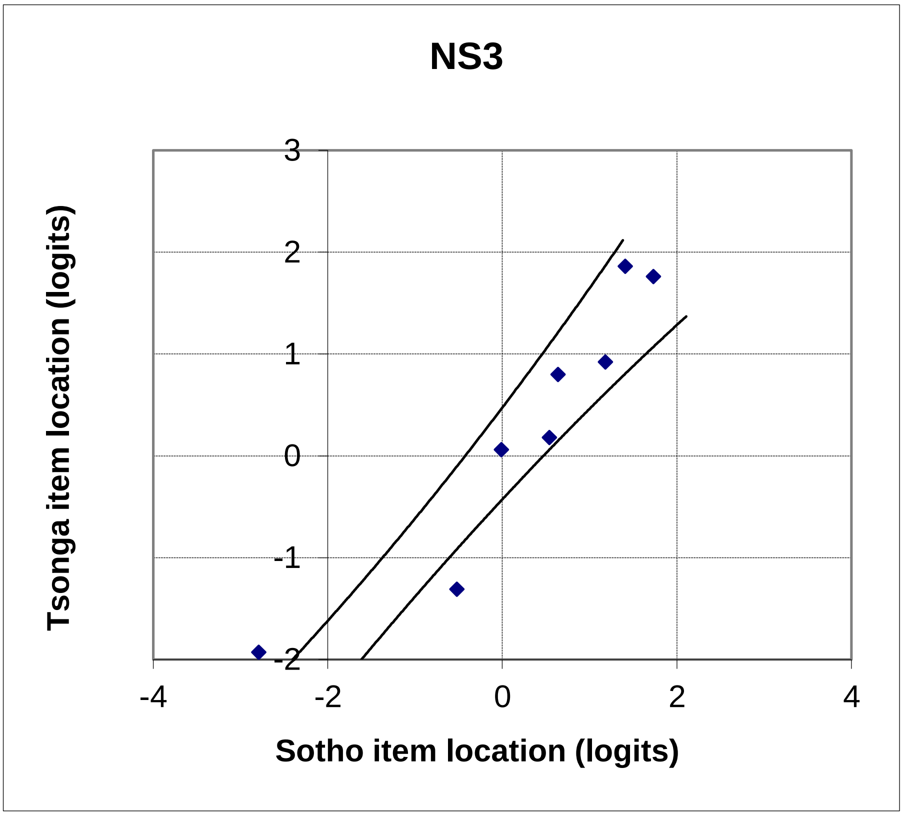

Figure 44: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.1.3.3 Venda Respondents Compared to Sotho Respondents

Table 105 illustrates that the t-values for two of the nine NS 3 items exceed the critical t-value range of -1.96. Figure 45 also shows the two items, which are located just outside the 95% confidence intervals. Items NS 3 (174) (t=-2.86) and NS 3 (155) (t=2.52) both exceed the critical values. This means that both items do not retain their measurement properties across the ethnic groups. These two items are considered to possess a significant degree of ethnic bias when assessing the NS 3 construct. Seven of the nine NS 3 items are located inside the 95% confidence bands (Bond & Fox, 2001). This means that the NS 3 sub-scale is biased to some degree and does not function invariantly across the two ethnic groups (Bond & Fox, 2001).

Table 105: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
NS 3 (19)	0.54	0.31	0.31	0.12	0.20	0.19	0.66	0.66	0.19	0.99
NS 3 (41)	1.73	1.97	1.97	0.17	0.30	1.50	2.19	2.19	1.50	-0.69
NS 3 (66)	-2.18	-2.03	-2.03	0.10	0.17	-2.30	-1.91	-1.91	-2.30	-0.75
NS 3 (109)	1.18	1.31	1.31	0.15	0.25	0.95	1.54	1.54	0.95	-0.44
NS 3 (139)	-0.01	-0.52	-0.52	0.11	0.17	-0.47	-0.06	-0.06	-0.47	2.52
NS 3 (155)	1.41	1.64	1.64	0.16	0.27	1.21	1.84	1.84	1.21	-0.73
NS 3 (174)	-2.79	-2.21	-2.21	0.11	0.17	-2.70	-2.30	-2.30	-2.70	-2.86
NS 3 (192)	0.64	0.27	0.27	0.13	0.19	0.22	0.68	0.68	0.22	1.61
NS 3 (219)	-0.52	-0.75	-0.75	0.10	0.17	-0.83	-0.44	-0.44	-0.83	1.17

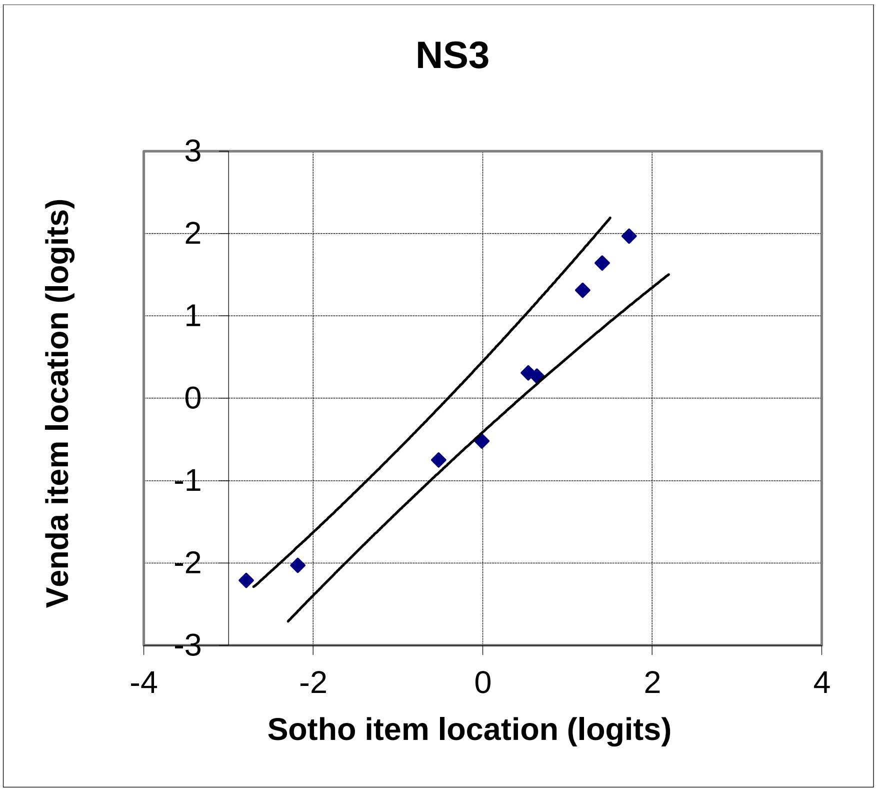

Figure 45: Differential Item Functioning for Venda-Sotho Comparison

4.5.1.4 <u>NS 4 Item Functioning across Different Ethnic Groups</u>

4.5.1.4.1 <u>Nguni Respondents Compared to Sotho Respondents</u>

Table 106 shows that the t-values for two of the NS 4 items exceed the critical values of +/-1.96. Figure 46 shows that the same two items are located outside the 95% confidence intervals. Items NS 4 (165) (t=-2.28) and NS 4 (204) (t=3.62) both exceed the critical value of 1.96. This means that both items do not retain their measurement properties across the two groups, which points out that these two items possess a significant degree of ethnic bias when assessing the NS 4 construct across the Sotho and Nguni groups. Only eight of the ten NS 4 items are located inside the 95% confidence bands, which mean that only 80% of the scale's items are located inside the 95% confidence intervals. This evidence suggests that the NS 4 sub-scale does not function invariantly across the two ethnic groups (Bond & Fox, 2001).

Table 106: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Ngu error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
NS 4 (34)	0.56	0.89	0.89	0.11	0.25	0.45	1.00	1.00	0.45	-1.21
NS 4 (53)	1.39	1.24	1.24	0.14	0.28	1.00	1.63	1.63	1.00	0.48
NS 4 (79)	-0.11	0.27	0.27	0.10	0.21	-0.15	0.31	0.31	-0.15	-1.64
NS 4 (91)	0.28	0.56	0.56	0.10	0.23	0.17	0.67	0.67	0.17	-1.12
NS 4 (110)	-1.76	-1.80	-1.80	0.10	0.20	-2.00	-1.56	-1.56	-2.00	0.17
NS 4 (141)	1.15	1.58	1.58	0.13	0.31	1.03	1.70	1.70	1.03	-1.28
NS 4 (165)	-0.11	-0.60	-0.60	0.10	0.19	-0.57	-0.14	-0.14	-0.57	2.28
NS 4 (183)	1.12	1.31	1.31	0.13	0.28	0.91	1.52	1.52	0.91	-0.62
NS 4 (204)	-1.70	-2.61	-2.61	0.10	0.23	-2.41	-1.90	-1.90	-2.41	3.62
NS 4 (212)	-0.84	-0.85	-0.85	0.09	0.19	-1.05	-0.63	-0.63	-1.05	0.04

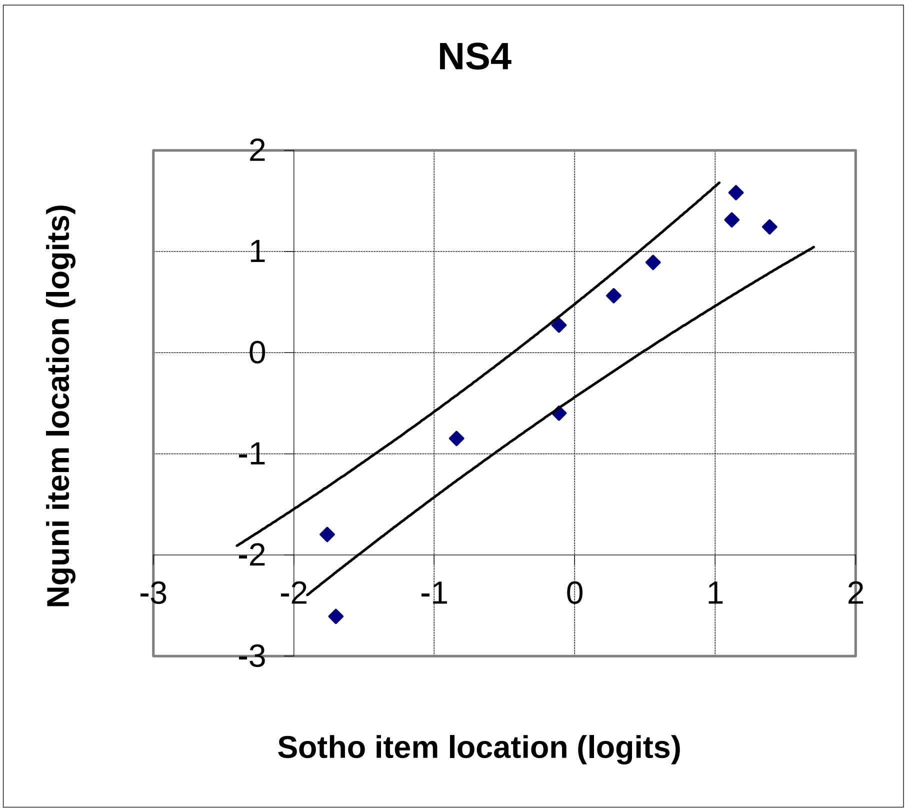

Figure 46: Differential Item Functioning for Nguni-Sotho Comparison

4.5.1.4.2 Tsonga Respondents Compared to Sotho Respondents

Table 107 illustrates that the t-values for all the items except one falls between the critical range of -1.96 and 1.96. Figure 47 shows that one item is located outside the 95% confidence intervals. NS 4 (110) (t=2.59) exceeds the critical value of 1.96 and does not retain its measurement properties in both ethnic groups which means the item is biased (Bond & Fox, 2001). Despite the fact that nine of the ten items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the boundary. According to Bond and Fox (2001) this means that the NS 4 sub-scale does not function invariantly across the two ethnic groups, and does seem to be ethnically biased.

Table 107: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
NS 4 (34)	0.56	0.86	0.86	0.11	0.21	0.47	0.95	0.95	0.47	-1.28
NS 4 (53)	1.39	1.73	1.73	0.14	0.27	1.26	1.87	1.87	1.26	-1.13
NS 4 (79)	-0.11	-0.06	-0.06	0.10	0.17	-0.28	0.11	0.11	-0.28	-0.27
NS 4 (91)	0.28	0.30	0.30	0.10	0.18	0.09	0.50	0.50	0.09	-0.11
NS 4 (110)	-1.76	-2.32	-2.32	0.10	0.19	-2.25	-1.82	-1.82	-2.25	2.59
NS 4 (141)	1.15	1.19	1.19	0.13	0.23	0.91	1.44	1.44	0.91	-0.16
NS 4 (165)	-0.11	0.15	0.15	0.10	0.18	-0.18	0.23	0.23	-0.18	-1.28
NS 4 (183)	1.12	1.35	1.35	0.13	0.24	0.96	1.51	1.51	0.96	-0.85
NS 4 (204)	-1.70	-2.09	-2.09	0.10	0.18	-2.10	-1.69	-1.69	-2.10	1.88
NS 4 (212)	-0.84	-1.10	-1.10	0.09	0.16	-1.15	-0.78	-0.78	-1.15	1.40

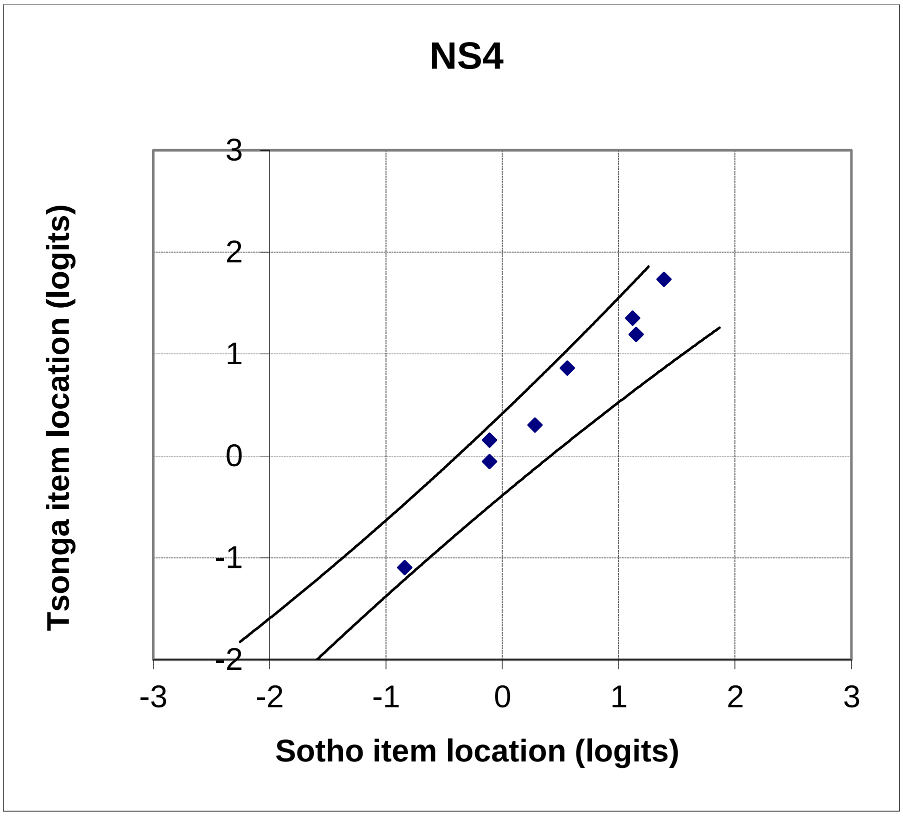

Figure 47: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.1.4.3 Venda Respondents Compared to Sotho Respondents

Table 108 illustrates that the t-values for all the items except one falls within the critical range of -1.96 and 1.96 (also see Figure 48). Item NS 4 (79) (t=2.59) exceeds the critical value of -1.96 and does not retain its measurement properties across the two groups. Despite the fact that nine of the ten items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the boundary. This means that the NS 4 sub-scale does not function invariantly across the two ethnic groups, and does seem to be ethnically biased (Bond & Fox, 2001).

Table 108: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
NS 4 (34)	0.56	0.50	0.50	0.11	0.18	0.32	0.74	0.74	0.32	0.28
NS 4 (53)	1.39	0.94	0.94	0.14	0.20	0.92	1.41	1.41	0.92	1.84
NS 4 (79)	-0.11	0.37	0.37	0.10	0.18	-0.08	0.34	0.34	-0.08	-2.34
NS 4 (91)	0.28	0.03	0.03	0.10	0.16	-0.03	0.34	0.34	-0.03	1.32
NS 4 (110)	-1.76	-1.68	-1.68	0.10	0.16	-1.91	-1.53	-1.53	-1.91	-0.43
NS 4 (141)	1.15	1.59	1.59	0.13	0.25	1.09	1.65	1.65	1.09	-1.57
NS 4 (165)	-0.11	-0.15	-0.15	0.10	0.16	-0.32	0.06	0.06	-0.32	0.21
NS 4 (183)	1.12	0.85	0.85	0.13	0.20	0.75	1.22	1.22	0.75	1.13
NS 4 (204)	-1.70	-1.53	-1.53	0.10	0.16	-1.80	-1.43	-1.43	-1.80	-0.91
NS 4 (212)	-0.84	-0.93	-0.93	0.09	0.15	-1.06	-0.71	-0.71	-1.06	0.51

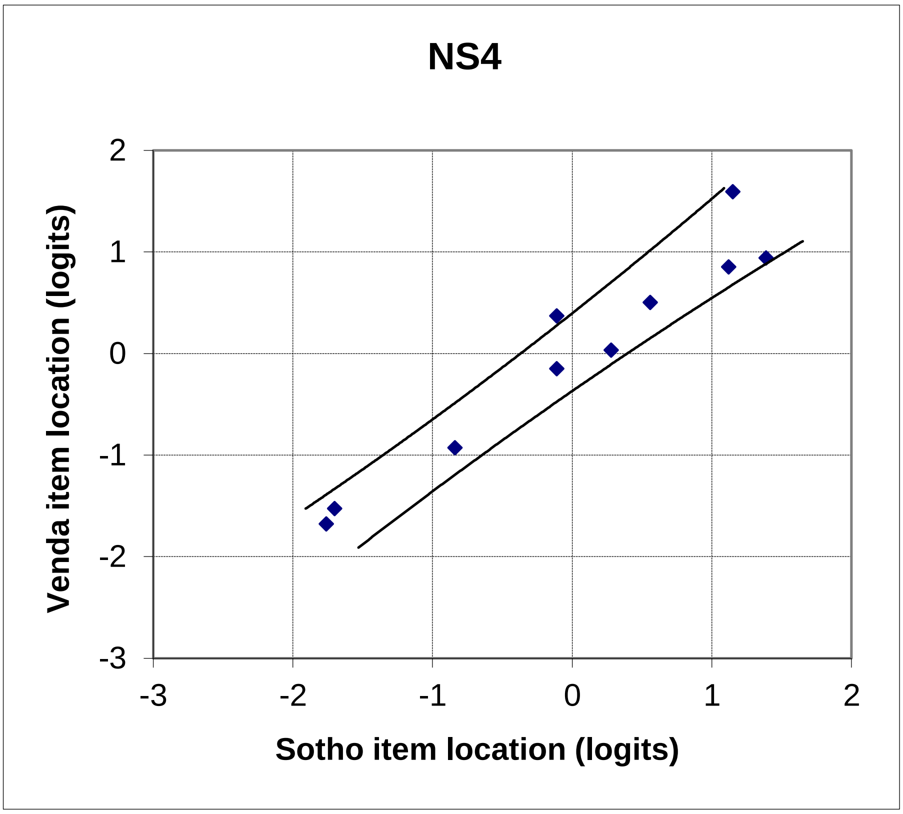

Figure 48: Differential Item Functioning for Venda-Sotho Comparison

4.5.2 Results Illustrating the Degree of Item Invariance in an Ethnic Group Comparisons for the sub-scales of the Primary Harm Avoidance Scale

4.5.2.1 HA 1 Item Functioning across Different Ethnic Groups

4.5.2.1.1 Nguni Respondents Compared to Sotho Respondents

Table 109 shows that the t-values for two items exceed the critical range of -1.96 and 1.96. Figure 49 also illustrates that these two items are located just outside the confidence intervals. Items HA 1 (149) (t=-2.06) and HA 1 (225) (t=-2.63) both exceed the critical t-value of -1.96 and do not retain the same measurement properties in the Nguni and Sotho ethnic groups. These items are considered to be biased; because their functioning is confounded by the ethnic grouping of the respondent it is measuring (Bond & Fox, 2001). Nine of the scale's eleven items are located inside the 95% confidence bands, which mean that more than 5% of the items are located outside the confidence bands. According to Bond and Fox (2001) this implies that the HA 1 sub-scale does not function invariantly across the two ethnic groups, which means that the scale is functioning in a biased manner.

Table 109: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho err	Nguni err	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
HA 1 (2)	1.96	1.93	1.93	0.19	0.43	1.47	2.41	2.41	1.47	0.07
HA 1 (20)	-0.59	-0.65	-0.65	0.10	0.20	-0.84	-0.40	-0.40	-0.84	0.27
HA 1 (42)	2.78	2.36	2.36	0.27	0.51	1.99	3.15	3.15	1.99	0.73
HA 1 (65)	1.46	1.47	1.47	0.16	0.36	1.07	1.86	1.86	1.07	-0.02
HA 1 (81)	-1.10	-1.33	-1.33	0.10	0.20	-1.44	-0.99	-0.99	-1.44	1.03
HA 1 (112)	-0.44	-0.35	-0.35	0.10	0.21	-0.63	-0.16	-0.16	-0.63	-0.38
HA 1 (119)	-1.22	-1.64	-1.64	0.10	0.20	-1.65	-1.21	-1.21	-1.65	1.88
HA 1 (149)	0.17	0.79	0.79	0.11	0.28	0.18	0.78	0.78	0.18	-2.06
HA 1 (164)	-1.48	-1.64	-1.64	0.10	0.20	-1.78	-1.34	-1.34	-1.78	0.72
HA 1 (188)	0.51	0.51	0.51	0.12	0.26	0.22	0.80	0.80	0.22	0.00
HA 1 (225)	-2.04	-1.45	-1.45	0.10	0.20	-1.97	-1.52	-1.52	-1.97	-2.63

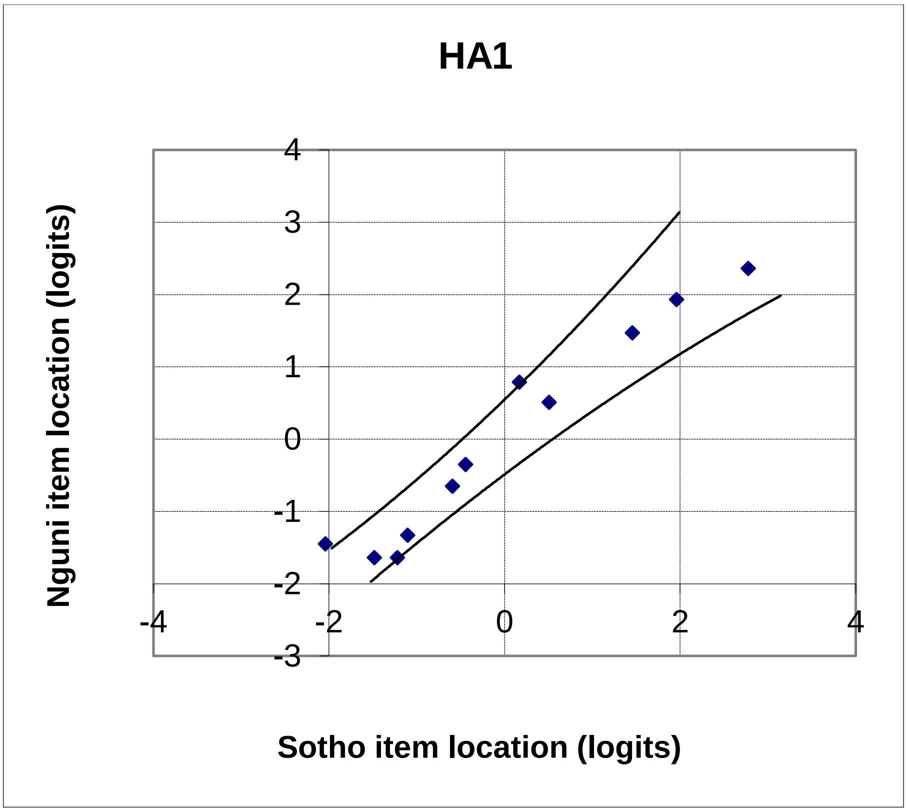

Figure 49: Differential Item Functioning for Nguni-Sotho Comparison

4.5.2.1.2 Tsonga Respondents Compared to Sotho Respondents

Table 110 illustrates that the t-values for three of the eleven items exceed the critical range of +/-1.96; Figure 50 depicts these three items. Items HA 1 (149) (t=-2.65), HA 1 (112) (t=2.64) and HA 1 (119) (t=2.18) all exceed the critical t-value range and do not retain their measurement properties across the two ethnic groups. These items are considered to be biased, as the ethnicity of a respondent influence the way the particular construct is measured by each of the respective items. This means that only eight of the eleven HA 1 items are located inside the 95% confidence bands. A simple division calculation shows that almost 30% of the scale's items are located outside the 95% boundary. This implies that the HA 1 sub-scale does not function invariantly across the two groups, which indicates that is possesses a considerable degree of ethnic bias (Bond & Fox, 2001).

Table 110: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
HA 1 (2)	1.96	2.00	2.00	0.19	0.37	1.56	2.40	2.40	1.56	-0.10
HA 1 (20)	-0.59	-0.64	-0.64	0.10	0.17	-0.81	-0.42	-0.42	-0.81	0.25
HA 1 (42)	2.78	2.31	2.31	0.27	0.42	2.05	3.04	3.04	2.05	0.94
HA 1 (65)	1.46	1.28	1.28	0.16	0.28	1.05	1.69	1.69	1.05	0.56
HA 1 (81)	-1.10	-0.93	-0.93	0.10	0.17	-1.21	-0.82	-0.82	-1.21	-0.86
HA 1 (112)	-0.44	-0.96	-0.96	0.10	0.17	-0.90	-0.50	-0.50	-0.90	2.64
HA 1 (119)	-1.22	-1.65	-1.65	0.10	0.17	-1.63	-1.24	-1.24	-1.63	2.18
HA 1 (149)	0.17	0.87	0.87	0.11	0.24	0.26	0.78	0.78	0.26	-2.65
HA 1 (164)	-1.48	-1.43	-1.43	0.10	0.17	-1.65	-1.26	-1.26	-1.65	-0.25
HA 1 (188)	0.51	0.87	0.87	0.12	0.24	0.42	0.96	0.96	0.42	-1.34
HA 1 (225)	-2.04	-1.71	-1.71	0.10	0.17	-2.07	-1.68	-1.68	-2.07	-1.67

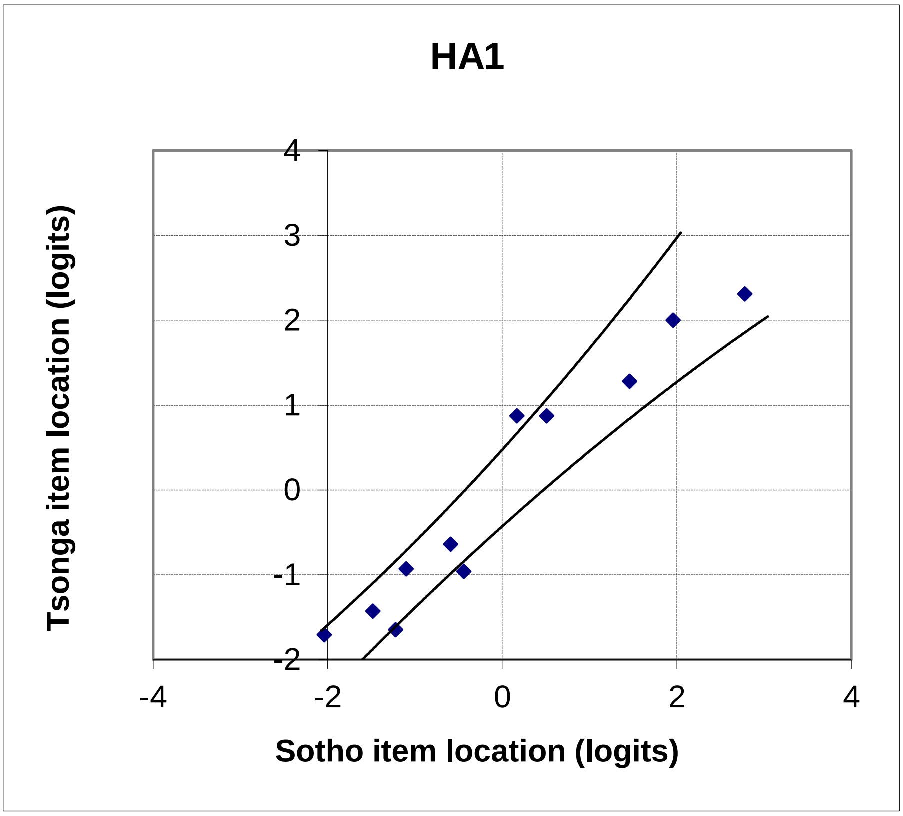

Figure 50: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.2.1.3 Venda Respondents Compared to Sotho Respondents

Table 111 shows that the t-values for all the items except one falls within the critical range of -1.96 and 1.96. Figure 51 also shows that one item is located just outside the confidence intervals. Item HA 1 (112) (t=2.17) exceeds the critical t-value of 1.96 and does not retain its measurement properties across the ethnic groups. This item is considered to possess a significant degree of ethnic bias (Bond & Fox, 2001). Despite the fact that ten of the eleven items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the confidence boundaries. According to Bond and Fox (2001) this means that the HA 1 sub-scale does not function invariantly across the two groups, and does seem to be biased, as the ethnicity of a respondent determines to a degree their score on the HA 1 scale.

Table 111: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho err	Venda err	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
HA 1 (2)	1.96	1.43	1.43	0.19	0.28	1.36	2.03	2.03	1.36	1.56
HA 1 (20)	-0.59	-0.72	-0.72	0.10	0.16	-0.84	-0.47	-0.47	-0.84	0.68
HA 1 (42)	2.78	2.65	2.65	0.27	0.46	2.18	3.25	3.25	2.18	0.24
HA 1 (65)	1.46	2.14	2.14	0.16	0.37	1.40	2.20	2.20	1.40	-1.69
HA 1 (81)	-1.10	-1.15	-1.15	0.10	0.16	-1.31	-0.94	-0.94	-1.31	0.26
HA 1 (112)	-0.44	-0.85	-0.85	0.10	0.16	-0.83	-0.46	-0.46	-0.83	2.17
HA 1 (119)	-1.22	-1.00	-1.00	0.10	0.16	-1.30	-0.92	-0.92	-1.30	-1.17
HA 1 (149)	0.17	0.36	0.36	0.11	0.20	0.04	0.49	0.49	0.04	-0.84
HA 1 (164)	-1.48	-1.49	-1.49	0.10	0.16	-1.67	-1.30	-1.30	-1.67	0.05
HA 1 (188)	0.51	0.44	0.44	0.12	0.20	0.24	0.71	0.71	0.24	0.30
HA 1 (225)	-2.04	-1.79	-1.79	0.10	0.16	-2.10	-1.73	-1.73	-2.10	-1.33

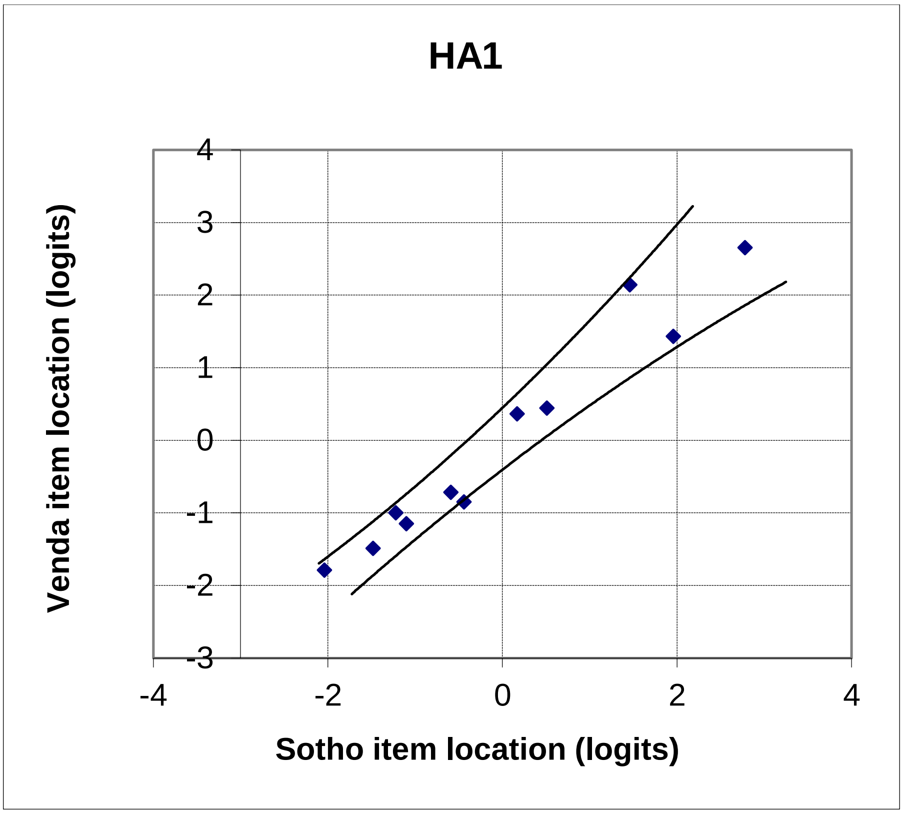

Figure 51: Differential Item Functioning for Venda-Sotho Comparison

4.5.2.2 HA 2 Item Functioning across Different Ethnic Groups

4.5.2.2.1 Nguni Respondents Compared to Sotho Respondents

Table 112 shows that the t-values for all seven HA 2 items fall within the critical t-value range of 1.96 and -1.96; Figure 52 also illustrates that no items are located outside the confidence bands. This means that the HA 2 scale and its items function invariantly across both Sotho and Nguni groups. According to Bond and Fox (2001) these results indicate that the scale measures the HA 2 construct without any significant degree of ethnic bias.

Table 112: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
HA 2 (12)	-0.31	-0.32	-0.32	0.10	0.20	-0.54	-0.09	-0.09	-0.54	0.06
HA 2 (26)	-0.38	-0.28	-0.28	0.10	0.20	-0.56	-0.11	-0.11	-0.56	-0.43
HA 2 (67)	0.55	0.42	0.42	0.10	0.21	0.25	0.72	0.72	0.25	0.57
HA 2 (129)	0.26	-0.08	-0.08	0.10	0.20	-0.14	0.31	0.31	-0.14	1.53
HA 2 (154)	-0.06	0.01	0.01	0.10	0.20	-0.25	0.20	0.20	-0.25	-0.30
HA 2 (189)	-0.46	-0.60	-0.60	0.10	0.20	-0.76	-0.31	-0.31	-0.76	0.64
HA 2 (217)	0.40	0.83	0.83	0.10	0.22	0.37	0.86	0.86	0.37	-1.77

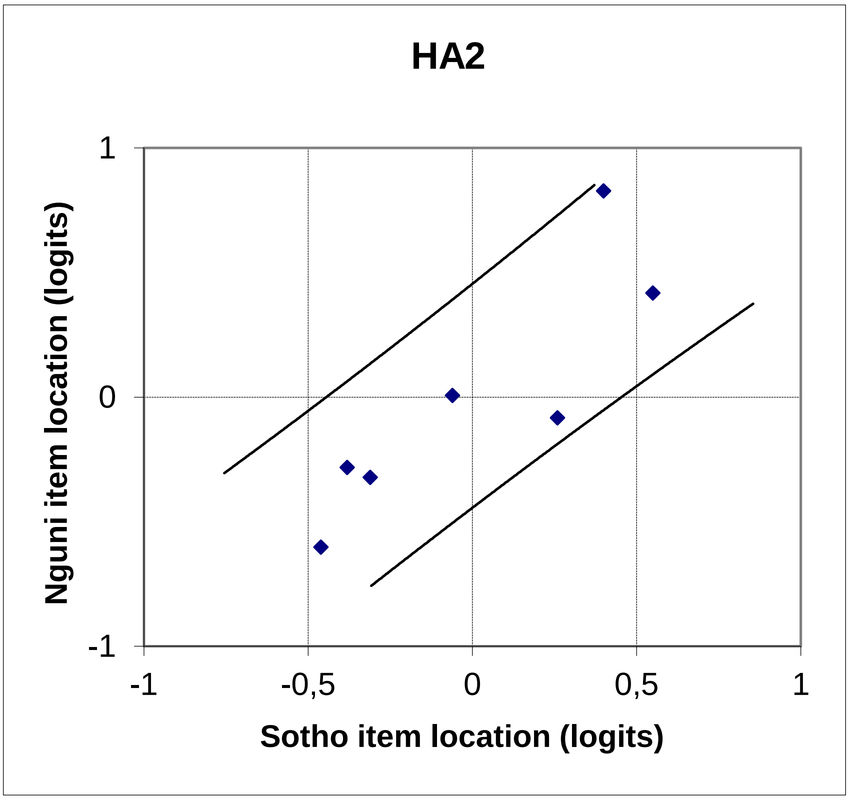

Figure 52: Differential Item Functioning for Nguni-Sotho Comparison

4.5.2.2.2 Tsonga Respondents Compared to Sotho Respondents

Table 113 shows that two of the seven HA 2 items have t-values that exceed the critical range. Figure 53 illustrates that these items are plotted just outside the confidence intervals. Items HA 2 (154) (t=2.43) and HA 2 (12) (t=-2.38) both exceed the critical t-values of +/-1.96, which implies that these items do not function invariantly across the Tsonga and Sotho groups. A simple division calculation shows that almost 30% of the scale's items are located outside the confidence bands. This means that the HA 2 sub-scale does not function invariantly across the two groups and can be considered biased (Bond & Fox, 2001).

Table 113: Item Functioning Tsonga vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
HA 2 (12)	-0.31	0.16	0.16	0.10	0.17	-0.27	0.12	0.12	-0.27	-2.38
HA 2 (26)	-0.38	-0.74	-0.74	0.10	0.17	-0.76	-0.36	-0.36	-0.76	1.83
HA 2 (67)	0.55	0.62	0.62	0.10	0.17	0.39	0.78	0.78	0.39	-0.35
HA 2 (129)	0.26	0.13	0.13	0.10	0.17	0.00	0.39	0.39	0.00	0.66
HA 2 (154)	-0.06	-0.54	-0.54	0.10	0.17	-0.50	-0.10	-0.10	-0.50	2.43
HA 2 (189)	-0.46	-0.43	-0.43	0.10	0.17	-0.64	-0.25	-0.25	-0.64	-0.15
HA 2 (217)	0.40	0.80	0.80	0.10	0.18	0.39	0.81	0.81	0.39	-1.94

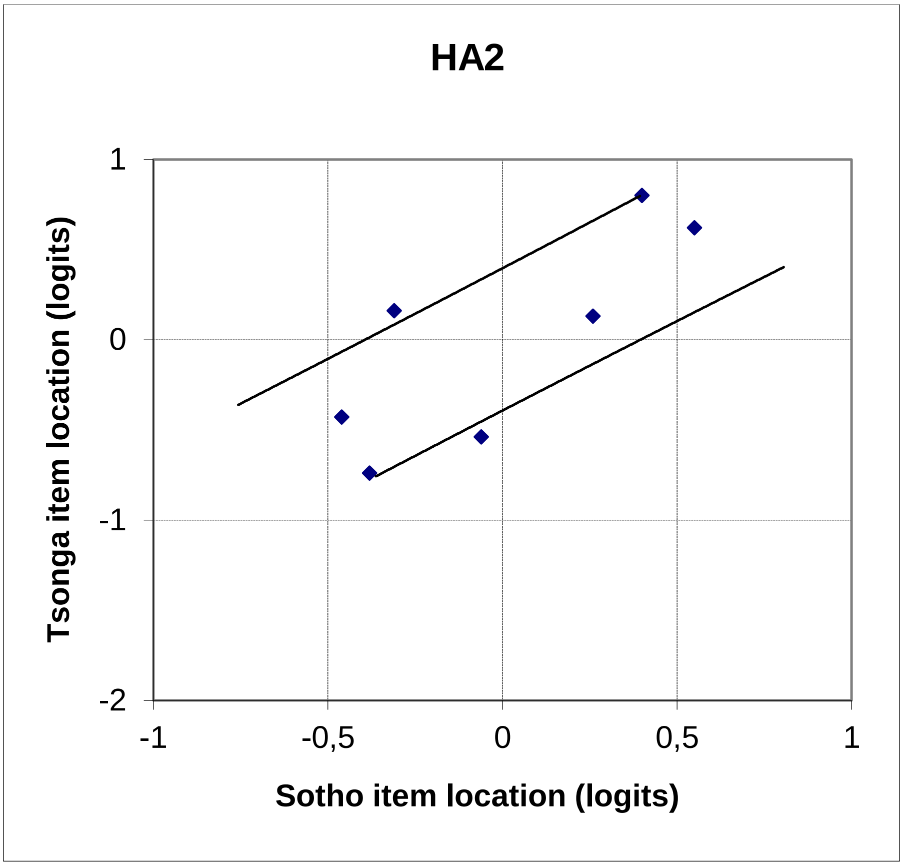

Figure 53: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.2.2.3 <u>Venda Respondents Compared to Sotho Respondents</u>

Table 114 shows that the t-values for all seven HA 2 items fall within the critical range of 1.96 and -1.96, the graph in Figure 54 also depicts that no items are located outside the confidence intervals. According to Bond and Fox (2001) this means that the HA 2 scale and its items functions invariantly across both Sotho and Venda groups, and do not show any significant evidence of ethnic bias.

Table 114: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
HA 2 (12)	-0.31	-0.49	-0.49	0.10	0.17	-0.60	-0.20	-0.20	-0.60	0.91
HA 2 (26)	-0.38	-0.46	-0.46	0.10	0.17	-0.62	-0.22	-0.22	-0.62	0.40
HA 2 (67)	0.55	0.72	0.72	0.10	0.17	0.44	0.83	0.83	0.44	-0.87
HA 2 (129)	0.26	0.37	0.37	0.10	0.17	0.12	0.51	0.51	0.12	-0.56
HA 2 (154)	-0.06	-0.29	-0.29	0.10	0.17	-0.37	0.02	0.02	-0.37	1.16
HA 2 (189)	-0.46	-0.24	-0.24	0.10	0.17	-0.55	-0.15	-0.15	-0.55	-1.12
HA 2 (217)	0.40	0.40	0.40	0.10	0.17	0.20	0.60	0.60	0.20	-0.01

Figure 54: Differential Item Functioning for Venda-Sotho Comparison

4.5.2.3 HA 3 Item Functioning across Different Ethnic Groups

4.5.2.3.1 Nguni Respondents Compared to Sotho Respondents

Table 115 illustrates that the t-values for two of the eight HA 3 items, exceed the critical values of 1.96 and -1.96; Figure 55 depicts the two items which are plotted just outside the confidence bands. In other words, items HA 3 (54) (t=-2.58) and HA 3 (100) (t=2.26) do not retain their measurement properties across the two ethnic groups and possess a significant degree of ethnic bias as their measurement properties vary significantly across the two groups. Only six of the eight HA 3 items are located inside the 95% confidence bands, which mean that only 75% of the scale's items are located inside the confidence intervals. This means that the HA 3 sub-scale does not function invariantly across the two ethnic groups, and seems to possess a considerable degree of ethnic bias (Bond & Fox, 2001).

Table 115: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
HA 3 (27)	-0.06	-0.41	-0.41	0.12	0.24	-0.50	0.03	0.03	-0.50	1.31
HA 3 (54)	-0.21	0.65	0.65	0.12	0.31	-0.11	0.55	0.55	-0.11	-2.58
HA 3 (80)	-1.68	-1.86	-1.86	0.12	0.22	-2.02	-1.52	-1.52	-2.02	0.72
HA 3 (100)	1.56	0.75	0.75	0.18	0.31	0.80	1.51	1.51	0.80	2.26
HA 3 (142)	1.62	1.50	1.50	0.18	0.41	1.11	2.01	2.01	1.11	0.27
HA 3 (157)	-0.34	-0.17	-0.17	0.12	0.25	-0.53	0.02	0.02	-0.53	-0.61
HA 3 (209)	-0.84	-0.41	-0.41	0.12	0.24	-0.89	-0.36	-0.36	-0.89	-1.60
HA 3 (231)	-0.04	-0.05	-0.05	0.12	0.26	-0.33	0.24	0.24	-0.33	0.04

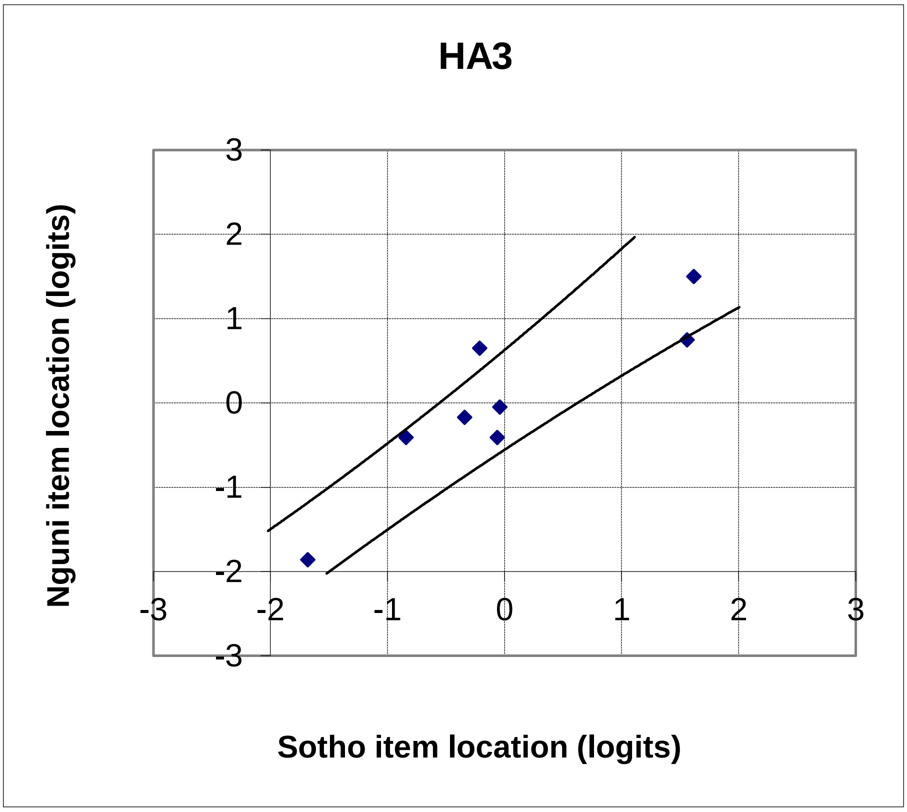

Figure 55: Differential Item Functioning for Nguni-Sotho Comparison

4.5.2.3.2 Tsonga Respondents Compared to Sotho Respondents

Table 116 illustrates that the t-values for all the HA 3 items apart from one fall within the critical t-value range of -1.96 and +1.96. Figure 56 also depicts the item, which is plotted just outside the confidence intervals. This means that item HA 3 (27) (t=3.06) does not retain its measurement properties across the two groups. It can be argued that the item possesses a significant degree of ethnic bias, as its measurement properties differs significantly across the two groups. Seven of the eight HA 3 items are located inside the 95% confidence bands, which mean that only 88% of the scale's items are located inside the confidence intervals; this implies that the sub-scale is biased as it does not function invariantly across the two ethnic groups (Bond & Fox, 2001).

Table 116: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
HA 3 (27)	-0.06	-0.75	-0.75	0.12	0.19	-0.63	-0.18	-0.18	-0.63	3.06
HA 3 (54)	-0.21	0.09	0.09	0.12	0.21	-0.30	0.18	0.18	-0.30	-1.25
HA 3 (80)	-1.68	-2.04	-2.04	0.12	0.19	-2.08	-1.63	-1.63	-2.08	1.60
HA 3 (100)	1.56	1.91	1.91	0.18	0.36	1.33	2.14	2.14	1.33	-0.87
HA 3 (142)	1.62	2.05	2.05	0.18	0.38	1.42	2.26	2.26	1.42	-1.03
HA 3 (157)	-0.34	-0.09	-0.09	0.12	0.21	-0.46	0.03	0.03	-0.46	-1.04
HA 3 (209)	-0.84	-1.24	-1.24	0.12	0.18	-1.26	-0.82	-0.82	-1.26	1.84
HA 3 (231)	-0.04	0.09	0.09	0.12	0.21	-0.22	0.27	0.27	-0.22	-0.54

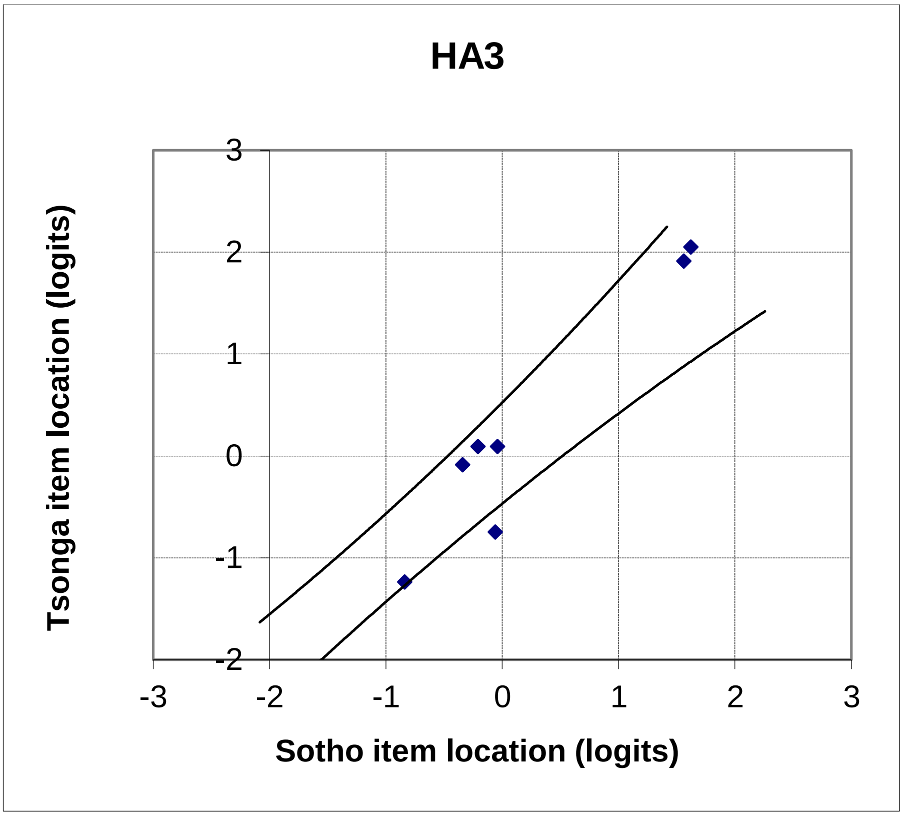

Figure 56: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.2.3.3 <u>Venda Respondents Compared to Sotho Respondents</u>

Table 117 shows that the t-values for two of the eight HA 3 items exceed the critical t-value range (-1.96 and +1.96). Items HA 3 (231) (t=-2.15) and HA 3 (80) (t=2.11) both exceed the critical t-value range of +/-1.96, and do not retain their measurement properties across the ethnic groups. Hence, these items are considered to possess a significant degree of ethnic bias when assessing the HA 3 construct. A simple calculation shows that only 75% of the scale's items are located inside the 95% confidence intervals. According to Bond and Fox (2001) this means that the HA 3 sub-scale does not function invariantly across the two ethnic groups and does possess a considerable degree of ethnic bias.

Table 117: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho err	Venda err	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
HA 3 (27)	-0.06	0.31	0.31	0.12	0.22	-0.13	0.37	0.37	-0.13	-1.47
HA 3 (54)	-0.21	-0.11	-0.11	0.12	0.21	-0.40	0.08	0.08	-0.40	-0.41
HA 3 (80)	-1.68	-2.17	-2.17	0.12	0.20	-2.16	-1.69	-1.69	-2.16	2.11
HA 3 (100)	1.56	1.13	1.13	0.18	0.27	1.02	1.67	1.67	1.02	1.33
HA 3 (142)	1.62	1.28	1.28	0.18	0.28	1.12	1.78	1.78	1.12	1.03
HA 3 (157)	-0.34	-0.16	-0.16	0.12	0.21	-0.49	-0.01	-0.01	-0.49	-0.74
HA 3 (209)	-0.84	-0.80	-0.80	0.12	0.20	-1.05	-0.59	-0.59	-1.05	-0.17
HA 3 (231)	-0.04	0.52	0.52	0.12	0.23	-0.02	0.50	0.50	-0.02	-2.15

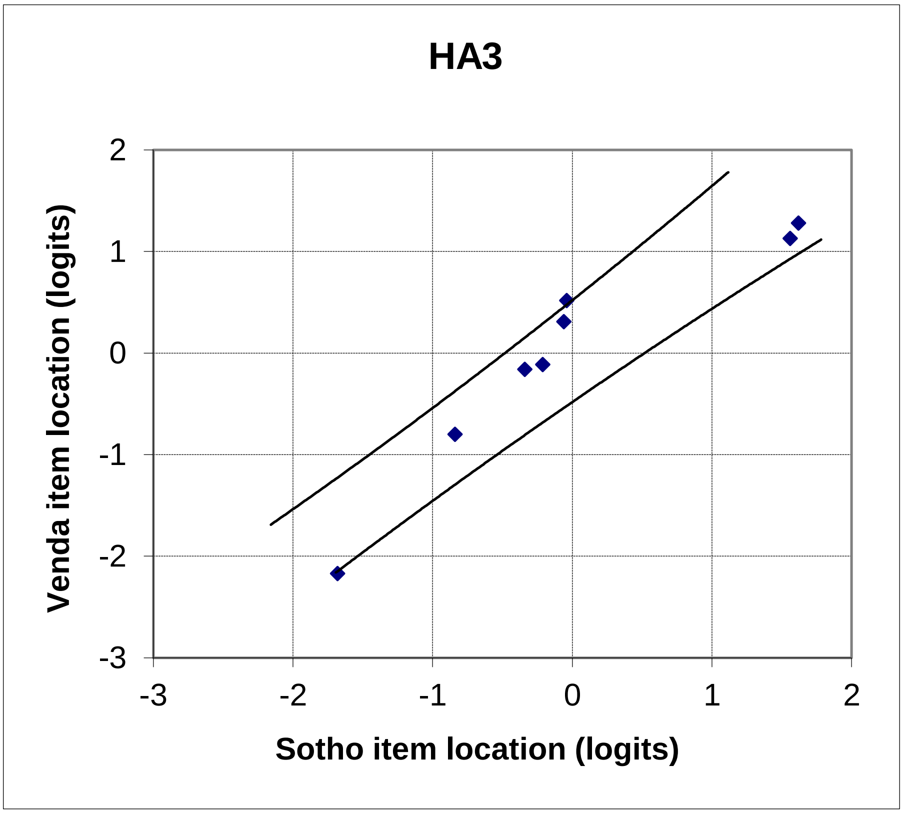

Figure 57: Differential Item Functioning for Venda-Sotho Comparison

4.5.2.4 HA 4 Item Functioning across Different Ethnic Groups

4.5.2.4.1 Nguni Respondents Compared to Sotho Respondents

The statistics presented in Table 118 show that only one of the nine HA 4 items exceeds the critical t-value range of +/-1.96. Figure 58 depicts the item, which is located just outside the critical range. The t-value for item HA 4 (147) (t=2.41) is larger than 1.96, which implies that it does not retain its measurement properties across the two ethnic groups. Therefore the item possesses a significant degree of ethnic bias when assessing the HA 4 construct across the Sotho and Nguni groups (Bond & Fox, 2001). Only 89% of the scale's items are plotted inside the 95% confidence intervals, which suggest that the HA 4 scale does not function invariantly across these groups. According to Bond and Fox (2001) this points out that the scale possesses a considerable degree of ethnic bias.

Table 118: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
HA 4 (22)	1.45	1.62	1.62	0.14	0.32	1.19	1.89	1.89	1.19	-0.49
HA 4 (43)	0.81	0.71	0.71	0.12	0.24	0.49	1.03	1.03	0.49	0.36
HA 4 (63)	0.84	1.26	1.26	0.12	0.28	0.75	1.36	1.36	0.75	-1.39
HA 4 (92)	-1.02	-1.00	-1.00	0.10	0.19	-1.22	-0.79	-0.79	-1.22	-0.10
HA 4 (113)	0.52	0.96	0.96	0.11	0.26	0.46	1.02	1.02	0.46	-1.57
HA 4 (147)	-0.63	-1.15	-1.15	0.10	0.19	-1.10	-0.67	-0.67	-1.10	2.41
HA 4 (182)	1.06	0.77	0.77	0.13	0.25	0.63	1.20	1.20	0.63	1.02
HA 4 (202)	-0.09	0.00	0.00	0.10	0.21	-0.28	0.19	0.19	-0.28	-0.40
HA 4 (236)	-2.96	-3.17	-3.17	0.12	0.26	-3.35	-2.78	-2.78	-3.35	0.73

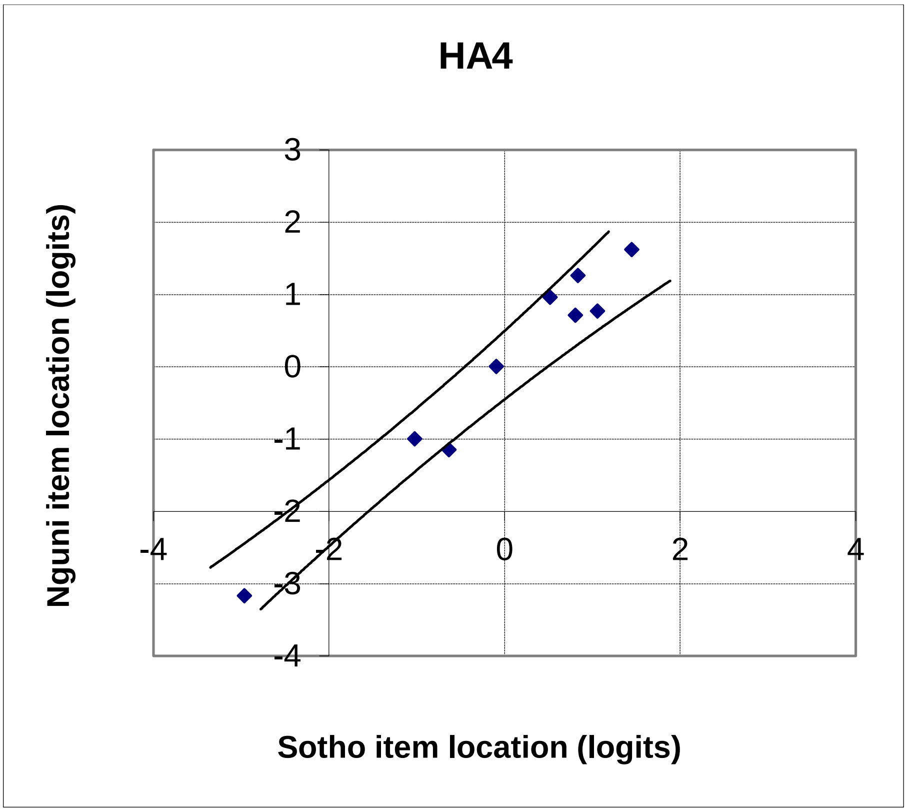

Figure 58: Differential Item Functioning for Nguni-Sotho Comparison

4.5.2.4.2 Tsonga Respondents Compared to Sotho Respondents

Table 119 illustrates that the t-values for two of the nine HA 4 items exceed the critical values of -1.96 and 1.96 (also see Figure 59). Items HA 4 (147) (t=3.43) and HA 4 (113) (t=-2.17) both exceed the critical t-value range of +/-1.96, which means that these items do not retain their measurement properties across the two ethnic groups. According to Bond and Fox (2001) these two items possess a significant degree of ethnic bias when assessing the HA 4 construct. Seven of the nine HA 4 items are located inside the 95% confidence bands; this translates to only 77.8%. According to standards set by Bond and Fox (2001) the sub-scale does possess as significant degree of ethnic bias, as it does not function invariantly across the two ethnic groups.

Table 119: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
HA 4 (22)	1.45	1.88	1.88	0.14	0.29	1.34	1.99	1.99	1.34	-1.35
HA 4 (43)	0.81	0.52	0.52	0.12	0.20	0.43	0.90	0.90	0.43	1.23
HA 4 (63)	0.84	1.05	1.05	0.12	0.22	0.70	1.20	1.20	0.70	-0.85
HA 4 (92)	-1.02	-1.15	-1.15	0.10	0.16	-1.27	-0.89	-0.89	-1.27	0.67
HA 4 (113)	0.52	1.05	1.05	0.11	0.22	0.54	1.03	1.03	0.54	-2.17
HA 4 (147)	-0.63	-1.28	-1.28	0.10	0.16	-1.14	-0.76	-0.76	-1.14	3.43
HA 4 (182)	1.06	1.32	1.32	0.13	0.24	0.92	1.46	1.46	0.92	-0.96
HA 4 (202)	-0.09	-0.15	-0.15	0.10	0.17	-0.32	0.08	0.08	-0.32	0.29
HA 4 (236)	-2.96	-3.23	-3.23	0.12	0.22	-3.34	-2.84	-2.84	-3.34	1.06

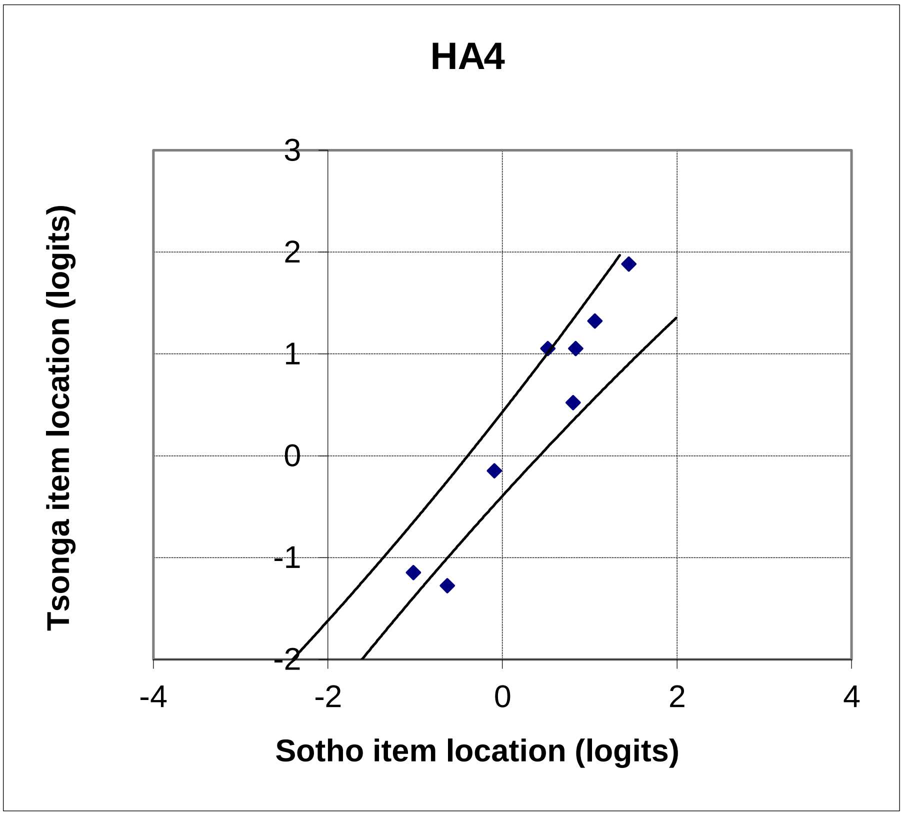

Figure 59: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.2.4.3 Venda Respondents Compared to Sotho Respondents

Table 120 illustrates that the t-values for all the items except one falls within the critical t-value range. Figure 60 also shows that one item is located just outside the 95% confidence bands. Item HA 4 (147) (t=2.43) exceed the critical t-value of 1.96 and does not retain the same measurement properties across both ethnic groups. Despite the fact that eight of the nine items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the boundary. This means that the HA 4 sub-scale does not function invariantly across the two ethnic groups, which implies that the scale possesses significant ethnic bias (Bond & Fox, 2001).

Table 120: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
HA 4 (22)	1.45	1.71	1.71	0.14	0.25	1.29	1.87	1.87	1.29	-0.91
HA 4 (43)	0.81	0.72	0.72	0.12	0.19	0.54	0.99	0.99	0.54	0.40
HA 4 (63)	0.84	0.72	0.72	0.12	0.19	0.56	1.01	1.01	0.56	0.53
HA 4 (92)	-1.02	-0.86	-0.86	0.10	0.16	-1.13	-0.75	-0.75	-1.13	-0.85
HA 4 (113)	0.52	0.58	0.58	0.11	0.19	0.33	0.77	0.77	0.33	-0.28
HA 4 (147)	-0.63	-1.09	-1.09	0.10	0.16	-1.05	-0.67	-0.67	-1.05	2.43
HA 4 (182)	1.06	1.18	1.18	0.13	0.21	0.87	1.37	1.37	0.87	-0.49
HA 4 (202)	-0.09	-0.16	-0.16	0.10	0.17	-0.32	0.07	0.07	-0.32	0.35
HA 4 (236)	-2.96	-2.81	-2.81	0.12	0.20	-3.12	-2.65	-2.65	-3.12	-0.65

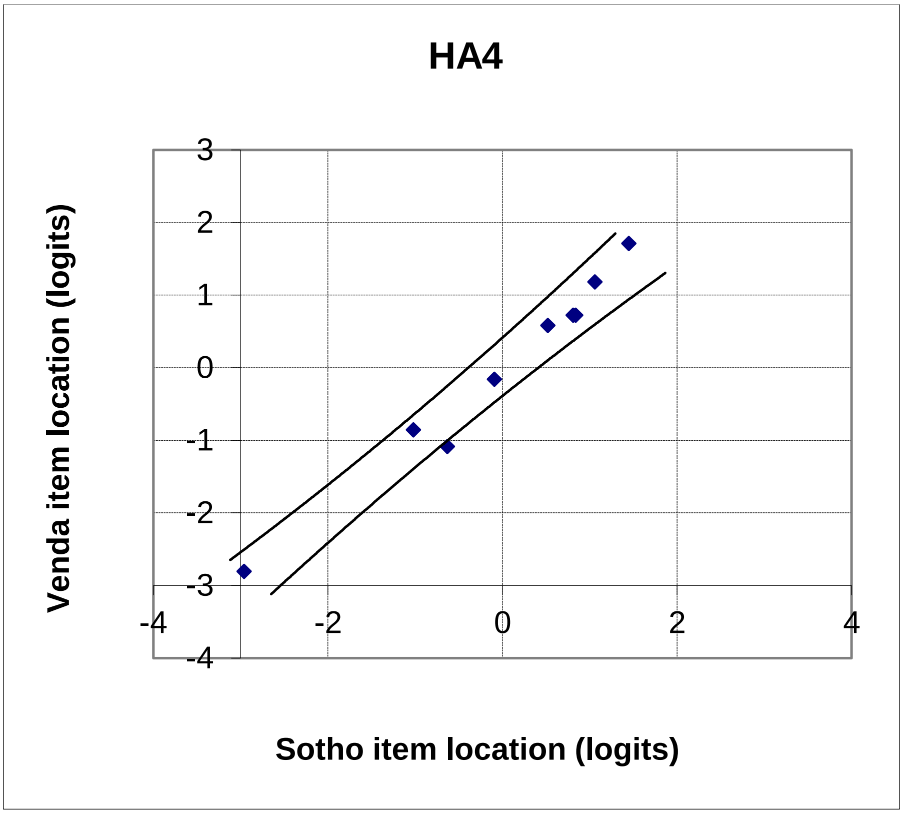

Figure 60: Differential Item Functioning for Venda-Sotho Comparison

4.5.3 Results Illustrating the Degree of Item Invariance in an Ethnic Group Comparisons for the sub-scales of the Primary Reward Dependence Scale

4.5.3.1 <u>RD 1 Item Functioning across Different Ethnic Groups</u>

4.5.3.1.1 <u>Nguni Respondents Compared to Sotho Respondents</u>

Table 121 shows that the t-values for two items exceed the critical t-value range (-1.96 and 1.96). Figure 61 illustrates that these two items are located just outside the confidence intervals. Items RD 1 (181) (t=-2.81) and RD 1 (28) (t=2.65) both exceed the critical value of +/-1.96 and do not retain the same measurement properties across the two ethnic groups. According to Bond and Fox (2001) these items function in a biased manner, as their functioning is confounded to a certain degree by the ethnicity of a respondent. Eight of the scale's items are located inside the 95% confidence bands, which mean that more than 5% of items are located outside the confidence boundaries. According to Bond and Fox's (2001) criteria this means that the RD 1 sub-scale does not function invariantly across the two groups, and does possess a significant degree of ethnic bias.

Table 121: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
RD 1 (3)	0.14	0.16	0.16	0.10	0.21	-0.08	0.38	0.38	-0.08	-0.09
RD 1 (28)	0.48	-0.16	-0.16	0.10	0.22	-0.08	0.40	0.40	-0.08	2.65
RD 1 (55)	1.76	2.15	2.15	0.10	0.20	1.73	2.18	2.18	1.73	-1.74
RD 1 (83)	-1.52	-2.22	-2.22	0.15	0.46	-2.35	-1.39	-1.39	-2.35	1.45
RD 1 (102)	-0.72	-0.62	-0.62	0.12	0.25	-0.95	-0.39	-0.39	-0.95	-0.36
RD 1 (120)	-0.07	0.29	0.29	0.10	0.20	-0.11	0.33	0.33	-0.11	-1.61
RD 1 (158)	0.27	0.03	0.03	0.10	0.21	-0.08	0.38	0.38	-0.08	1.03
RD 1 (181)	1.95	2.63	2.63	0.10	0.22	2.05	2.53	2.53	2.05	-2.81
RD 1 (210)	-1.56	-1.71	-1.71	0.15	0.37	-2.03	-1.24	-1.24	-2.03	0.38
RD 1 (224)	-0.73	-0.55	-0.55	0.12	0.25	-0.92	-0.36	-0.36	-0.92	-0.65

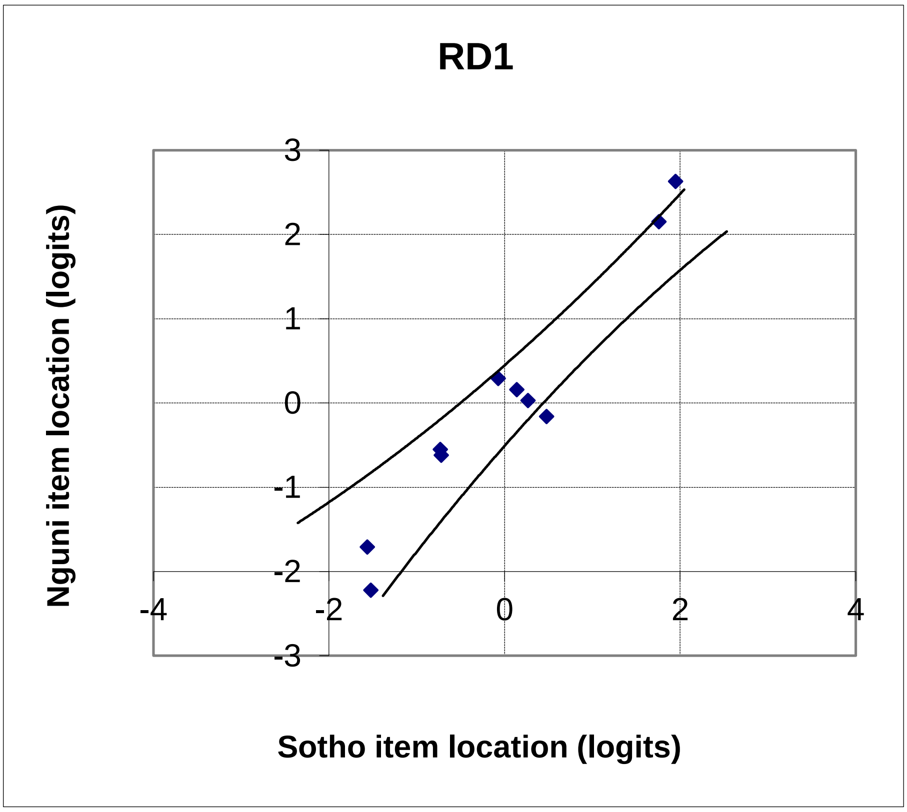

Figure 61: Differential Item Functioning for Nguni-Sotho Comparison

4.5.3.1.2 Tsonga Respondents Compared to Sotho Respondents

Table 122 illustrates that the t-values for two of the ten RD 1 items exceed the critical t-value range of +/-1.96. Figure 62 depicts the two items, which are located just outside the confidence intervals. Items RD 1 (224) (t=-3.89) and RD 1 (28) (t=2.19) both exceed the critical t-value range and do not retain their measurement properties across the two ethnic groups. These two items possess a considerable degree of bias as the ethnicity of a respondent influences their score on the item (Bond & Fox, 2001). The fact that only 80% of the RD 1 items are located inside the 95% confidence bands means that the RD 1 sub-scale shows a significant degree of ethnic bias, as its measurement properties differs significantly across the two groups (Bond & Fox, 2001).

Table 122: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
RD 1 (3)	0.14	0.14	0.14	0.10	0.17	-0.06	0.34	0.34	-0.06	0.01
RD 1 (28)	0.48	0.05	0.05	0.10	0.17	0.07	0.46	0.46	0.07	2.19
RD 1 (55)	1.76	1.84	1.84	0.10	0.17	1.60	2.00	2.00	1.60	-0.40
RD 1 (83)	-1.52	-2.14	-2.14	0.15	0.33	-2.19	-1.47	-1.47	-2.19	1.71
RD 1 (102)	-0.72	-0.40	-0.40	0.12	0.19	-0.79	-0.34	-0.34	-0.79	-1.42
RD 1 (120)	-0.07	-0.23	-0.23	0.10	0.18	-0.36	0.06	0.06	-0.36	0.78
RD 1 (158)	0.27	0.28	0.28	0.10	0.17	0.08	0.47	0.47	0.08	-0.05
RD 1 (181)	1.95	2.22	2.22	0.10	0.18	1.88	2.29	2.29	1.88	-1.31
RD 1 (210)	-1.56	-1.85	-1.85	0.15	0.30	-2.04	-1.37	-1.37	-2.04	0.87
RD 1 (224)	-0.73	0.08	0.08	0.12	0.17	-0.53	-0.12	-0.12	-0.53	-3.89

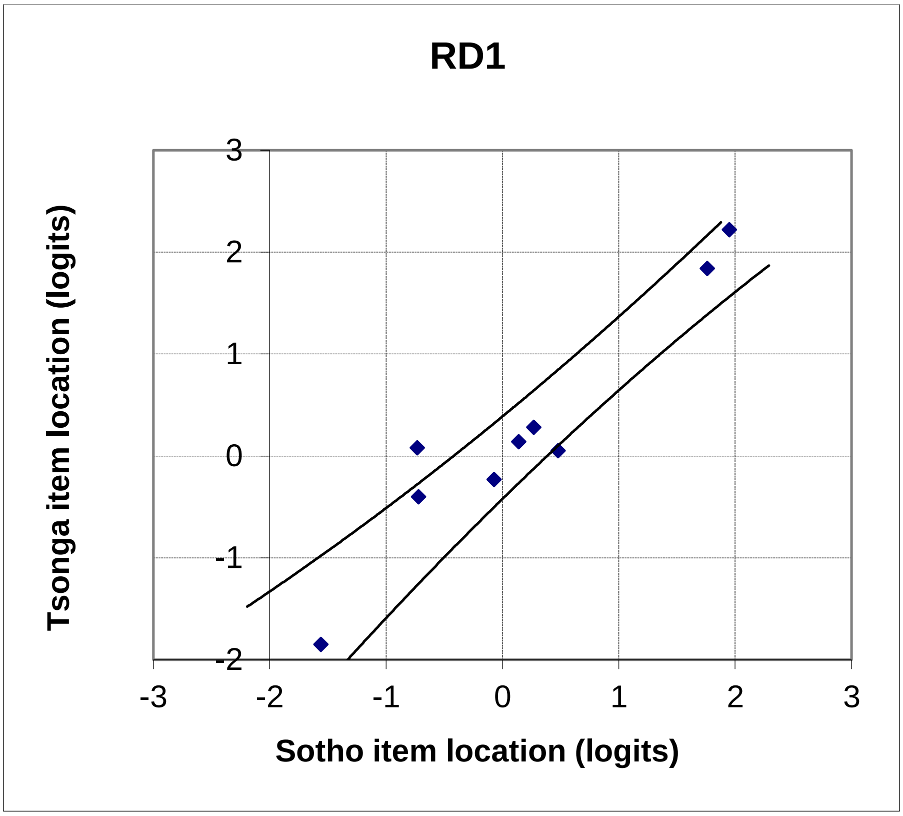

Figure 62: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.3.1.3 Venda Respondents Compared to Sotho Respondents

Table 123 illustrates that the t-values for three of the sub-scale's items exceed the critical t-value range. Figure 63 shows the three items which are plotted outside the 95% confidence intervals. Items RD 1 (224) (t=-3.32), RD 1 (181) (t=-2.98) and RD 1 (120) (t=2.09) all exceed t=+/-1.96. These items have a certain degree of ethnic bias, as they do not retain the same measurement properties across both groups (Bond & Fox, 2001). Only seven of the ten RD 1 items are located inside the 95% confidence bands, which mean that only 70% of the scale's items are located inside the 95% confidence intervals. According to Bond and Fox (2001) this points out that the RD 1 sub-scale does not function invariantly across the two ethnic groups.

Table 123: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
RD 1 (3)	0.14	-0.15	-0.15	0.10	0.17	-0.20	0.19	0.19	-0.20	1.47
RD 1 (28)	0.48	0.41	0.41	0.10	0.16	0.26	0.63	0.63	0.26	0.37
RD 1 (55)	1.76	1.87	1.87	0.10	0.17	1.62	2.01	2.01	1.62	-0.56
RD 1 (83)	-1.52	-1.99	-1.99	0.15	0.29	-2.08	-1.43	-1.43	-2.08	1.44
RD 1 (102)	-0.72	-0.98	-0.98	0.12	0.20	-1.08	-0.62	-0.62	-1.08	1.11
RD 1 (120)	-0.07	-0.50	-0.50	0.10	0.18	-0.49	-0.08	-0.08	-0.49	2.09
RD 1 (158)	0.27	0.36	0.36	0.10	0.16	0.13	0.50	0.50	0.13	-0.48
RD 1 (181)	1.95	2.59	2.59	0.10	0.19	2.06	2.48	2.48	2.06	-2.98
RD 1 (210)	-1.56	-1.57	-1.57	0.15	0.25	-1.86	-1.27	-1.27	-1.86	0.03
RD 1 (224)	-0.73	-0.04	-0.04	0.12	0.17	-0.59	-0.18	-0.18	-0.59	-3.32

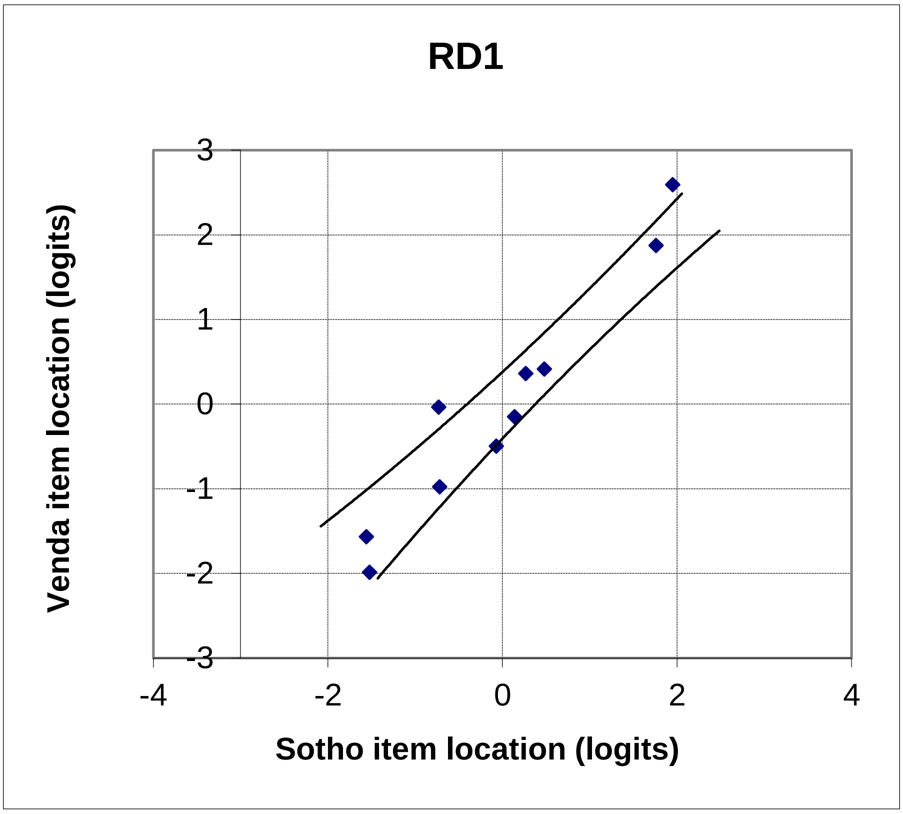

Figure 63: Differential Item Functioning for Venda-Sotho Comparison

4.5.3.2 RD 3 Item Functioning across Different Ethnic Groups

4.5.3.2.1 Nguni Respondents Compared to Sotho Respondents

Table 124 illustrates that the t-values for three of the RD 3 items exceed the critical t-value range (also see Figure 64). Items RD 3 (180) (t=5.61), RD (226) (t=-3.99), and RD 3 (68) (t=2.09) do not retain the same measurement properties across the ethnic groups, and therefore possess a considerable degree of ethnic bias (Bond & Fox, 2001). Only 63% of the RD 3 items are located inside the 95% confidence bands, which mean that the sub-scale does not function invariantly across the two ethnic groups. According to Bond and Fox (2001) this points out that the scale is functioning in an ethnically biased manner.

Table 124: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
RD 3 (21)	-2.00	-1.34	-1.34	0.17	0.30	-2.01	-1.33	-1.33	-2.01	-1.91
RD 3 (44)	0.66	0.88	0.88	0.10	0.20	0.55	0.99	0.99	0.55	-0.98
RD 3 (68)	-0.90	-1.64	-1.64	0.13	0.33	-1.62	-0.92	-0.92	-1.62	2.09
RD 3 (117)	-0.44	-0.36	-0.36	0.12	0.24	-0.67	-0.13	-0.13	-0.67	-0.30
RD 3 (143)	0.28	0.72	0.72	0.10	0.21	0.27	0.73	0.73	0.27	-1.89
RD 3 (180)	2.37	1.09	1.09	0.11	0.20	1.50	1.96	1.96	1.50	5.61
RD 3 (201)	0.95	0.55	0.55	0.10	0.21	0.52	0.98	0.98	0.52	1.72
RD 3 (226)	-0.92	0.10	0.10	0.13	0.22	-0.67	-0.15	-0.15	-0.67	-3.99

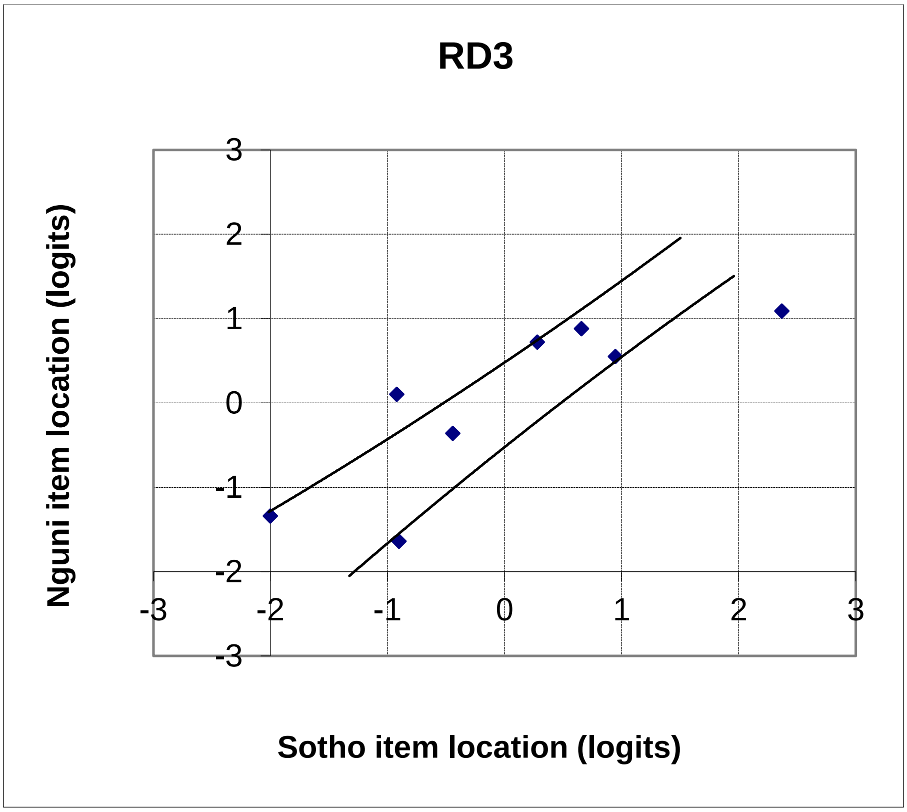

Figure 64: Differential Item Functioning for Nguni-Sotho Comparison

4.5.3.2.2 Tsonga Respondents Compared to Sotho Respondents

The t-values for two items exceed the critical range of +/-1.96 (see Table 125). Items RD 3 (180) (t=2.82) and RD 3 (201) (t=-1.98) do not retain their measurement properties across the two ethnic groups (Figure 65); and are considered to be biased, as the ethnicity of a person determines the way they are measured by the items (Bond & Fox, 2001). Only six of the RD 3 items are located inside the 95% confidence bands, which points out that the scale possesses a significant degree of ethnic bias as it does not function invariantly across the two ethnic groups (Bond & Fox, 2001).

Table 125: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
RD 3 (21)	-2.00	-2.64	-2.64	0.17	0.41	-2.76	-1.88	-1.88	-2.76	1.44
RD 3 (44)	0.66	0.96	0.96	0.10	0.17	0.61	1.01	1.01	0.61	-1.52
RD 3 (68)	-0.90	-1.06	-1.06	0.13	0.23	-1.24	-0.72	-0.72	-1.24	0.61
RD 3 (117)	-0.44	-0.08	-0.08	0.12	0.19	-0.48	-0.04	-0.04	-0.48	-1.60
RD 3 (143)	0.28	0.25	0.25	0.10	0.18	0.06	0.47	0.47	0.06	0.15
RD 3 (180)	2.37	1.80	1.80	0.11	0.17	1.88	2.29	2.29	1.88	2.82
RD 3 (201)	0.95	1.34	1.34	0.10	0.17	0.95	1.34	1.34	0.95	-1.98
RD 3 (226)	-0.92	-0.57	-0.57	0.13	0.21	-0.99	-0.50	-0.50	-0.99	-1.42

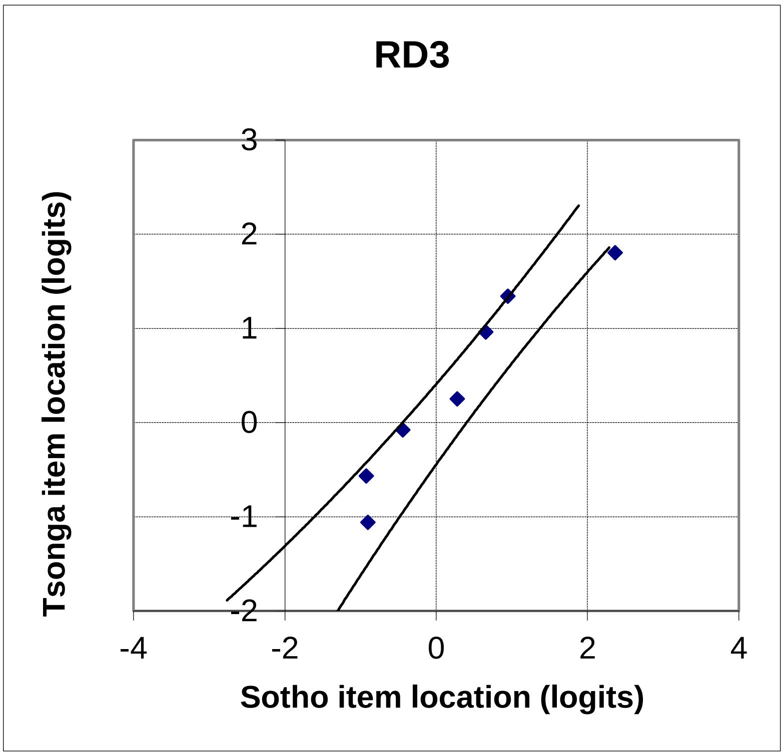

Figure 65: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.3.2.3 Venda Respondents Compared to Sotho Respondents

Table 126 illustrates that the t-values for two of the eight RD 3 items exceed the critical t-values of -1.96 and +1.96; the location of these two items are shown in Figure 66. Items RD 3 (44) (t=3.06) and RD 3 (226) (t=-2.13) do not retain their measurement properties across the two ethnic groups. According to Bond and Fox (2001) these two items possess a significant degree of ethnic bias when assessing the RD 3 construct. Six of the eight RD 3 items are located inside the 95% confidence bands; consequently only 75% of the scale's items are located inside the 95% confidence intervals. This means that the RD 3 sub-scale does not function invariantly across the two ethnic groups, which points out that the scale functions in an ethnically biased manner.

Table 126: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
RD 3 (21)	-2.00	-1.51	-1.51	0.17	0.24	-2.05	-1.46	-1.46	-2.05	-1.67
RD 3 (44)	0.66	0.03	0.03	0.10	0.18	0.14	0.55	0.55	0.14	3.06
RD 3 (68)	-0.90	-0.74	-0.74	0.13	0.20	-1.06	-0.58	-0.58	-1.06	-0.67
RD 3 (117)	-0.44	-0.66	-0.66	0.12	0.20	-0.78	-0.32	-0.32	-0.78	0.94
RD 3 (143)	0.28	0.39	0.39	0.10	0.17	0.14	0.53	0.53	0.14	-0.56
RD 3 (180)	2.37	1.98	1.98	0.11	0.18	1.96	2.39	2.39	1.96	1.85
RD 3 (201)	0.95	0.94	0.94	0.10	0.17	0.75	1.14	1.14	0.75	0.05
RD 3 (226)	-0.92	-0.43	-0.43	0.13	0.19	-0.91	-0.44	-0.44	-0.91	-2.13

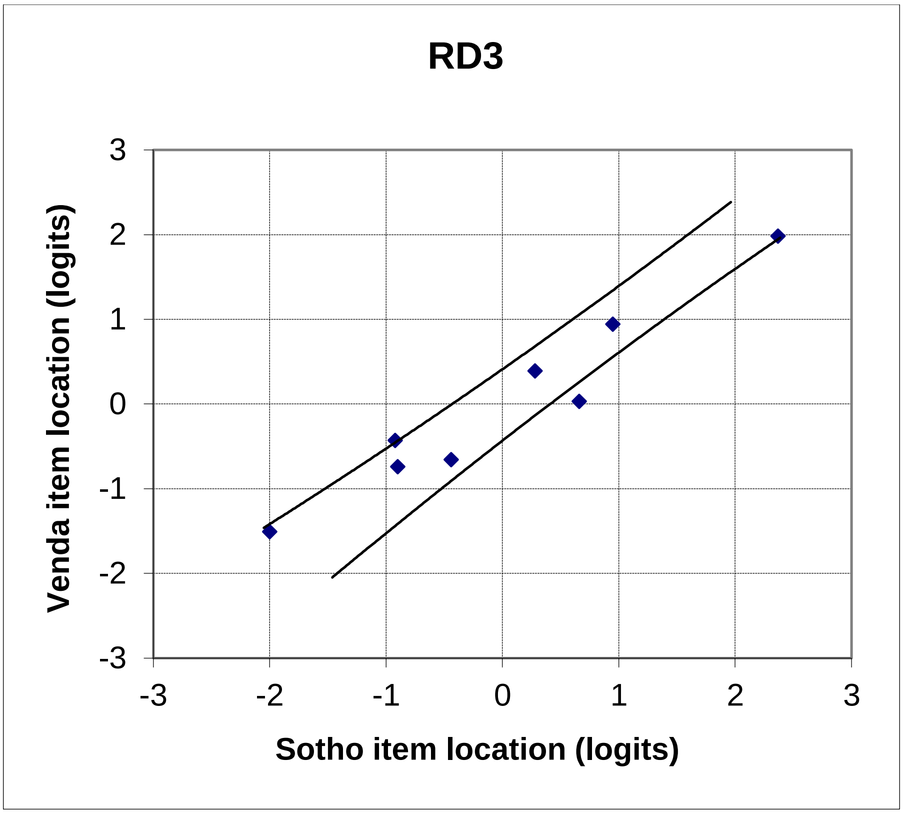

Figure 66: Differential Item Functioning for Venda-Sotho Comparison

4.5.3.3 RD 4 Item Functioning across Different Ethnic Groups

4.5.3.3.1 Nguni Respondents Compared to Sotho Respondents

Table 127 shows that only one of six RD 4 items exceeds the critical t-value range. Figure 67 depicts the item, which is located outside the critical range. Item RD 4 (156) (t=2.06) does not retain its measurement properties across the two ethnic groups. According to Bond and Fox (2001) this item possesses a significant degree of ethnic bias. Only 88% of the scale's items are located inside the 95% confidence intervals, which suggest that the RD 4 sub-scale possesses a considerable degree of ethnic bias, as it does not function invariantly across the two groups (Bond & Fox, 2001).

Table 127: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
RD 4 (14)	-0.02	-0.02	-0.02	0.10	0.20	-0.24	0.20	0.20	-0.24	0.00
RD 4 (46)	0.55	0.91	0.91	0.10	0.21	0.50	0.96	0.96	0.50	-1.55
RD 4 (71)	-2.14	-1.82	-1.82	0.13	0.26	-2.27	-1.69	-1.69	-2.27	-1.10
RD 4 (131)	0.31	0.14	0.14	0.10	0.20	0.00	0.45	0.45	0.00	0.76
RD 4 (156)	0.64	0.18	0.18	0.10	0.20	0.19	0.63	0.63	0.19	2.06
RD 4 (193)	0.65	0.60	0.60	0.10	0.21	0.39	0.86	0.86	0.39	0.21

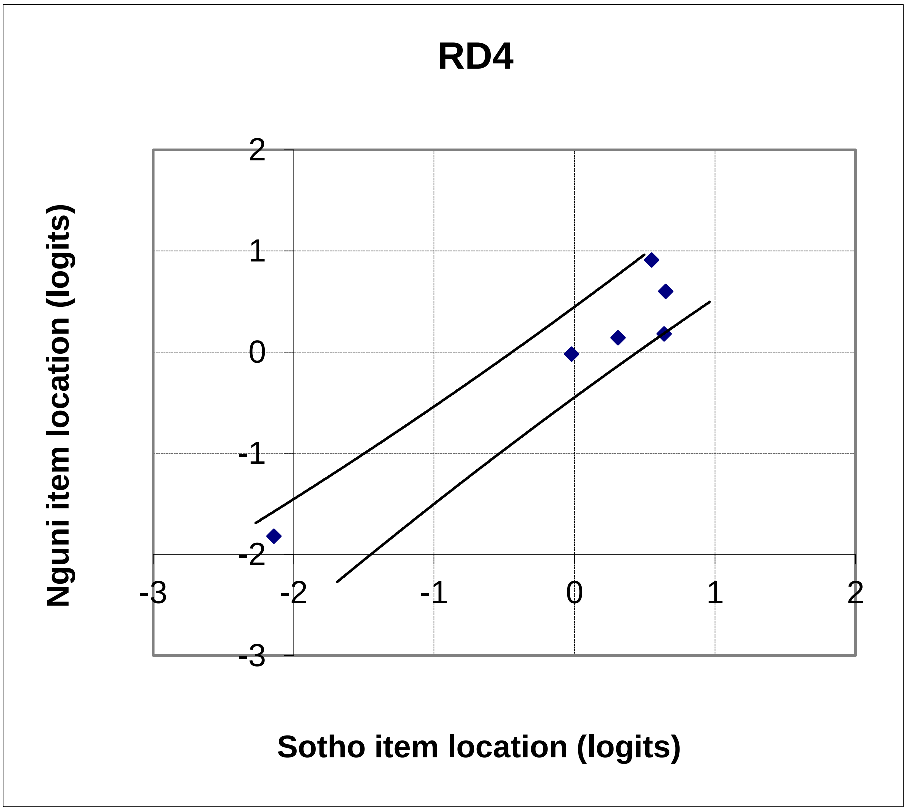

Figure 67: Differential Item Functioning for Nguni-Sotho Comparison

4.5.3.3.2 Tsonga Respondents Compared to Sotho Respondents

Table 128 illustrates that the t-values of four of the scale's six items exceed the critical t-value range. Figure 68 shows that the same four items are plotted way outside the 95% confidence intervals. Items RD 4 (71) (t=-11.64), RD 4 (193) (t=10.01), RD 4 (14) (t=-4.48) and RD 4 (156) (3.49) all exceed the critical values of +/-1.96 and do not retain their measurement properties across the two ethnic groups. All four items are considered to possess a significant degree of ethnic bias when assessing the RD 4 construct (Bond & Fox, 2001). Almost 67% of the RD 4 items are located outside the 95% confidence bands, which indicate that the RD 4 sub-scale does not function invariantly across the two groups and does possess a significant degree of ethnic bias (Bond & Fox, 2001).

Table 128: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
RD 4 (14)	-0.02	0.90	0.90	0.10	0.18	0.23	0.65	0.65	0.23	-4.48
RD 4 (46)	0.55	0.41	0.41	0.10	0.17	0.28	0.68	0.68	0.28	0.70
RD 4 (71)	-2.14	0.35	0.35	0.13	0.17	-1.11	-0.68	-0.68	-1.11	-11.64
RD 4 (131)	0.31	-0.02	-0.02	0.10	0.17	-0.05	0.34	0.34	-0.05	1.66
RD 4 (156)	0.64	-0.05	-0.05	0.10	0.17	0.10	0.49	0.49	0.10	3.49
RD 4 (193)	0.65	-1.59	-1.59	0.10	0.20	-0.69	-0.25	-0.25	-0.69	10.01

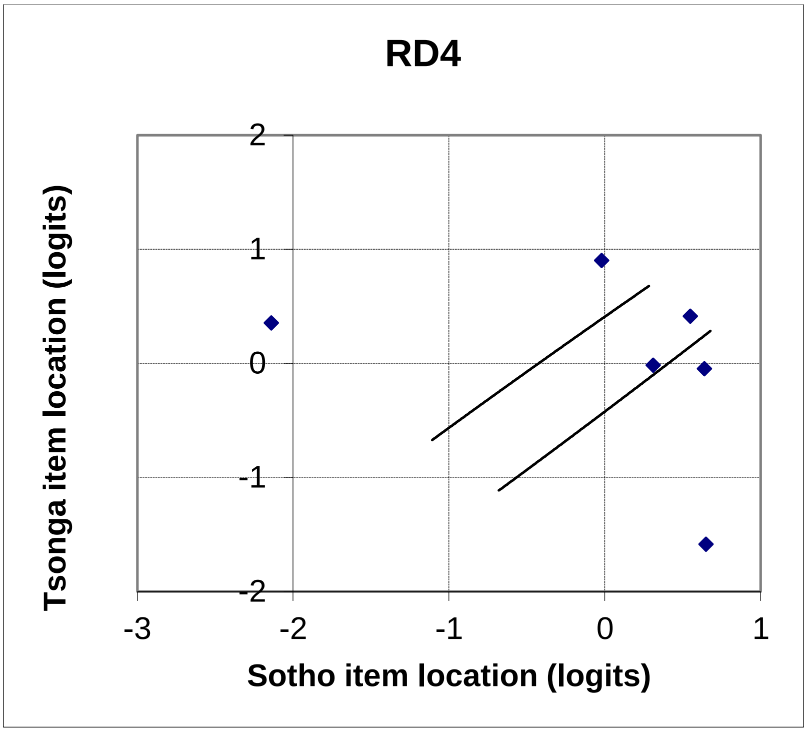

Figure 68: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.3.3.3 Venda Respondents Compared to Sotho Respondents

Table 129 illustrates that the t-values for all the items apart from one, falls within the acceptable t-value range. Item RD 4 (46) (t=-2.04) does not retain the same measurement properties across both ethnic groups, which means that it possesses a significant degree of ethnic bias (Bond & Fox, 2001). Despite the fact that five of the six items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the boundary. According to Bond and Fox (2001) this means that the RD 4 sub-scale does not function invariantly across the two ethnic groups and does possess a considerable degree of ethnic bias.

Table 129: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
RD 4 (14)	-0.02	0.04	0.04	0.10	0.17	-0.19	0.21	0.21	-0.19	-0.31
RD 4 (46)	0.55	0.95	0.95	0.10	0.17	0.55	0.95	0.95	0.55	-2.04
RD 4 (71)	-2.14	-2.56	-2.56	0.13	0.24	-2.62	-2.08	-2.08	-2.62	1.53
RD 4 (131)	0.31	-0.06	-0.06	0.10	0.17	-0.07	0.32	0.32	-0.07	1.87
RD 4 (156)	0.64	0.89	0.89	0.10	0.17	0.57	0.96	0.96	0.57	-1.28
RD 4 (193)	0.65	0.74	0.74	0.10	0.17	0.50	0.89	0.89	0.50	-0.46

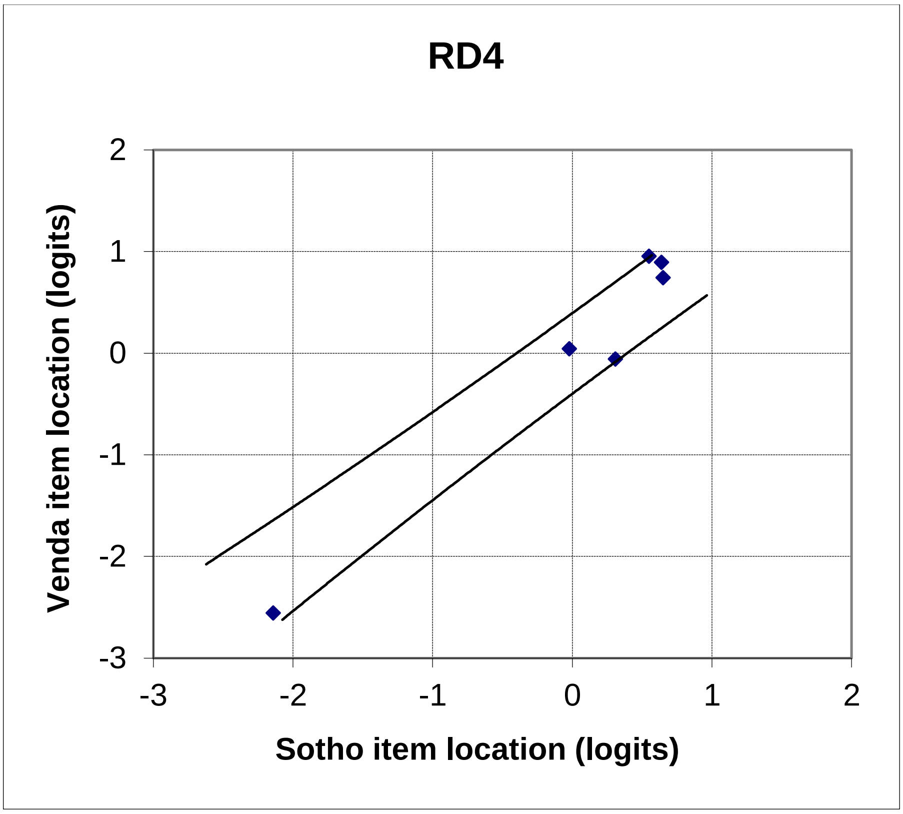

Figure 69: Differential Item Functioning for Venda-Sotho Comparison

4.5.4 Results Illustrating the Degree of Item Invariance in an Ethnic Group Comparisons for the Persistence Scale

4.5.4.1 <u>Nguni Respondents Compared across Sotho Respondents</u>

Table 130 shows that the t-values for two of the eight items on the persistence scale fall outside the critical t-value range. Items PS (166) (t=-3.14) and PS (218) (t=-2.20) do not retain their measurement properties across the two ethnic groups, which points out that they possess a significant degree of ethnic bias (Bond & Fox, 2001). The fact that two of the scale's items are located outside the 95% confidence bands means than more than 5% of the scale's items are located outside the boundary (see Figure 70). This implies that the persistence scale does not function invariantly across the two groups, which indicates a significant degree of ethnic bias (Bond & Fox, 2001).

Table 130: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
PS (11)	1.06	1.17	1.17	0.10	0.21	0.88	1.35	1.35	0.88	-0.47
PS (37)	-0.43	-0.92	-0.92	0.12	0.30	-1.00	-0.35	-0.35	-1.00	1.52
PS (62)	-0.44	-0.92	-0.92	0.12	0.30	-1.00	-0.36	-0.36	-1.00	1.49
PS (103)	-2.11	-2.80	-2.80	0.19	0.60	-3.08	-1.83	-1.83	-3.08	1.10
PS (128)	2.32	2.45	2.45	0.11	0.21	2.15	2.62	2.62	2.15	-0.55
PS (166)	-1.15	-0.25	-0.25	0.14	0.25	-0.99	-0.41	-0.41	-0.99	-3.14
PS (205)	1.22	1.17	1.17	0.10	0.21	0.96	1.43	1.43	0.96	0.21
PS (218)	-0.47	0.10	0.10	0.12	0.23	-0.44	0.07	0.07	-0.44	-2.20

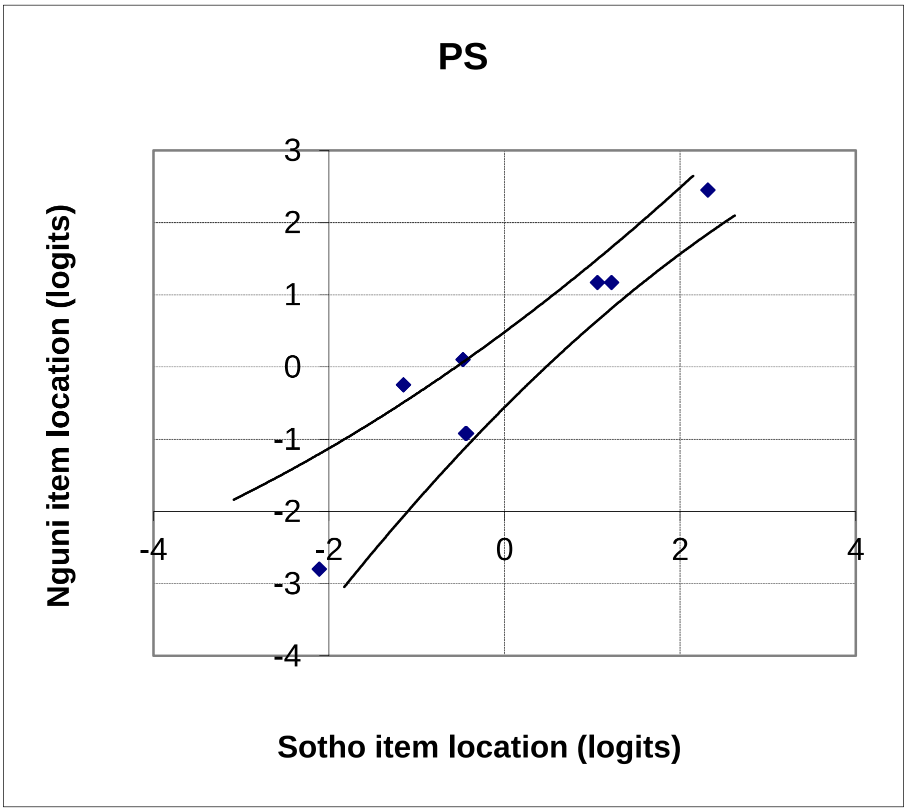

Figure 70: Differential Item Functioning for Nguni-Sotho Comparison

4.5.4.2 <u>Tsonga Respondents Compared to Sotho Respondents</u>

The t-values for all the items of the persistence scales fall within the critical t-value range (see Table 131 and Figure 71), which means that the scale and its items functions invariantly across both Sotho and Tsonga groups. This indicates that the neither the items nor the scale functions in an ethnically biased manner (Bond & Fox, 2001).

Table 131: Tsonga Item Functioning vs. Sotho Item Functioning

Item Name	Sotho measure	Tsonga measure	Tsonga Adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
PS (11)	1.06	0.68	0.68	0.10	0.17	0.67	1.07	1.07	0.67	1.93
PS (37)	-0.43	-0.93	-0.93	0.12	0.23	-0.94	-0.42	-0.42	-0.94	1.93
PS (62)	-0.44	-0.46	-0.46	0.12	0.20	-0.68	-0.22	-0.22	-0.68	0.09
PS (103)	-2.11	-1.76	-1.76	0.19	0.30	-2.29	-1.58	-1.58	-2.29	-0.99
PS (128)	2.32	2.17	2.17	0.11	0.18	2.03	2.46	2.46	2.03	0.71
PS (166)	-1.15	-0.68	-0.68	0.14	0.22	-1.18	-0.65	-0.65	-1.18	-1.80
PS (205)	1.22	1.21	1.21	0.10	0.17	1.02	1.41	1.41	1.02	0.05
PS (218)	-0.47	-0.23	-0.23	0.12	0.19	-0.57	-0.13	-0.13	-0.57	-1.07

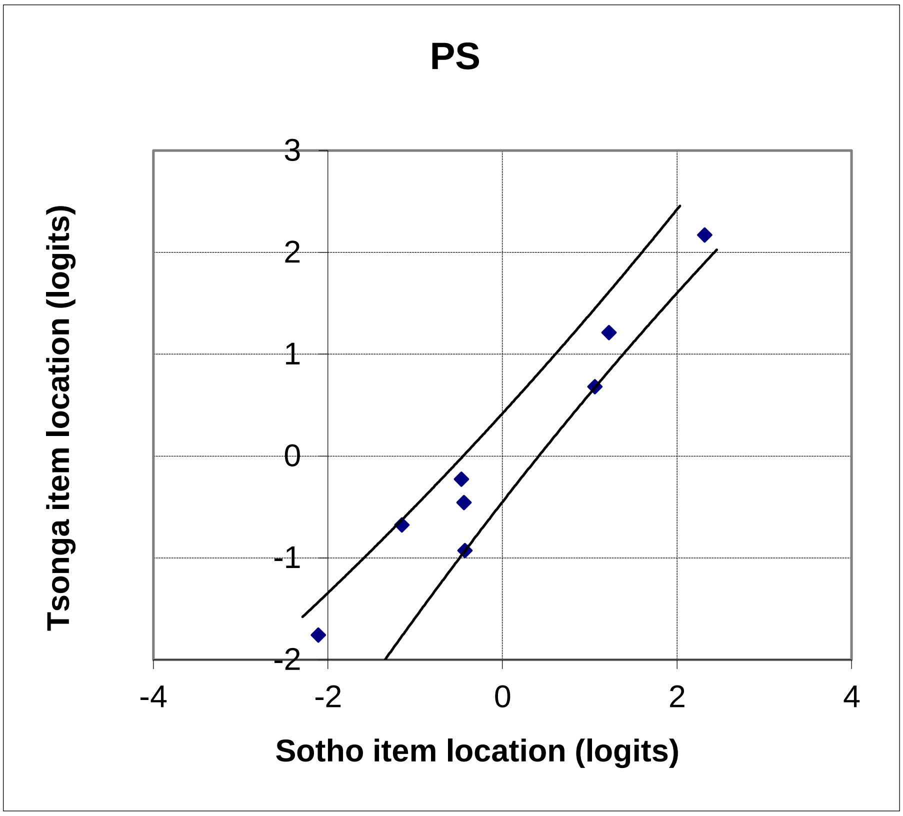

Figure 71: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.4.3 Venda Respondents Compared to Sotho Respondents

The t-values for all the persistence scale's items fall within the acceptable range of t=-1.96/1.96 (see Table 132 and Figure 72). The persistence scale and its items do not show any evidence of ethnic bias, as they function invariantly across both groups (Bond & Fox, 2001).

Table 132: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
PS (11)	1.06	0.68	0.68	0.10	0.17	0.67	1.07	1.07	0.67	1.93
PS (37)	-0.43	-0.93	-0.93	0.12	0.23	-0.94	-0.42	-0.42	-0.94	1.93
PS (62)	-0.44	-0.46	-0.46	0.12	0.20	-0.68	-0.22	-0.22	-0.68	0.09
PS (103)	-2.11	-1.76	-1.76	0.19	0.30	-2.29	-1.58	-1.58	-2.29	-0.99
PS (128)	2.32	2.17	2.17	0.11	0.18	2.03	2.46	2.46	2.03	0.71
PS (166)	-1.15	-0.68	-0.68	0.14	0.22	-1.18	-0.65	-0.65	-1.18	-1.80
PS (205)	1.22	1.21	1.21	0.10	0.17	1.02	1.41	1.41	1.02	0.05
PS (218)	-0.47	-0.23	-0.23	0.12	0.19	-0.57	-0.13	-0.13	-0.57	-1.07

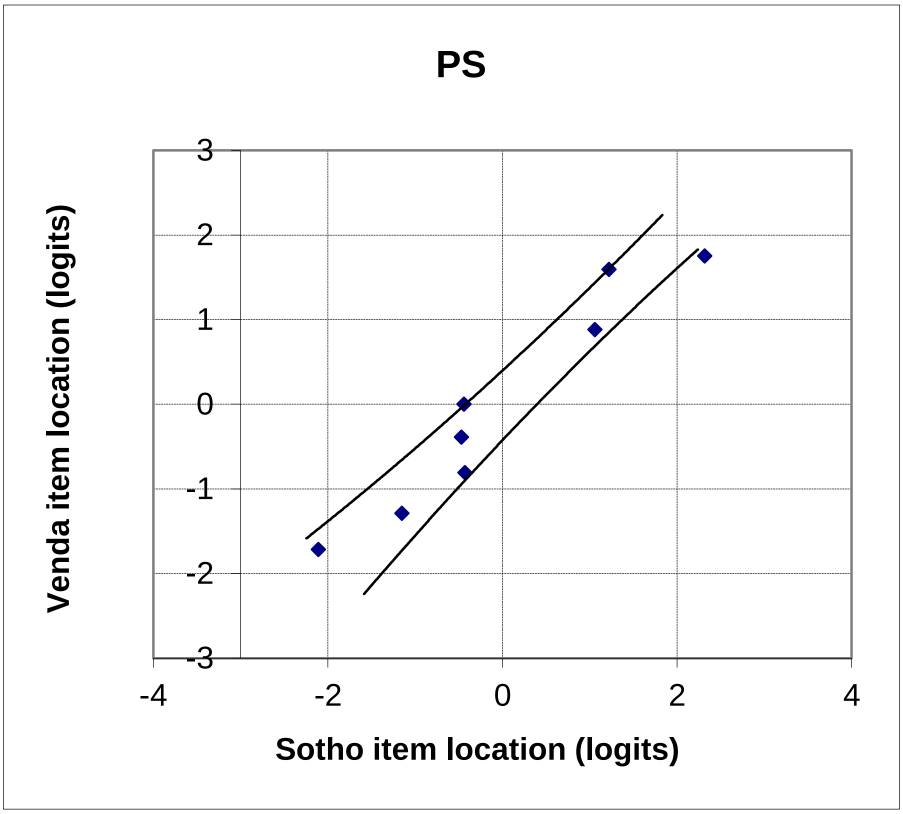

Figure 72: Differential Item Functioning for Venda-Sotho Comparison

4.5.5 Results Illustrating the Degree of Item Invariance in an Ethnic Group Comparisons for the sub-scales of the Primary Self-Directedness Scale

4.5.5.1 SD 1 Item Functioning across Different Ethnic Groups

4.5.5.1.1 Nguni Respondents Compared to Sotho Respondents

Table 133 shows that the t-values for all the scale's items apart from one are located between t=-1.96 and +1.96. Figure 73 also illustrates that one item is located outside the confidence intervals. Item SD 1 (24) (t=-3.16) does not retain its measurement properties across the ethnic groups, which points out that it possesses a considerable degree of ethnic bias (Bond & Fox, 2001). Despite the fact that seven of the eight items are located within the 95% confidence bands, more than 5% of the scale's items are still situated outside the confidence boundaries. According to Bond and Fox (2001) this indicates that the scale's measurement properties differs significantly across the two groups, which implies that the scale possesses a certain degree of ethnic bias.

Table 133: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 1 (4)	0.00	-0.19	-0.19	0.11	0.22	-0.34	0.15	0.15	-0.34	0.77
SD 1 (24)	2.73	3.78	3.78	0.12	0.31	2.92	3.59	3.59	2.92	-3.16
SD 1 (58)	0.08	-0.09	-0.09	0.11	0.22	-0.25	0.24	0.24	-0.25	0.69
SD 1 (86)	-1.12	-1.35	-1.35	0.14	0.30	-1.57	-0.90	-0.90	-1.57	0.69
SD 1 (121)	0.84	0.62	0.62	0.10	0.20	0.51	0.95	0.95	0.51	0.98
SD 1 (151)	-2.47	-2.35	-2.35	0.22	0.43	-2.89	-1.93	-1.93	-2.89	-0.25
SD 1 (169)	0.61	0.70	0.70	0.10	0.20	0.43	0.88	0.88	0.43	-0.41
SD 1 (198)	-0.67	-1.11	-1.11	0.12	0.28	-1.19	-0.58	-0.58	-1.19	1.44

Figure 73: Differential Item Functioning for Nguni-Sotho Comparison

4.5.5.1.2 Tsonga Respondents Compared to Sotho Respondents

Table 134 illustrates that the t-values of two items exceed the critical t-value range (t=+/-1.96). Figure 74 depicts both items, which are located just outside the confidence intervals. Items, SD 1 (24) (t=-2.78) and SD 1 (86) (t=2.08), do not retain their measurement properties across the two ethnic groups. These two items are considered to be biased, as the ethnicity of a respondent determines the way they are measured by the item (Bond & Fox, 2001). Only six of the eight SD 1 items are located inside the 95% confidence bands, which mean that the scale does not function invariantly across the two groups. According to Bond and Fox's (2001) criteria the scale functions in an ethnically biased manner, as a participant's score on the scale will be confounded by their ethnicity.

Table 134: Tsonga Item Functioning vs. Sotho Item Functioning

Item Name	Sotho measure	Tsonga measure	Tsonga Adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
SD 1 (4)	0.00	0.26	0.26	0.11	0.18	-0.08	0.34	0.34	-0.08	-1.24
SD 1 (24)	2.73	3.45	3.45	0.12	0.23	2.83	3.35	3.35	2.83	-2.78
SD 1 (58)	0.08	-0.33	-0.33	0.11	0.20	-0.35	0.10	0.10	-0.35	1.79
SD 1 (86)	-1.12	-1.81	-1.81	0.14	0.30	-1.80	-1.13	-1.13	-1.80	2.08
SD 1 (121)	0.84	0.93	0.93	0.10	0.18	0.68	1.09	1.09	0.68	-0.44
SD 1 (151)	-2.47	-2.10	-2.10	0.22	0.33	-2.68	-1.89	-1.89	-2.68	-0.94
SD 1 (169)	0.61	0.52	0.52	0.10	0.18	0.36	0.77	0.77	0.36	0.43
SD 1 (198)	-0.67	-0.91	-0.91	0.12	0.23	-1.05	-0.53	-0.53	-1.05	0.92

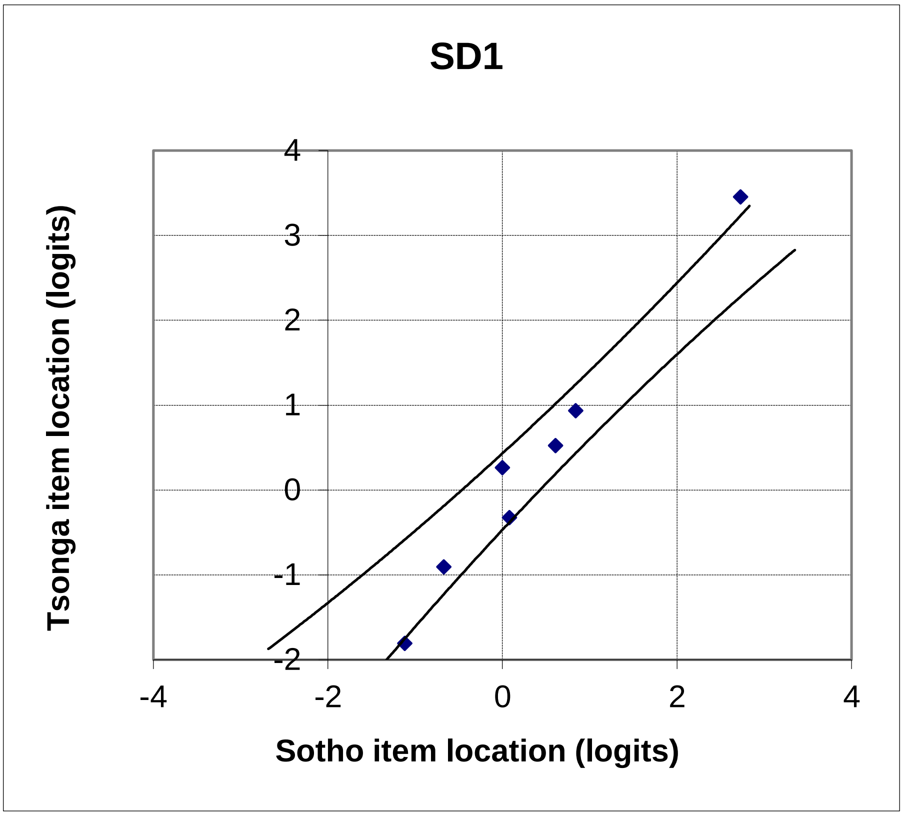

Figure 74: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.5.1.3 <u>Venda Respondents Compared to Sotho Respondents</u>

Table 135 points out that the t-values for all eight SD 1 items fall within the critical t-value range; it is also depicted in Figure 75 that no items are situated outside the confidence intervals. According to Bond and Fox (2001) this means that the SD 1 scale and its items do not function invariantly across the Sotho and Venda groups, which points out that the scale functions in an unbiased manner.

Table 135: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
SD 1 (4)	0.00	0.23	0.23	0.11	0.17	-0.09	0.32	0.32	-0.09	-1.14
SD 1 (24)	2.73	2.95	2.95	0.12	0.20	2.61	3.07	3.07	2.61	-0.95
SD 1 (58)	0.08	0.23	0.23	0.11	0.17	-0.05	0.36	0.36	-0.05	-0.75
SD 1 (86)	-1.12	-1.42	-1.42	0.14	0.25	-1.56	-0.98	-0.98	-1.56	1.04
SD 1 (121)	0.84	0.57	0.57	0.10	0.17	0.51	0.90	0.90	0.51	1.36
SD 1 (151)	-2.47	-2.24	-2.24	0.22	0.34	-2.76	-1.95	-1.95	-2.76	-0.57
SD 1 (169)	0.61	0.49	0.49	0.10	0.17	0.35	0.75	0.75	0.35	0.60
SD 1 (198)	-0.67	-0.80	-0.80	0.12	0.21	-0.98	-0.49	-0.49	-0.98	0.53

Figure 75: Differential Item Functioning for Venda -Sotho Comparison

4.5.5.2 SD 2 Item Functioning across Different Ethnic Groups

4.5.5.2.1 Nguni Respondents Compared to Sotho Respondents

Table 136 shows that the t-values for two of the eight items fall outside the critical t-value range. Figure 76 shows that these two items are located outside just outside the confidence intervals. Items SD 2 (159) (t=-2.80) and SD 2 (9) (t=2.39) do not retain their measurement properties across the two groups, and are therefore considered to be biased as the score of a respondent on the item will to a certain degree be determined by their ethnicity (Bond & Fox, 2001). The fact that more than two of the scale's items are located outside the 95% confidence bands implies that more than 5% of the scale's items are situated outside the critical range. According to Bond and Fox (2001) this indicates that the SD 2 scale does not function invariantly across the two groups, and does possess a considerable degree of ethnic bias.

Table 136: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 2 (9)	2.63	2.06	2.06	0.11	0.21	2.11	2.58	2.58	2.11	2.39
SD 2 (30)	0.98	1.28	1.28	0.12	0.23	0.87	1.39	1.39	0.87	-1.17
SD 2 (59)	-3.19	-2.70	-2.70	0.58	1.01	-4.11	-1.78	-1.78	-4.11	-0.42
SD 2 (105)	1.58	1.69	1.69	0.11	0.22	1.39	1.88	1.88	1.39	-0.46
SD 2 (126)	-0.36	-0.34	-0.34	0.18	0.36	-0.75	0.05	0.05	-0.75	-0.06
SD 2 (159)	1.27	1.97	1.97	0.12	0.22	1.37	1.87	1.87	1.37	-2.80
SD 2 (177)	-0.60	-1.25	-1.25	0.19	0.52	-1.48	-0.37	-0.37	-1.48	1.17
SD 2 (223)	-2.32	-2.70	-2.70	0.39	1.01	-3.59	-1.43	-1.43	-3.59	0.35

Figure 76: Differential Item Functioning for Nguni-Sotho Comparison

4.5.5.2.2 Tsonga Respondents Compared to Sotho Respondents

Table 137 illustrates that the t-value of only one item falls outside the critical t-value range; Figure 77 shows that this item is plotted just outside the confidence intervals. Item SD 2 (30) (t=2.70) does not retain its measurement properties across the two ethnic groups. Bond and Fox (2001) argue that such an item possesses a significant degree of ethnic bias, as its measurement properties are significantly influenced by the ethnicity of the respondent it is measuring. Although seven of the eight SD 2 items are located inside the 95% confidence bands 12% of the scale's items are still located outside the critical range. According to Bond and Fox (2001) this implies that this scale is biased as it does not function invariantly across the two ethnic groups. Consequently differences in a Tsonga and Sotho respondent's scores on this scale cannot necessarily be attributed to inherent differences on the construct, but probably to their ethnicity.

Table 137: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 2 (9)	2.63	2.36	2.36	0.11	0.19	2.28	2.71	2.71	2.28	1.23
SD 2 (30)	0.98	0.23	0.23	0.12	0.25	0.33	0.88	0.88	0.33	2.70
SD 2 (59)	-3.19	-2.10	-2.10	0.58	0.59	-3.47	-1.82	-1.82	-3.47	-1.32
SD 2 (105)	1.58	1.33	1.33	0.11	0.20	1.23	1.68	1.68	1.23	1.10
SD 2 (126)	-0.36	-0.55	-0.55	0.18	0.32	-0.82	-0.09	-0.09	-0.82	0.52
SD 2 (159)	1.27	1.45	1.45	0.12	0.20	1.13	1.59	1.59	1.13	-0.77
SD 2 (177)	-0.60	-1.18	-1.18	0.19	0.40	-1.33	-0.45	-0.45	-1.33	1.31
SD 2 (223)	-2.32	-1.55	-1.55	0.39	0.47	-2.55	-1.32	-1.32	-2.55	-1.26

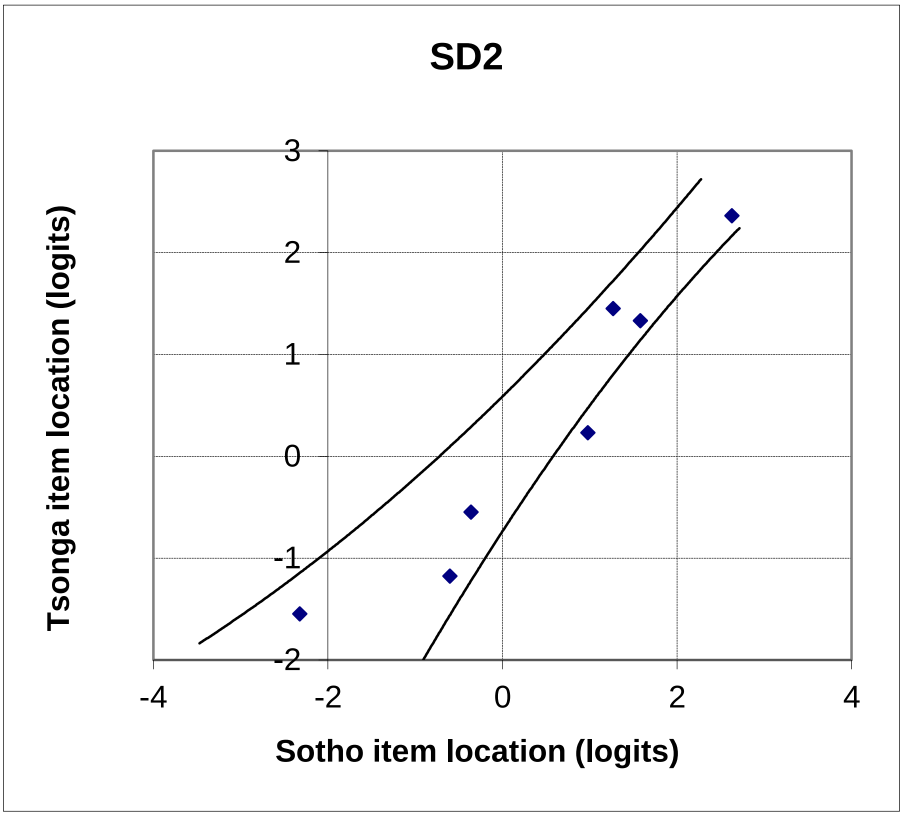

Figure 77: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.5.2.3 Venda Respondents Compared to Sotho Respondents

Table 138 shows that the t-values for all the scale's items except one fall within the critical t-value range (-1.96 and +1.96); Figure 78 shows the location of this item. Item SD 2 (9) (t=3.75) does not retain its measurement properties across both ethnic groups, and therefore functions in an ethnically biased manner. Despite the fact that seven of the eight items are located inside the 95% confidence bands, more than 5% of items are plotted outside. This means that the SD 2 sub-scale does not function invariantly across the two groups, which implies that it does possess a significant degree of ethnic bias (Bond & Fox, 2001).

Table 138: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 2 (9)	2.63	1.87	1.87	0.11	0.17	2.05	2.45	2.45	2.05	3.75
SD 2 (30)	0.98	0.71	0.71	0.12	0.20	0.61	1.08	1.08	0.61	1.16
SD 2 (59)	-3.19	-1.78	-1.78	0.58	0.46	-3.23	-1.74	-1.74	-3.23	-1.90
SD 2 (105)	1.58	1.61	1.61	0.11	0.17	1.39	1.80	1.80	1.39	-0.15
SD 2 (126)	-0.36	-0.55	-0.55	0.18	0.28	-0.79	-0.12	-0.12	-0.79	0.57
SD 2 (159)	1.27	1.42	1.42	0.12	0.18	1.13	1.56	1.56	1.13	-0.69
SD 2 (177)	-0.60	-1.27	-1.27	0.19	0.37	-1.35	-0.52	-0.52	-1.35	1.61
SD 2 (223)	-2.32	-2.02	-2.02	0.39	0.51	-2.81	-1.53	-1.53	-2.81	-0.47

Figure 78: Differential Item Functioning for Venda-Sotho Comparison

4.5.5.3 SD 3 Item Functioning across Different Ethnic Groups

4.5.5.3.1 Nguni Respondents Compared to Sotho Respondents

Table 139 shows that the t-value for only one item exceed the critical t-value range; Figure 79 illustrates that the outlying item is located just outside the confidence intervals. Item SD 3 (40) (t=-2.88) does not retain its measurement properties across both ethnic groups, and is functioning in an ethnically biased manner. Despite the fact that four of the five items are situated inside the 95% confidence bands, more than 5% of the scale's items are located outside the confidence boundaries. This means that the SD 3 sub-scale does not function invariantly across the two groups, and does possess a significant degree of ethnic bias when measuring the SD 3 construct across the two groups (Bond & Fox, 2001).

Table 139: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 3 (40)	-0.08	0.72	0.72	0.14	0.24	0.04	0.60	0.60	0.04	-2.88
SD 3 (106)	-0.77	-1.59	-1.59	0.17	0.41	-1.62	-0.74	-0.74	-1.62	1.85
SD 3 (171)	0.72	1.05	1.05	0.13	0.23	0.62	1.15	1.15	0.62	-1.25
SD 3 (197)	1.95	1.59	1.59	0.13	0.23	1.51	2.03	2.03	1.51	1.36
SD 3 (233)	-1.82	-1.77	-1.77	0.24	0.44	-2.30	-1.29	-1.29	-2.30	-0.10

Figure 79: Differential Item Functioning for Nguni-Sotho Comparison

4.5.5.3.2 Tsonga Respondents Compared to Sotho Respondents

Table 140 illustrates that the t-values for only one of the SD 3 items fall outside the critical t-value range. Figure 80 depicts that item SD 3 (197) (t=2.79) exceeds the critical value of 1.96. This means that this item does not retain its measurement properties across the two ethnic groups. It is argued by Bond and Fox (2001) that this item possesses a significant degree of ethnic bias, as its measurement properties will likely be influenced by the ethnicity of a respondent. Only four of the SD 3 items are plotted inside the 95% confidence bands, which mean that 20% of the scale's items are located outside. This implies that the SD 3 scale is biased as it does not function invariantly across the two ethnic groups (Bond & Fox, 2001).

Table 140: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 3 (40)	-0.08	0.25	0.25	0.14	0.22	-0.17	0.35	0.35	-0.17	-1.27
SD 3 (106)	-0.77	-1.02	-1.02	0.17	0.30	-1.24	-0.55	-0.55	-1.24	0.72
SD 3 (171)	0.72	0.84	0.84	0.13	0.21	0.53	1.03	1.03	0.53	-0.49
SD 3 (197)	1.95	1.26	1.26	0.13	0.21	1.36	1.85	1.85	1.36	2.79
SD 3 (233)	-1.82	-1.32	-1.32	0.24	0.33	-1.98	-1.16	-1.16	-1.98	-1.23

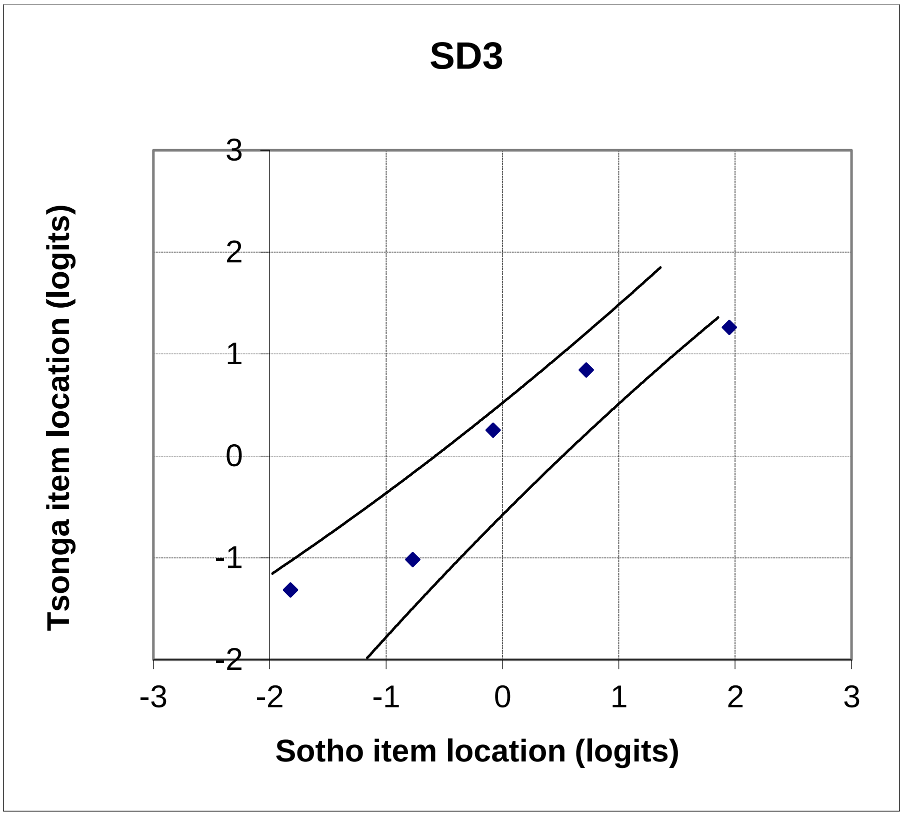

Figure 80: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.5.3.3 <u>Venda Respondents Compared to Sotho Respondents</u>

Table 141 shows that the t-values for all five the SD 3 items fall within the critical t-value range of -1.96 and +1.96; Figure 81 also depicts that no items are located outside the confidence intervals. According to Bond and Fox (2001) this points out that the SD 3 scale and its items functions invariantly across both Sotho and Venda groups, which implies that for this comparison the scale, show no ethnic bias.

Table 141: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 3 (40)	-0.08	0.15	0.15	0.14	0.23	-0.23	0.31	0.31	-0.23	-0.86
SD 3 (106)	-0.77	-0.66	-0.66	0.17	0.27	-1.03	-0.39	-0.39	-1.03	-0.35
SD 3 (171)	0.72	0.35	0.35	0.13	0.22	0.28	0.79	0.79	0.28	1.44
SD 3 (197)	1.95	1.69	1.69	0.13	0.21	1.57	2.07	2.07	1.57	1.04
SD 3 (233)	-1.82	-1.52	-1.52	0.24	0.35	-2.09	-1.24	-1.24	-2.09	-0.71

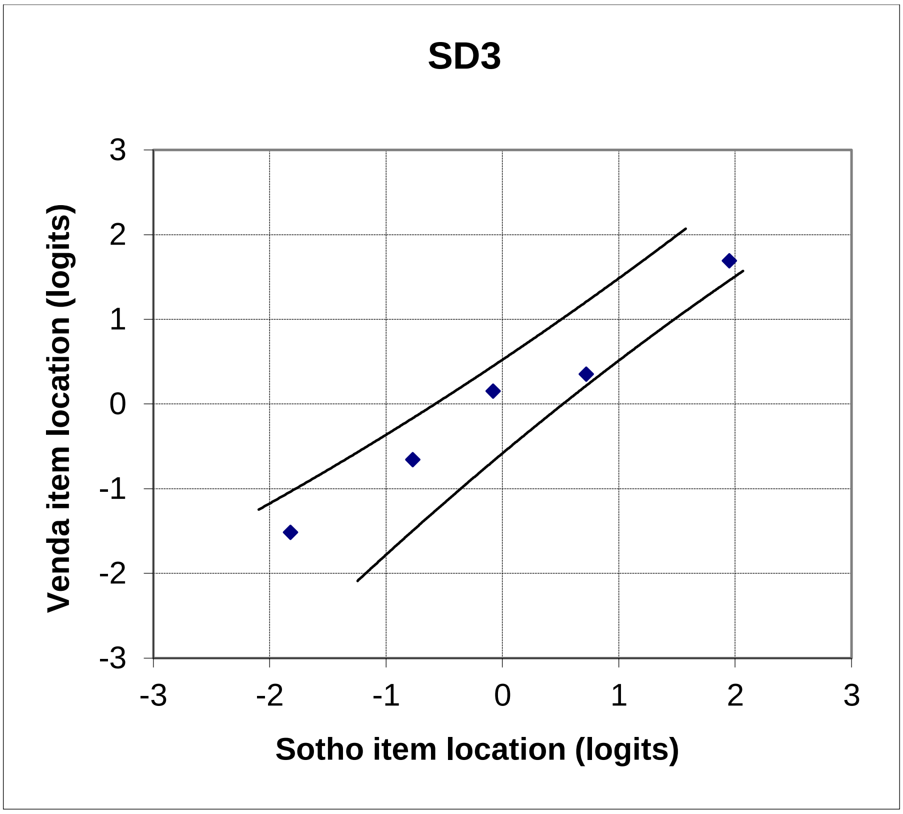

Figure 81: Differential Item Functioning for Venda-Sotho Comparison

4.5.5.4 SD 4 Item Functioning across Different Ethnic Groups

4.5.5.4.1 Nguni Respondents Compared to Sotho Respondents

Table 142 shows that the t-values for two of the SD 4 items are located outside the critical t-value range. Figure 82 shows that SD 4 (94) (t=-2.73) and SD 4 (74) (t=2.28) both exceed the critical range, as they are located outside the confidence intervals. According to Bond and Fox (2001) this means that the items do not retain their measurement properties across the ethnic groups. The fact that more than two of the scale's items are plotted outside the confidence bands also means than more than 5% of the scale's items are located outside the boundary. This implies that the SD 4 sub-scale does function in an ethnically biased manner when measuring the SD 4 construct across the Nguni and Sotho groups.

Table 142: Nguni Item Functioning vs. Sotho Item Functioning

Item Name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 4 (32)	-0.73	-0.50	-0.50	0.10	0.21	-0.85	-0.38	-0.38	-0.85	-0.99
SD 4 (60)	1.01	1.31	1.31	0.10	0.22	0.92	1.40	1.40	0.92	-1.25
SD 4 (74)	0.30	-0.21	-0.21	0.10	0.20	-0.18	0.27	0.27	-0.18	2.28
SD 4 (85)	0.39	0.49	0.49	0.10	0.21	0.21	0.67	0.67	0.21	-0.43
SD 4 (94)	-0.86	-0.25	-0.25	0.10	0.20	-0.78	-0.33	-0.33	-0.78	-2.73
SD 4 (107)	-1.32	-1.74	-1.74	0.11	0.24	-1.79	-1.27	-1.27	-1.79	1.59
SD 4 (136)	-0.67	-0.46	-0.46	0.10	0.21	-0.80	-0.33	-0.33	-0.80	-0.91
SD 4 (150)	0.41	0.28	0.28	0.10	0.20	0.12	0.57	0.57	0.12	0.58
SD 4 (179)	2.61	2.06	2.06	0.15	0.26	2.04	2.64	2.64	2.04	1.83
SD 4 (214)	-0.47	-0.46	-0.46	0.10	0.21	-0.70	-0.23	-0.23	-0.70	-0.05
SD 4 (229)	-0.66	-0.50	-0.50	0.10	0.21	-0.81	-0.35	-0.35	-0.81	-0.69

Figure 82: Differential Item Functioning for Nguni-Sotho Comparison

4.5.5.4.2 Tsonga Respondents Compared to Sotho Respondents

Table 143 shows that the t-values of two items exceed the critical t-value range of +/-1.96; Figure 83 shows the two items which are located just outside the confidence intervals. Item's SD 4 (74) (t=3.66) and SD 4 (107) (t=3.42) do not retain their measurement properties when measuring the construct across the two ethnic groups. These two items are considered to be biased, as the ethnicity of a respondent determines the way a person is measured by the item (Bond & Fox, 2001). The fact that only nine of the eleven SD 4 items are located inside the 95% confidence bands means that more than 5% are situated outside. Hence, the SD 4 sub-scale does not function invariantly across the two ethnic groups, which means that it possesses a significant degree of ethnic bias when measuring the construct across the two groups (Bond & Fox, 2001)

Table 143: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 4 (32)	-0.73	-0.65	-0.65	0.10	0.17	-0.89	-0.49	-0.49	-0.89	-0.40
SD 4 (60)	1.01	0.96	0.96	0.10	0.18	0.78	1.19	1.19	0.78	0.25
SD 4 (74)	0.30	-0.42	-0.42	0.10	0.17	-0.26	0.14	0.14	-0.26	3.66
SD 4 (85)	0.39	0.62	0.62	0.10	0.17	0.31	0.70	0.70	0.31	-1.16
SD 4 (94)	-0.86	-0.51	-0.51	0.10	0.17	-0.88	-0.49	-0.49	-0.88	-1.77
SD 4 (107)	-1.32	-2.16	-2.16	0.11	0.22	-1.99	-1.49	-1.49	-1.99	3.42
SD 4 (136)	-0.67	-0.31	-0.31	0.10	0.17	-0.69	-0.29	-0.29	-0.69	-1.82
SD 4 (150)	0.41	0.42	0.42	0.10	0.17	0.22	0.61	0.61	0.22	-0.05
SD 4 (179)	2.61	2.67	2.67	0.15	0.26	2.34	2.94	2.94	2.34	-0.20
SD 4 (214)	-0.47	-0.20	-0.20	0.10	0.17	-0.53	-0.14	-0.14	-0.53	-1.36
SD 4 (229)	-0.66	-0.42	-0.42	0.10	0.17	-0.74	-0.34	-0.34	-0.74	-1.21

Figure 83: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.5.4.3 Venda Respondents Compared to Sotho Respondents

Table 144 shows that the t-values of four items exceed the critical t-value range (also see Figure 84). Item's SD 4 (107) (t=-3.26), SD 4 (136) (t=-2.84), SD 4 (179) (t=2.64), and SD 4 (229) (t=2.04) do not retain their measurement properties across the two ethnic groups. These items are considered to be biased, as the manner they measure the construct is confounded by the ethnicity of the respondent who is being measured. Four of the scale's eleven items are located outside the 95% confidence bands. This implies that the SD 4 sub-scale does not function invariantly across the two ethnic groups; hence the scale does possess a considerable degree of ethnic bias when assessing the SD 4 construct.

Table 144: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 4 (32)	-0.73	-0.66	-0.66	0.10	0.17	-0.89	-0.50	-0.50	-0.89	-0.36
SD 4 (60)	1.01	1.09	1.09	0.10	0.17	0.85	1.25	1.25	0.85	-0.41
SD 4 (74)	0.30	0.35	0.35	0.10	0.17	0.13	0.52	0.52	0.13	-0.26
SD 4 (85)	0.39	0.38	0.38	0.10	0.17	0.19	0.58	0.58	0.19	0.05
SD 4 (94)	-0.86	-0.88	-0.88	0.10	0.18	-1.08	-0.66	-0.66	-1.08	0.09
SD 4 (107)	-1.32	-0.66	-0.66	0.11	0.17	-1.19	-0.79	-0.79	-1.19	-3.26
SD 4 (136)	-0.67	-0.11	-0.11	0.10	0.17	-0.59	-0.19	-0.19	-0.59	-2.84
SD 4 (150)	0.41	0.19	0.19	0.10	0.17	0.10	0.50	0.50	0.10	1.11
SD 4 (179)	2.61	1.97	1.97	0.15	0.19	2.05	2.53	2.53	2.05	2.64
SD 4 (214)	-0.47	-0.57	-0.57	0.10	0.17	-0.72	-0.32	-0.32	-0.72	0.50
SD 4 (229)	-0.66	-1.08	-1.08	0.10	0.18	-1.08	-0.66	-0.66	-1.08	2.04

Figure 84: Differential Item Functioning for Venda-Sotho Comparison

4.5.5.5 SD 5 Item Functioning across Different Ethnic Groups

4.5.5.5.1 Nguni Respondents Compared to Sotho Respondents

Table 145 show that the t-values for all the SD 5 items fall within the critical t-value range (also see Figure 85). According to Bond and Fox (2001) this means that the SD 5 scale and its items functions invariantly across the Sotho and Nguni groups. Hence the SD 5 and its items scale show no evidence of ethnic bias.

Table 145: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 5 (17)	-1.89	-1.51	-1.51	0.25	0.40	-2.17	-1.23	-1.23	-2.17	-0.81
SD 5 (36)	-0.44	-0.21	-0.21	0.14	0.25	-0.61	-0.04	-0.04	-0.61	-0.80
SD 5 (39)	0.40	0.33	0.33	0.12	0.22	0.11	0.62	0.62	0.11	0.28
SD 5 (90)	-1.57	-2.11	-2.11	0.22	0.51	-2.40	-1.28	-1.28	-2.40	0.97
SD 5 (104)	0.09	-0.48	-0.48	0.12	0.27	-0.49	0.10	0.10	-0.49	1.93
SD 5 (115)	2.37	2.79	2.79	0.10	0.22	2.34	2.82	2.82	2.34	-1.74
SD 5 (135)	0.29	0.56	0.56	0.12	0.21	0.18	0.67	0.67	0.18	-1.12
SD 5 (162)	0.62	0.51	0.51	0.11	0.21	0.33	0.80	0.80	0.33	0.46
SD 5 (184)	2.34	2.28	2.28	0.10	0.20	2.09	2.53	2.53	2.09	0.27
SD 5 (196)	-2.02	-1.87	-1.87	0.26	0.46	-2.47	-1.42	-1.42	-2.47	-0.28
SD 5 (207)	-0.95	-0.80	-0.80	0.17	0.30	-1.22	-0.53	-0.53	-1.22	-0.44
SD 5 (221)	0.76	0.51	0.51	0.11	0.21	0.40	0.87	0.87	0.40	1.05

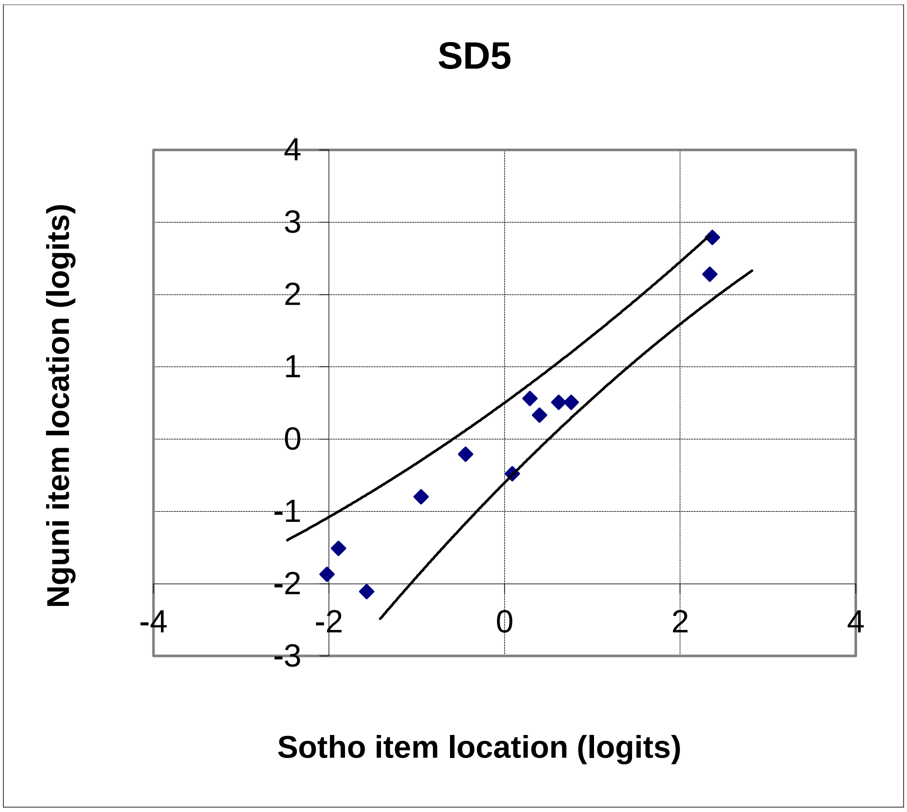

Figure 85: Differential Item Functioning for Nguni-Sotho Comparison

4.5.5.5.2 Tsonga Respondents Compared to Sotho Respondents

Table 146 illustrates that the t-values of two items exceed the critical t-value range. Figure 86 also shows these items, which are located outside the 95% confidence intervals. Items SD 5 (162) (t=3.29) and SD 5 (39) (t=2.35) do not retain their measurement properties across the two ethnic groups. It can be argued that these items possess a significant degree of ethnic bias, as their measurement properties are influenced by the ethnicity of a respondent (Bond & Fox, 2001). Only 83% of items are located inside the 95% confidence bands, which imply that this scale is biased as it does not function invariantly across the two groups.

Table 146: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 5 (17)	-1.89	-1.37	-1.37	0.25	0.32	-2.04	-1.22	-1.22	-2.04	-1.28
SD 5 (36)	-0.44	-0.67	-0.67	0.14	0.25	-0.84	-0.27	-0.27	-0.84	0.80
SD 5 (39)	0.40	-0.19	-0.19	0.12	0.22	-0.15	0.36	0.36	-0.15	2.35
SD 5 (90)	-1.57	-1.47	-1.47	0.22	0.33	-1.92	-1.12	-1.12	-1.92	-0.25
SD 5 (104)	0.09	-0.28	-0.28	0.12	0.22	-0.35	0.16	0.16	-0.35	1.48
SD 5 (115)	2.37	2.61	2.61	0.10	0.18	2.28	2.70	2.70	2.28	-1.17
SD 5 (135)	0.29	0.68	0.68	0.12	0.18	0.27	0.70	0.70	0.27	-1.80
SD 5 (162)	0.62	-0.19	-0.19	0.11	0.22	-0.03	0.46	0.46	-0.03	3.29
SD 5 (184)	2.34	2.64	2.64	0.10	0.18	2.28	2.70	2.70	2.28	-1.46
SD 5 (196)	-2.02	-1.72	-1.72	0.26	0.37	-2.32	-1.42	-1.42	-2.32	-0.66
SD 5 (207)	-0.95	-0.79	-0.79	0.17	0.26	-1.18	-0.56	-0.56	-1.18	-0.52
SD 5 (221)	0.76	0.75	0.75	0.11	0.18	0.54	0.97	0.97	0.54	0.05

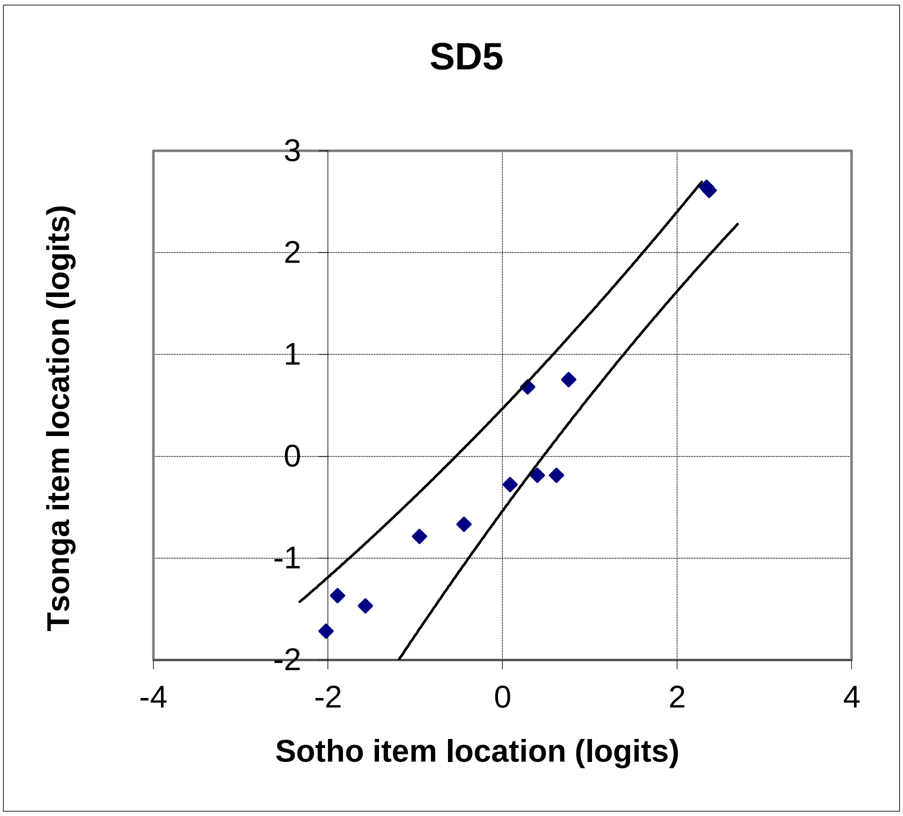

Figure 86: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.5.5.3 Venda Respondents Compared to Sotho Respondents

Table 147 illustrates that the t-values for three of the scale's items exceed the critical t-values of -1.96 and 1.96. Figure 87 shows that these three items are plotted just outside the 95% confidence intervals. Items SD 5 (135) (t=-3.41), SD 5 (184) (t=2.54) and SD 5 (162) (t=2.02) do not retain their measurement properties across the ethnic groups, and consequently possess a significant degree of ethnic bias when assessing the construct (Bond & Fox, 2001). Only 25% of the scale's items are located outside the 95% confidence intervals, which mean that the sub-scale does not function invariantly across the two ethnic groups.

Table 147: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
SD 5 (17)	-1.89	-2.28	-2.28	0.25	0.46	-2.61	-1.56	-1.56	-2.61	0.74
SD 5 (36)	-0.44	-0.04	-0.04	0.14	0.21	-0.49	0.01	0.01	-0.49	-1.58
SD 5 (39)	0.40	0.78	0.78	0.12	0.18	0.37	0.81	0.81	0.37	-1.76
SD 5 (90)	-1.57	-1.32	-1.32	0.22	0.31	-1.83	-1.06	-1.06	-1.83	-0.66
SD 5 (104)	0.09	0.45	0.45	0.12	0.19	0.05	0.49	0.49	0.05	-1.60
SD 5 (115)	2.37	2.41	2.41	0.10	0.17	2.19	2.59	2.59	2.19	-0.20
SD 5 (135)	0.29	1.00	1.00	0.12	0.17	0.44	0.85	0.85	0.44	-3.41
SD 5 (162)	0.62	0.16	0.16	0.11	0.20	0.16	0.62	0.62	0.16	2.02
SD 5 (184)	2.34	1.86	1.86	0.10	0.16	1.91	2.29	2.29	1.91	2.54
SD 5 (196)	-2.02	-2.81	-2.81	0.26	0.59	-3.06	-1.77	-1.77	-3.06	1.23
SD 5 (207)	-0.95	-1.32	-1.32	0.17	0.31	-1.49	-0.78	-0.78	-1.49	1.05
SD 5 (221)	0.76	1.11	1.11	0.11	0.17	0.73	1.14	1.14	0.73	-1.73

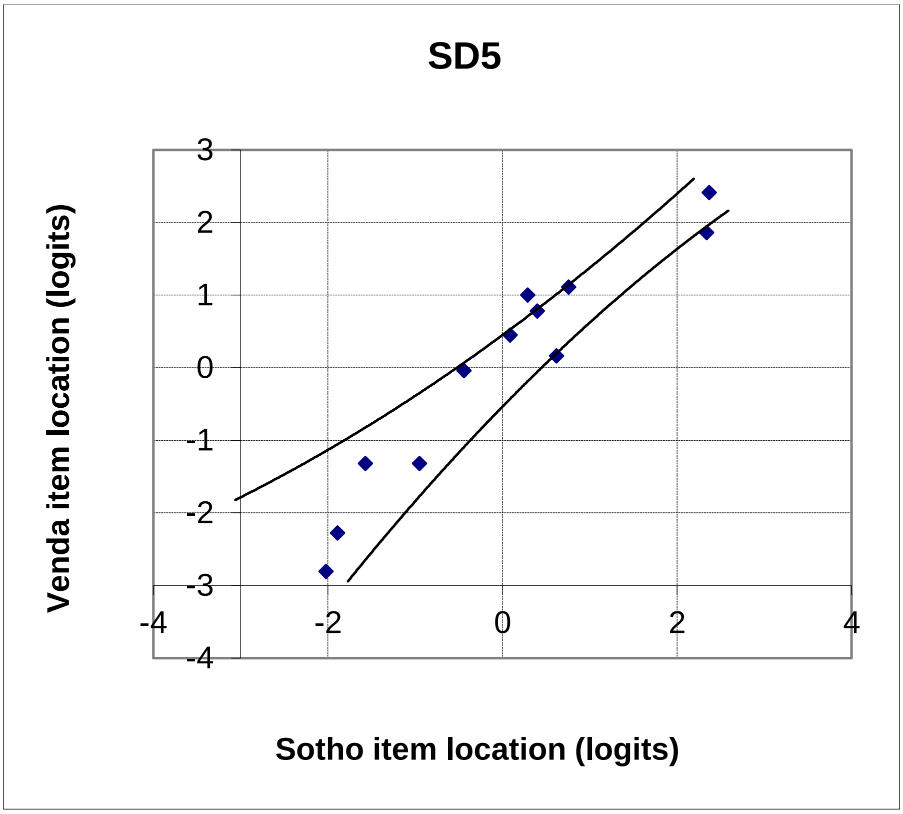

Figure 87: Differential Item Functioning for Venda-Sotho Comparison

4.5.6 Results Illustrating the Degree of Item Invariance in an Ethnic Group Comparisons for the sub-scales of the Primary Cooperativeness Scale

4.5.6.1 <u>C 1 Item Functioning across Different Ethnic Groups</u>

4.5.6.1.1 <u>Nguni Respondents Compared to Sotho Respondents</u>

Table 148 shows that the t-values of five items exceed the critical t-value range. Figure 88 illustrates that items C 1 (5) (t=-14.30), C 1 (89) (t=-6.48), C 1 (234) (t=6.05), C 1(16) (t=-4.74) and C 1 (133) (t=2.82) are located outside the confidence intervals. All these items do not retain their measurement properties within both ethnic groups. According to Bond and Fox (2001) these items possess a considerable degree of ethnic biased, as their functioning is confounded by the ethnic group of the respondent it is assessing. Five of the scale's eight items are located outside the 95% confidence bands, which imply that the C 1 scale does not function invariantly across the two groups (Bond & Fox, 2001).

Table 148: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
C 1 (5)	-0.93	3.45	3.45	0.19	0.24	0.95	1.56	1.56	0.95	-14.30
C 1 (16)	-0.24	1.13	1.13	0.16	0.24	0.16	0.73	0.73	0.16	-4.74
C 1 (48)	1.45	0.96	0.96	0.12	0.24	0.94	1.47	1.47	0.94	1.84
C 1 (89)	-2.61	0.36	0.36	0.37	0.27	-1.58	-0.67	-0.67	-1.58	-6.48
C 1 (122)	0.71	0.12	0.12	0.13	0.29	0.10	0.73	0.73	0.10	1.86
C 1 (133)	0.09	-1.21	-1.21	0.14	0.44	-1.02	-0.10	-0.10	-1.02	2.82
C 1 (172)	-1.46	-1.67	-1.67	0.23	0.53	-2.14	-0.99	-0.99	-2.14	0.37
C 1 (234)	3.00	-3.15	-3.15	0.12	1.01	-1.09	0.94	0.94	-1.09	6.05

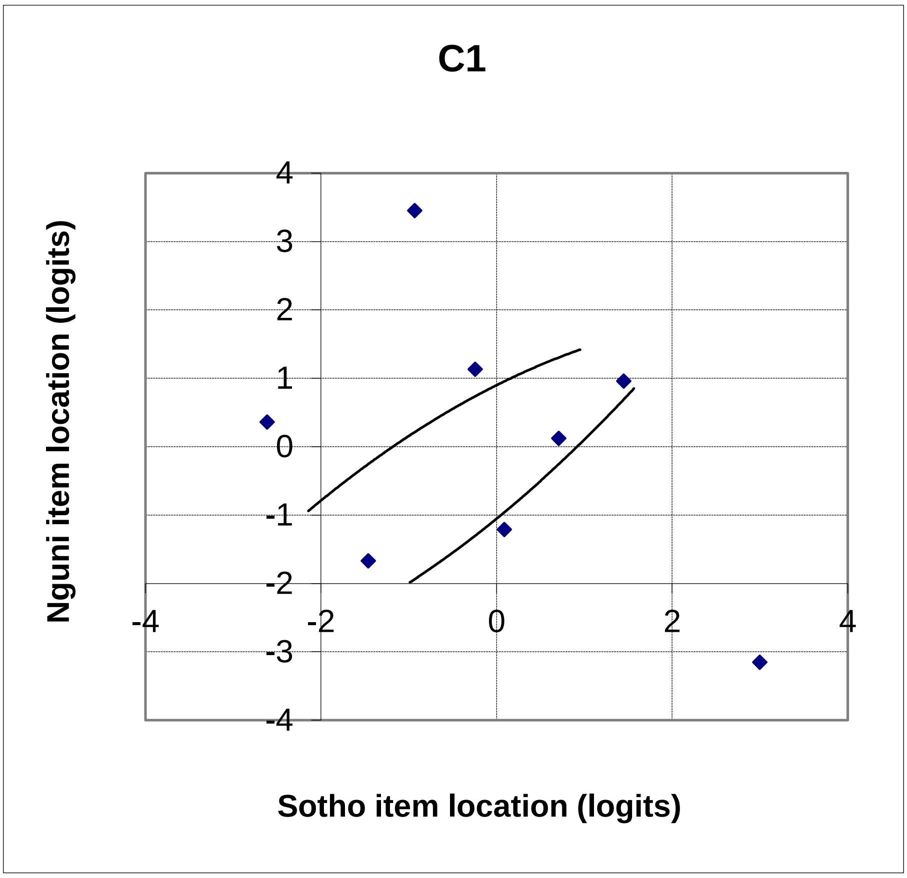

Figure 88: Differential Item Functioning for Nguni-Sotho Comparison

4.5.6.1.2 Tsonga Respondents Compared to Sotho Respondents

Table 149 illustrates that the t-values of two of the eight items exceed the critical t-value range (+/-1.96). Figure 89 show that these items are located just outside the confidence bands. Items C 1 (48) (t=3.27) and C 1 (16) (t=-2.79) do not retain their measurement properties across the two ethnic groups; and are considered to be biased, as the ethnicity of the respondent determines the way they are measured by the item (Bond & Fox, 2001). The fact that only six of the scale's eight items are situated within the 95% confidence bands, mean that 25% of the scale's items are plotted outside. According to Bond and Fox (2001) this indicates that the C1 scale does not function invariantly across the two groups, and does possess a significant degree of ethnic bias.

Table 149: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
C 1 (5)	-0.93	-1.49	-1.49	0.19	0.40	-1.65	-0.77	-0.77	-1.65	1.27
C 1 (16)	-0.24	0.52	0.52	0.16	0.22	-0.13	0.41	0.41	-0.13	-2.79
C 1 (48)	1.45	0.66	0.66	0.12	0.21	0.81	1.30	1.30	0.81	3.27
C 1 (89)	-2.61	-2.41	-2.41	0.37	0.59	-3.21	-1.81	-1.81	-3.21	-0.29
C 1 (122)	0.71	0.83	0.83	0.13	0.21	0.52	1.02	1.02	0.52	-0.48
C 1 (133)	0.09	0.21	0.21	0.14	0.23	-0.12	0.42	0.42	-0.12	-0.44
C 1 (172)	-1.46	-1.66	-1.66	0.23	0.43	-2.05	-1.07	-1.07	-2.05	0.41
C 1 (234)	3.00	3.34	3.34	0.12	0.21	2.93	3.41	3.41	2.93	-1.40

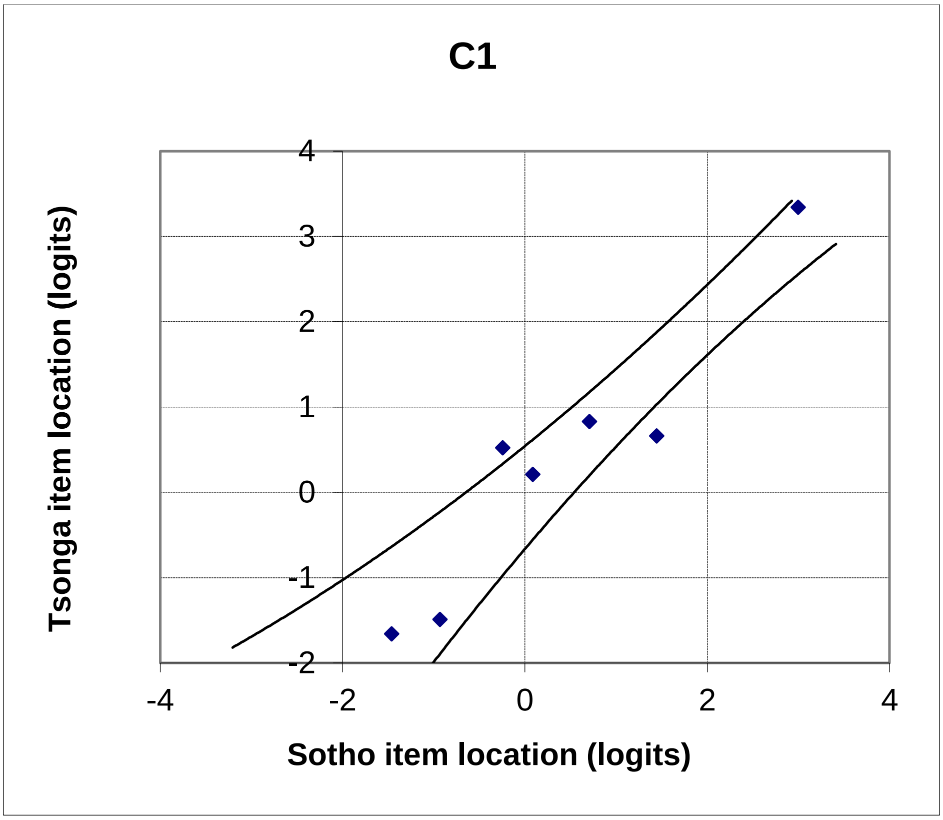

Figure 89: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.6.1.3 Venda Respondents Compared to Sotho Respondents

Table 150 and Figure 90 show that the t-values for all eight the C 1 items fall within the critical t-value range of 1.96 and -1.96. According to Bond and Fox (2001) this means that the C 1 scale and its items functions invariantly across both the Sotho and Venda groups.

Table 150: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
C 1 (5)	-0.93	-1.43	-1.43	0.19	0.39	-1.61	-0.75	-0.75	-1.61	1.15
C 1 (16)	-0.24	-0.14	-0.14	0.16	0.26	-0.50	0.12	0.12	-0.50	-0.33
C 1 (48)	1.45	1.05	1.05	0.12	0.20	1.02	1.48	1.48	1.02	1.71
C 1 (89)	-2.61	-1.78	-1.78	0.37	0.44	-2.77	-1.62	-1.62	-2.77	-1.44
C 1 (122)	0.71	0.75	0.75	0.13	0.21	0.48	0.98	0.98	0.48	-0.16
C 1 (133)	0.09	0.24	0.24	0.14	0.24	-0.11	0.44	0.44	-0.11	-0.54
C 1 (172)	-1.46	-1.59	-1.59	0.23	0.42	-2.00	-1.05	-1.05	-2.00	0.27
C 1 (234)	3.00	2.91	2.91	0.12	0.19	2.73	3.18	3.18	2.73	0.40

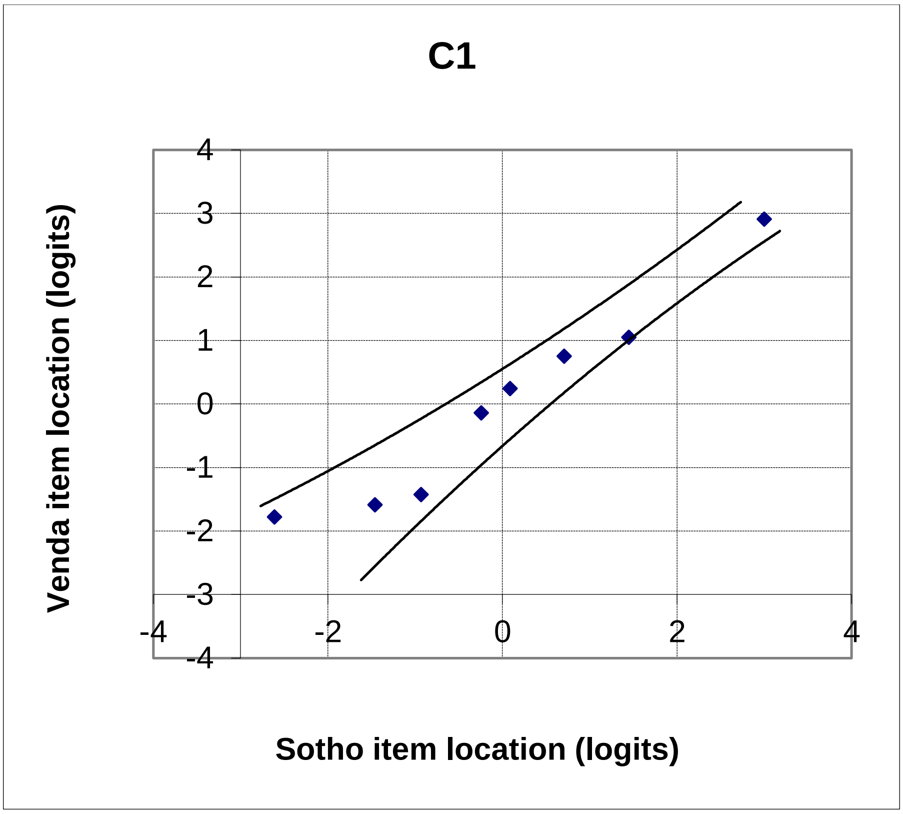

Figure 90: Differential Item Functioning for Venda-Sotho Comparison

4.5.6.2 C 2 Item Functioning across Different Ethnic Groups

4.5.6.2.1 Nguni Respondents Compared to Sotho Respondents

The results in Table 151 show that the t-values for two of the seven items on the C 2 sub-scale falls outside the critical t-value range (also see Figure 91). Items C 2 (137) (t=-2.43) and C 2 (185) (t=2.33) do not retain their measurement properties across the two ethnic groups, and is therefore considered to possess a significant degree of ethnic biased. The fact that more than 5% of the scale's items are plotted outside these boundaries indicates that the C 2 scale does not function invariantly across the two ethnic groups, and does seem to function in an ethnically biased manner (Bond & Fox, 2001).

Table 151: Nguni Item Functioning vs. Sotho Item Functioning

Item Name	Sotho measure	Nguni measure	Nguni Adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
C 2 (25)	-0.59	-0.79	-0.79	0.12	0.26	-0.98	-0.40	-0.40	-0.98	0.70
C 2 (49)	-0.08	-0.29	-0.29	0.11	0.23	-0.44	0.07	0.07	-0.44	0.82
C 2 (73)	-1.57	-1.18	-1.18	0.16	0.30	-1.72	-1.04	-1.04	-1.72	-1.15
C 2 (137)	-0.50	0.11	0.11	0.12	0.22	-0.45	0.06	0.06	-0.45	-2.43
C 2 (161)	-0.80	-0.72	-0.72	0.13	0.26	-1.05	-0.47	-0.47	-1.05	-0.28
C 2 (185)	1.10	0.59	0.59	0.09	0.20	0.63	1.06	1.06	0.63	2.33
C 2 (227)	2.43	2.27	2.27	0.11	0.22	2.10	2.60	2.60	2.10	0.65

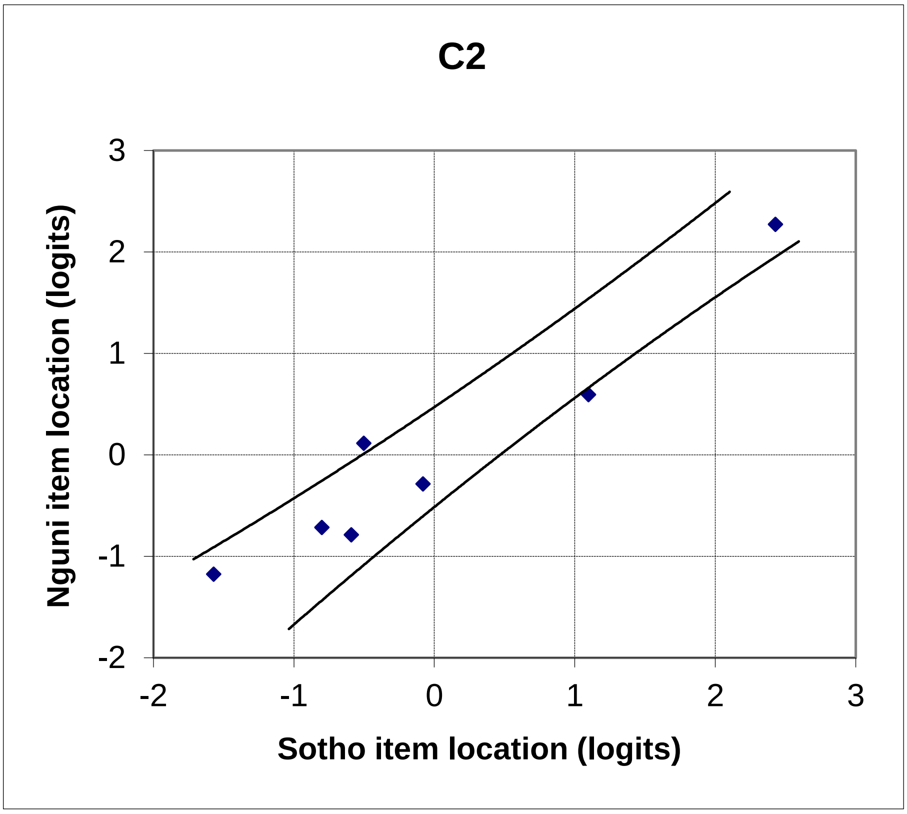

Figure 91: Differential Item Functioning for Nguni-Sotho Comparison

4.5.6.2.2 Tsonga Respondents Compared to Sotho Respondents

Table 152 shows that the t-values for three of the seven C 2 items exceed the critical t-value range. Figure 92 points out that these items are plotted outside the confidence intervals. Items C 2 (137) (t=-6.36), C 2 (49) (t=2.05) and C 2 (25) (t=1.97) do not function invariantly across the Tsonga and Sotho groups, which points out that the functioning of these items are confounded by the ethnicity of the respondent they are assessing. A simple division calculation shows that almost 30% of the scale's items are located outside the confidence bands, which implies means that C 2 sub-scale does possess a considerable degree of ethnic bias, as the scale does not function invariantly across the Tsonga and Sotho groups (Bond & Fox, 2001).

Table 152: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
C 2 (25)	-0.59	-1.14	-1.14	0.12	0.25	-1.14	-0.59	-0.59	-1.14	1.97
C 2 (49)	-0.08	-0.57	-0.57	0.11	0.21	-0.56	-0.09	-0.09	-0.56	2.05
C 2 (73)	-1.57	-1.27	-1.27	0.16	0.26	-1.72	-1.11	-1.11	-1.72	-0.99
C 2 (137)	-0.50	0.82	0.82	0.12	0.17	-0.05	0.37	0.37	-0.05	-6.36
C 2 (161)	-0.80	-1.14	-1.14	0.13	0.25	-1.25	-0.69	-0.69	-1.25	1.20
C 2 (185)	1.10	0.93	0.93	0.09	0.17	0.82	1.21	1.21	0.82	0.87
C 2 (227)	2.43	2.38	2.38	0.11	0.18	2.20	2.62	2.62	2.20	0.22

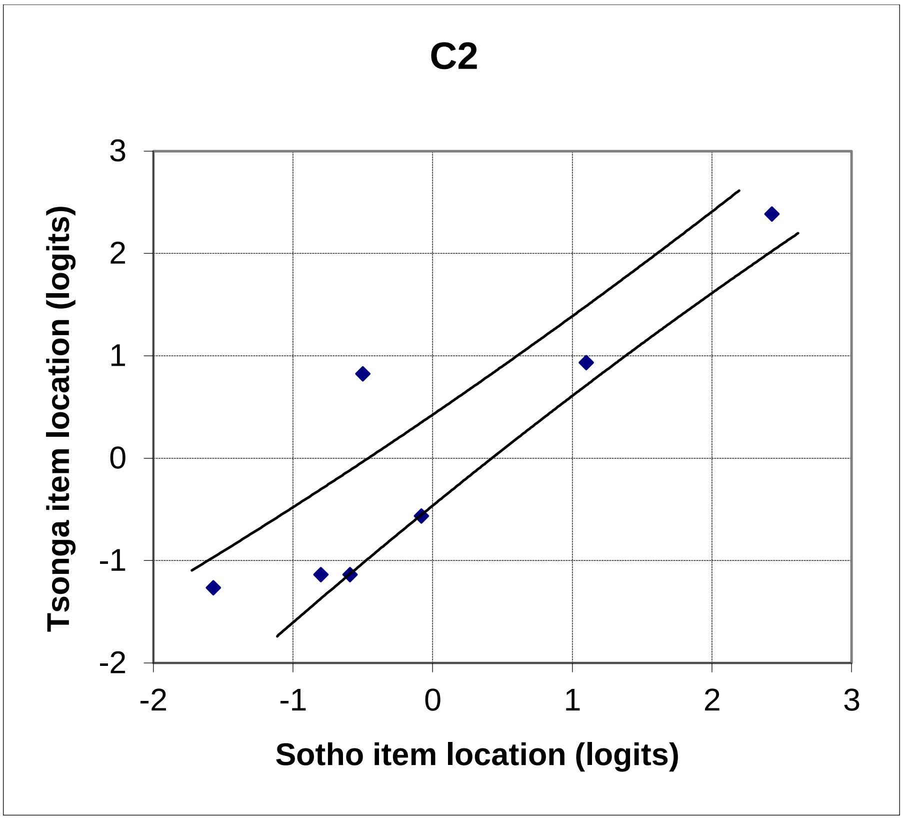

Figure 92: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.6.2.3 Venda Respondents Compared to Sotho Respondents

The results presented in Table 153 points out that the t-values for all the items except one fall within the critical t-value range of -1.96 and +1.96. Figure 93 depicts the outlying item, and shows that it is located just outside the confidence bands. Item C 2 (25) (t=-2.09) does not retain its measurement properties across the ethnic groups, which indicates that it does possess a significant degree of ethnic bias. More than 5% of the scale's items are plotted outside the confidence boundaries, which mean that the C 2 sub-scale does not function invariantly across the two ethnic groups, and consequently functions in a biased manner (Bond & Fox, 2001).

Table 153: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
C 2 (25)	-0.59	-0.14	-0.14	0.12	0.18	-0.58	-0.15	-0.15	-0.58	-2.09
C 2 (49)	-0.08	-0.11	-0.11	0.11	0.18	-0.30	0.12	0.12	-0.30	0.13
C 2 (73)	-1.57	-1.71	-1.71	0.16	0.28	-1.96	-1.32	-1.32	-1.96	0.43
C 2 (137)	-0.50	-0.48	-0.48	0.12	0.19	-0.71	-0.26	-0.26	-0.71	-0.10
C 2 (161)	-0.80	-1.04	-1.04	0.13	0.22	-1.17	-0.66	-0.66	-1.17	0.93
C 2 (185)	1.10	0.93	0.93	0.09	0.16	0.83	1.20	1.20	0.83	0.91
C 2 (227)	2.43	2.56	2.56	0.11	0.18	2.29	2.71	2.71	2.29	-0.63

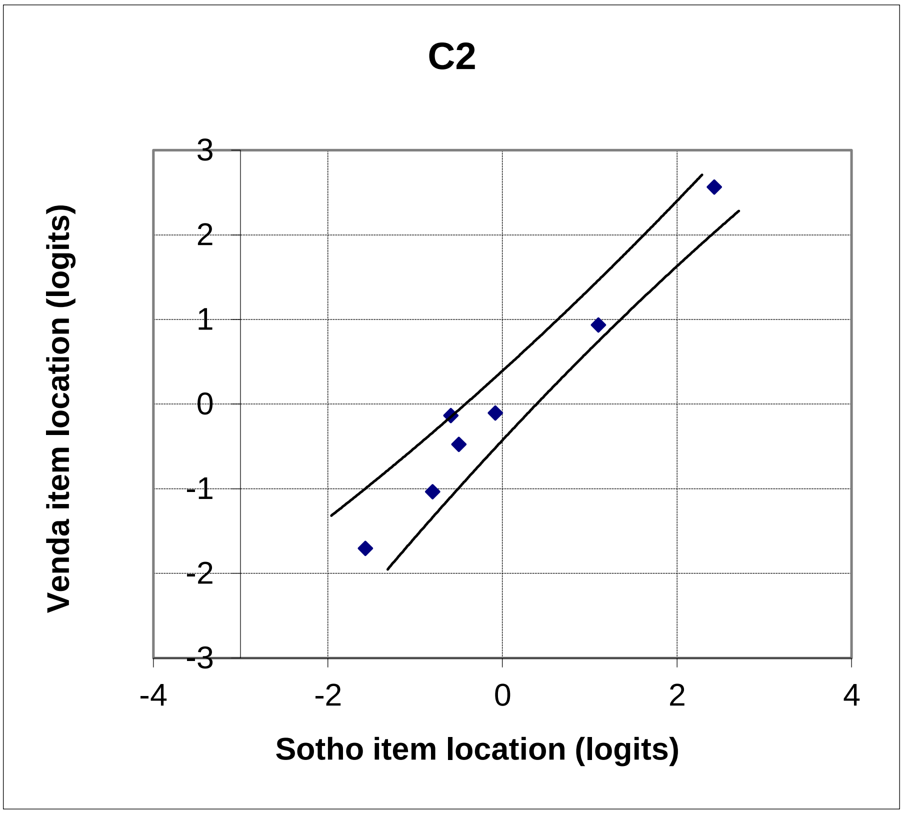

Figure 93: Differential Item Functioning for Venda-Sotho Comparison

4.5.6.3 C 3 Item Functioning across Different Ethnic Groups

4.5.6.3.1 Nguni Respondents Compared to Sotho Respondents

Table 154 shows that the t-values for all the items, apart from one, are located outside the critical t-value range. Items C 3 (64) (t=5.16), C 3 (47) (t=3.15), C 3 (87) (t=2.59), C 3 (216) (t=2.33), C 3 (153) (t=2.29), and C 3 (178) (t=2.07) all exceed the critical t-value range. Figure 94 also shows that the majority of the C 3 items possess some degree of ethnic bias (Bond & Fox, 2001). In this scale's case more than 85% of its items are plotted outside the confidence bands, which imply that the scale's measurement properties fluctuate extremely across the two groups. According to Bond and Fox (2001) this scale possesses a high degree of ethnic bias, when assessing the C 3 construct across the two groups.

Table 154: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
C 3 (47)	3.71	3.18	2.77	0.13	0.27	2.94	3.54	3.54	2.94	3.15
C 3 (64)	-0.08	-1.17	-1.58	0.11	0.27	-1.12	-0.54	-0.54	-1.12	5.16
C 3 (87)	-2.18	-3.41	-3.82	0.21	0.60	-3.64	-2.37	-2.37	-3.64	2.59
C 3 (127)	-2.91	-2.29	-2.70	0.27	0.39	-3.28	-2.33	-2.33	-3.28	-0.43
C 3 (153)	2.92	2.73	2.32	0.11	0.24	2.35	2.88	2.88	2.35	2.29
C 3 (178)	-1.29	-1.59	-2.00	0.15	0.31	-1.99	-1.30	-1.30	-1.99	2.07
C 3 (216)	2.74	2.56	2.15	0.11	0.23	2.19	2.70	2.70	2.19	2.33

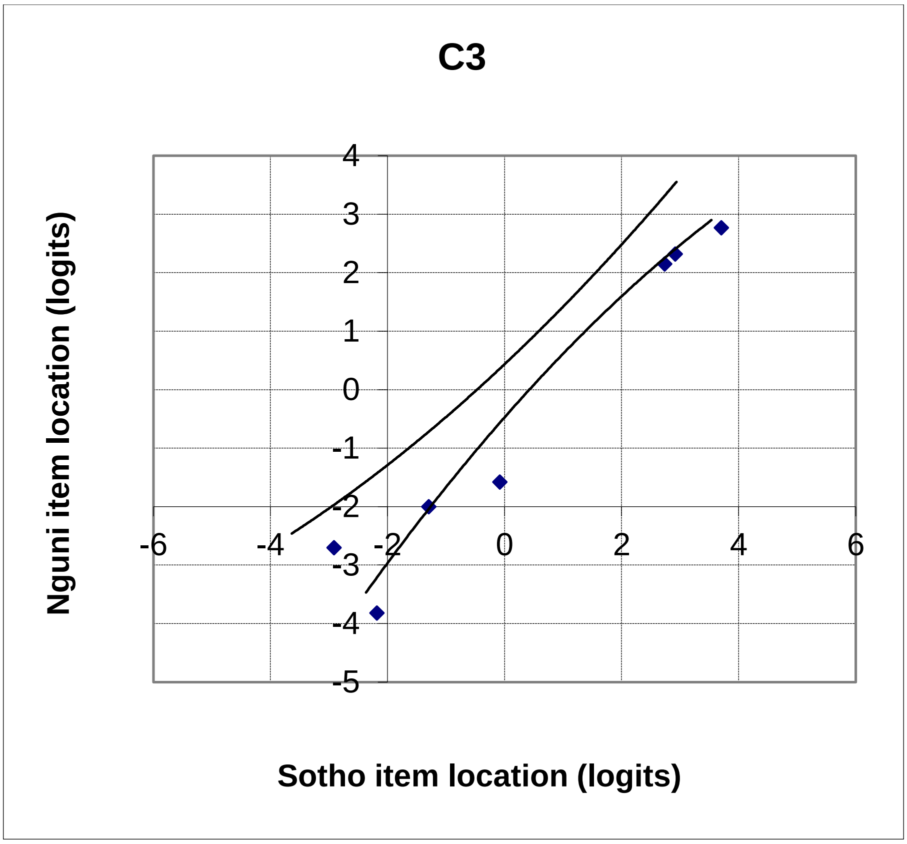

Figure 94: Differential Item Functioning for Nguni-Sotho Comparison

4.5.6.3.2 Tsonga Respondents Compared to Sotho Respondents

Table 155 illustrates that the t-values for only two C 3 items do not fall within the critical t-value range (also see Figure 95). Items C 3 (216) (t=-3.54) and C 3 (87) (t=2.17) do not retain their measurement properties across the ethnic groups. Bond and Fox (2001) argue that these items possess a significant degree of ethnic bias, as their measurement properties differ significantly between the two groups. Only 75% of items are located inside the 95% confidence bands, which imply that this scale possess a significant degree of ethnic bias as it does not function invariantly across the two ethnic groups.

Table 155: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
C 3 (10)	-2.91	-3.39	-3.39	0.27	0.59	-3.80	-2.50	-2.50	-3.80	0.74
C 3 (47)	3.71	3.65	3.65	0.13	0.22	3.42	3.94	3.94	3.42	0.23
C 3 (64)	-0.08	0.20	0.20	0.11	0.19	-0.16	0.28	0.28	-0.16	-1.28
C 3 (87)	-2.18	-3.81	-3.81	0.21	0.72	-3.75	-2.25	-2.25	-3.75	2.17
C 3 (127)	-2.91	-2.47	-2.47	0.27	0.40	-3.17	-2.21	-2.21	-3.17	-0.91
C 3 (153)	2.92	3.01	3.01	0.11	0.19	2.75	3.18	3.18	2.75	-0.41
C 3 (178)	-1.29	-0.80	-0.80	0.15	0.23	-1.32	-0.77	-0.77	-1.32	-1.78
C 3 (216)	2.74	3.61	3.61	0.11	0.22	2.93	3.42	3.42	2.93	-3.54

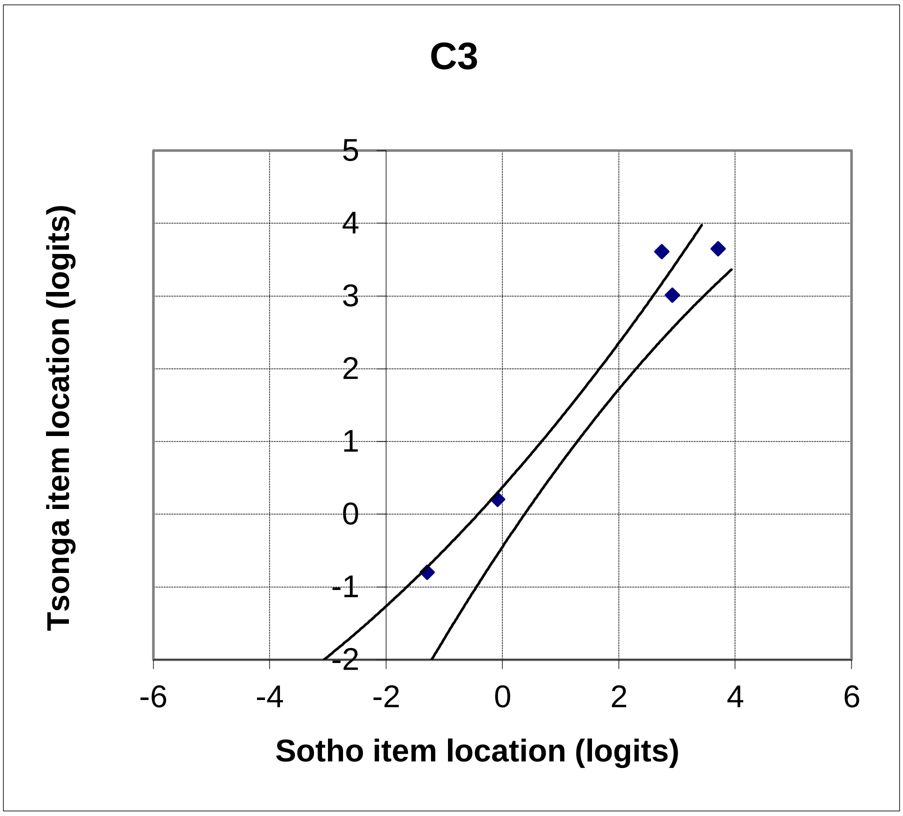

Figure 95: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.6.3.3 Venda Respondents Compared to Sotho Respondents

Table 156 illustrates that the t-value for one item only just exceeds the critical t-value range (also see Figure 96). Item C 3 (64) (t=-2.08) does not retain the same measurement properties in both ethnic groups, which points out that it might possess a significant degree of ethnic bias. Despite the fact that seven of the eight items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the boundary. According to Bond and Fox (2001) this means that the C 3 sub-scale does not function invariantly across the two ethnic groups, which implies that it possesses a considerable degree of ethnic bias.

Table 156: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
C 3 (10)	-2.91	-2.13	-2.13	0.27	0.35	-2.96	-2.08	-2.08	-2.96	-1.76
C 3 (47)	3.71	3.70	3.70	0.13	0.21	3.46	3.95	3.95	3.46	0.05
C 3 (64)	-0.08	0.36	0.36	0.11	0.18	-0.07	0.35	0.35	-0.07	-2.08
C 3 (87)	-2.18	-2.58	-2.58	0.21	0.43	-2.86	-1.90	-1.90	-2.86	0.84
C 3 (127)	-2.91	-3.32	-3.32	0.27	0.59	-3.76	-2.47	-2.47	-3.76	0.63
C 3 (153)	2.92	2.61	2.61	0.11	0.17	2.56	2.97	2.97	2.56	1.54
C 3 (178)	-1.29	-1.23	-1.23	0.15	0.26	-1.56	-0.96	-0.96	-1.56	-0.20
C 3 (216)	2.74	2.58	2.58	0.11	0.17	2.46	2.86	2.86	2.46	0.80

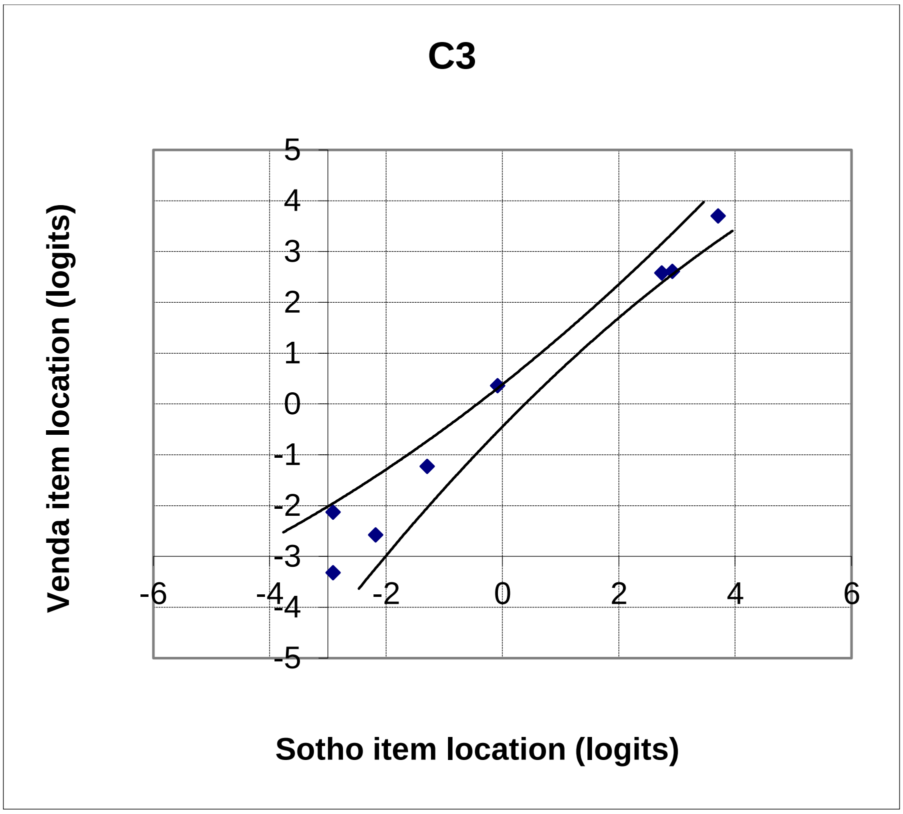

Figure 96: Differential Item Functioning for Venda-Sotho Comparison

4.5.6.4 C 4 Item Functioning across Different Ethnic Groups

4.5.6.4.1 Nguni Respondents Compared to Sotho Respondents

Table 157 illustrates that the t-values for three of the scale's item exceed the critical t-value range. Figure 97 also depicts the three items, which are located outside the confidence bands. Items C 4 (146) (t=2.45), C 4 (33) (t=2.37), and C 4 (199) (t=-2.30) do not retain their measurement properties across the two ethnic groups. These three items possess a significant degree of ethnic bias, as their measurement properties vary significantly depending on the ethnic group which is being measured. Only 70% of the C 4 items are located inside the 95% confidence bands, which imply that the scale is functioning in a biased way when measuring the C 4 construct across the Nguni and Sotho groups (Bond & Fox, 2001).

Table 157: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
C 4 (7)	-1.58	-1.43	-1.43	0.20	0.39	-1.94	-1.07	-1.07	-1.94	-0.34
C 4 (33)	0.36	-0.36	-0.36	0.12	0.28	-0.31	0.30	0.30	-0.31	2.37
C 4 (57)	2.19	2.35	2.35	0.10	0.21	2.04	2.50	2.50	2.04	-0.67
C 4 (78)	-1.25	-1.43	-1.43	0.18	0.39	-1.77	-0.91	-0.91	-1.77	0.43
C 4 (98)	3.82	4.32	4.32	0.13	0.27	3.77	4.37	4.37	3.77	-1.66
C 4 (124)	-0.27	-0.36	-0.36	0.14	0.28	-0.63	0.00	0.00	-0.63	0.30
C 4 (146)	0.11	-0.71	-0.71	0.13	0.31	-0.64	0.03	0.03	-0.64	2.45
C 4 (168)	-0.52	-0.28	-0.28	0.15	0.28	-0.72	-0.08	-0.08	-0.72	-0.75
C 4 (199)	-1.35	-0.53	-0.53	0.19	0.30	-1.30	-0.59	-0.59	-1.30	-2.30
C 4 (222)	-1.50	-1.59	-1.59	0.20	0.41	-2.00	-1.09	-1.09	-2.00	0.20

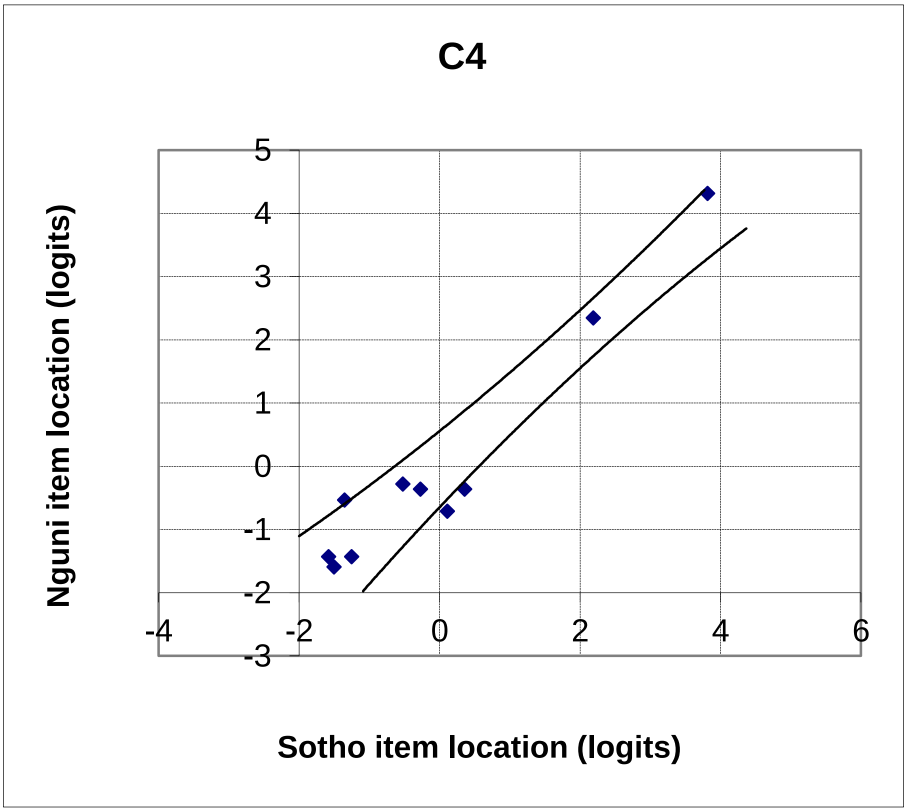

Figure 97: Differential Item Functioning for Nguni-Sotho Comparison

4.5.6.4.2 Tsonga Respondents Compared to Sotho Respondents

Table 158 points out that the t-values for all the C 4 items except one fall within the critical t-value range. Figure 98 depicts that the outlying item is located, just outside the 95% confidence intervals. Item C 4 (57) (t=-2.96) does not retain its measurement properties across the two ethnic groups, and therefore possesses a significant degree of ethnic bias. Only 90% of the scale's items are located inside the confidence intervals. According to Bond and Fox's criteria this implies that the scale possesses a considerable degree of ethnic bias, as it does not function invariantly across the two ethnic groups (Bond & Fox, 2001).

Table 158: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
C 4 (7)	-1.58	-1.30	-1.30	0.20	0.32	-1.82	-1.06	-1.06	-1.82	-0.74
C 4 (33)	0.36	0.12	0.12	0.12	0.22	-0.01	0.49	0.49	-0.01	0.96
C 4 (57)	2.19	2.80	2.80	0.10	0.18	2.29	2.70	2.70	2.29	-2.96
C 4 (78)	-1.25	-1.52	-1.52	0.18	0.34	-1.77	-1.00	-1.00	-1.77	0.70
C 4 (98)	3.82	4.31	4.31	0.13	0.23	3.80	4.33	4.33	3.80	-1.85
C 4 (124)	-0.27	-0.50	-0.50	0.14	0.25	-0.67	-0.10	-0.10	-0.67	0.81
C 4 (146)	0.11	-0.31	-0.31	0.13	0.24	-0.37	0.17	0.17	-0.37	1.54
C 4 (168)	-0.52	-0.85	-0.85	0.15	0.28	-1.00	-0.37	-0.37	-1.00	1.04
C 4 (199)	-1.35	-1.11	-1.11	0.19	0.30	-1.59	-0.88	-0.88	-1.59	-0.67
C 4 (222)	-1.50	-1.64	-1.64	0.20	0.35	-1.97	-1.17	-1.17	-1.97	0.35

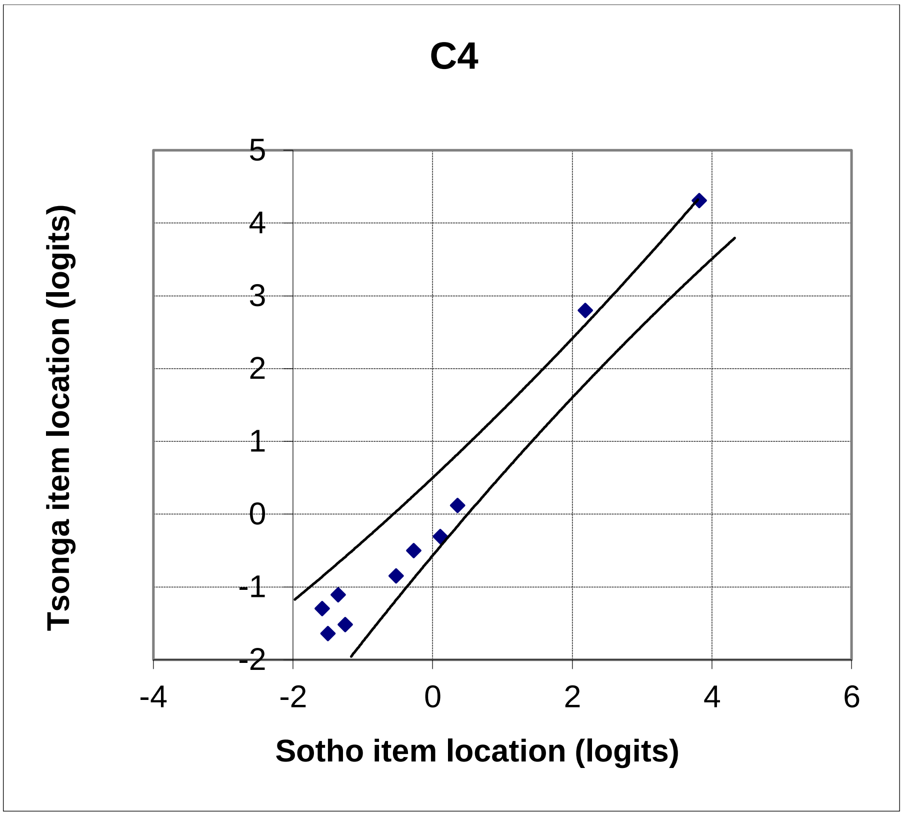

Figure 98: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.6.4.3 <u>Venda Respondents Compared to Sotho Respondents</u>

Table 159 illustrates that the t-values for only two items exceed the critical values of t=-1.96/1.96; Figure 99 shows that these same two items are located just outside the 95% confidence intervals. Items C 4 (222) (t=2.38) and C 4 (199) (t=-2.30) do not retain their measurement properties across the ethnic groups. These two items possess a significant degree of ethnic bias when assessing the C 4 construct (Bond & Fox, 2001). Only 80% of the scale's items are located inside the 95% confidence intervals, which indicate that the C 4 sub-scale possesses a considerable degree of ethnic bias when assessing the construct across the two groups.

Table 159: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
C 4 (7)	-1.58	-1.17	-1.17	0.20	0.31	-1.74	-1.01	-1.01	-1.74	-1.11
C 4 (33)	0.36	-0.06	-0.06	0.12	0.23	-0.11	0.41	0.41	-0.11	1.62
C 4 (57)	2.19	2.23	2.23	0.10	0.17	2.01	2.41	2.41	2.01	-0.20
C 4 (78)	-1.25	-0.83	-0.83	0.18	0.28	-1.37	-0.71	-0.71	-1.37	-1.26
C 4 (98)	3.82	3.57	3.57	0.13	0.19	3.46	3.93	3.93	3.46	1.09
C 4 (124)	-0.27	0.24	0.24	0.14	0.22	-0.28	0.25	0.25	-0.28	-1.96
C 4 (146)	0.11	-0.29	-0.29	0.13	0.24	-0.36	0.18	0.18	-0.36	1.47
C 4 (168)	-0.52	-0.29	-0.29	0.15	0.24	-0.69	-0.12	-0.12	-0.69	-0.81
C 4 (199)	-1.35	-0.61	-0.61	0.19	0.26	-1.30	-0.66	-0.66	-1.30	-2.30
C 4 (222)	-1.50	-2.78	-2.78	0.20	0.50	-2.68	-1.60	-1.60	-2.68	2.38

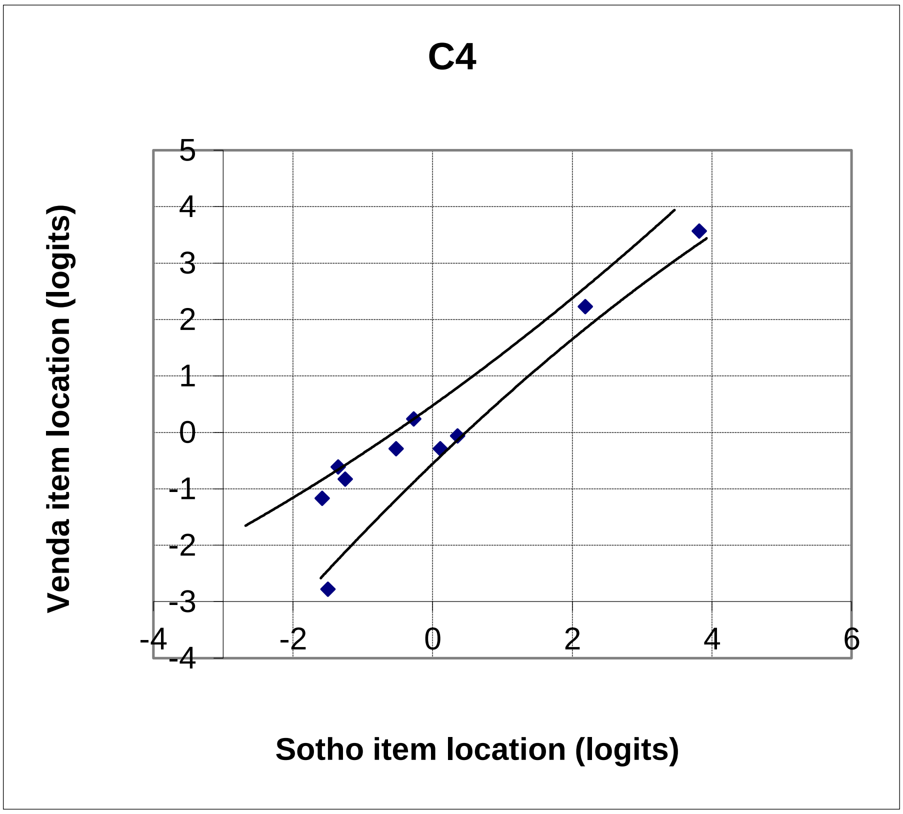

Figure 99: Differential Item Functioning for Venda-Sotho Comparison

4.5.6.5 C 5 Item Functioning across Different Ethnic Groups

4.5.6.5.1 Nguni Respondents Compared to Sotho Respondents

Table 160 shows that the t-value for only one item exceeds t=-1.96 and 1.96 (also see Figure 100). Item C 5 (72) (t=-2.98) does not retain its measurement properties across both ethnic groups, and therefore possesses some degree of ethnic bias. More than 5% of the scale's items are located outside the confidence boundaries, which imply that the scale functions in an ethnically bias manner; as its measurement properties vary significantly when measuring the construct across the two groups (Bond & Fox, 2001).

Table 160: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
C 5 (18)	1.78	2.23	2.23	0.11	0.23	1.75	2.26	2.26	1.75	-1.77
C 5 (50)	-0.60	-0.54	-0.54	0.10	0.21	-0.80	-0.34	-0.34	-0.80	-0.26
C 5 (72)	-0.80	-0.12	-0.12	0.11	0.20	-0.69	-0.23	-0.23	-0.69	-2.98
C 5 (93)	-1.44	-1.73	-1.73	0.13	0.29	-1.90	-1.27	-1.27	-1.90	0.91
C 5 (138)	0.37	0.15	0.15	0.09	0.19	0.05	0.47	0.47	0.05	1.04
C 5 (160)	-0.36	0.00	0.00	0.10	0.20	-0.40	0.04	0.04	-0.40	-1.61
C 5 (186)	-2.68	-3.29	-3.29	0.19	0.53	-3.55	-2.42	-2.42	-3.55	1.08
C 5 (206)	1.86	1.46	1.46	0.11	0.20	1.43	1.89	1.89	1.43	1.75
C 5 (235)	1.86	1.84	1.84	0.11	0.21	1.61	2.09	2.09	1.61	0.08

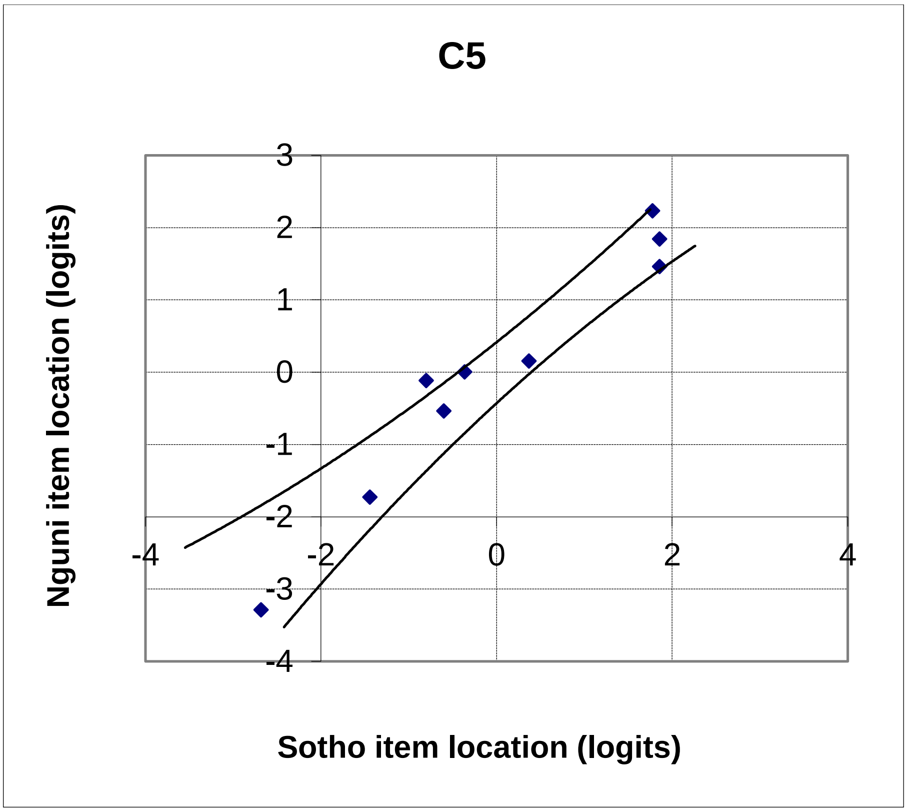

Figure 100: Differential Item Functioning for Nguni-Sotho Comparison

4.5.6.5.2 Tsonga Respondents Compared to Sotho Respondents

Table 161 and Figure 101 point out that the t-values for all nine C 5 items fall within the critical t-value range. According to Bond and Fox (2001) this imply that the C 5 scale and its items functions invariantly across both Sotho and Tsonga groups, and consequently possesses a negligible degree of ethnic bias (if any).

Table 161: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
C 5 (18)	1.78	2.15	2.15	0.11	0.20	1.74	2.19	2.19	1.74	-1.63
C 5 (50)	-0.60	-0.44	-0.44	0.10	0.17	-0.72	-0.32	-0.32	-0.72	-0.82
C 5 (72)	-0.80	-1.17	-1.17	0.11	0.19	-1.20	-0.76	-0.76	-1.20	1.68
C 5 (93)	-1.44	-1.41	-1.41	0.13	0.20	-1.66	-1.19	-1.19	-1.66	-0.13
C 5 (138)	0.37	0.07	0.07	0.09	0.16	0.04	0.40	0.40	0.04	1.63
C 5 (160)	-0.36	-0.14	-0.14	0.10	0.16	-0.44	-0.06	-0.06	-0.44	-1.17
C 5 (186)	-2.68	-2.76	-2.76	0.19	0.32	-3.09	-2.35	-2.35	-3.09	0.21
C 5 (206)	1.86	1.85	1.85	0.11	0.19	1.64	2.08	2.08	1.64	0.04
C 5 (235)	1.86	1.85	1.85	0.11	0.19	1.64	2.08	2.08	1.64	0.04

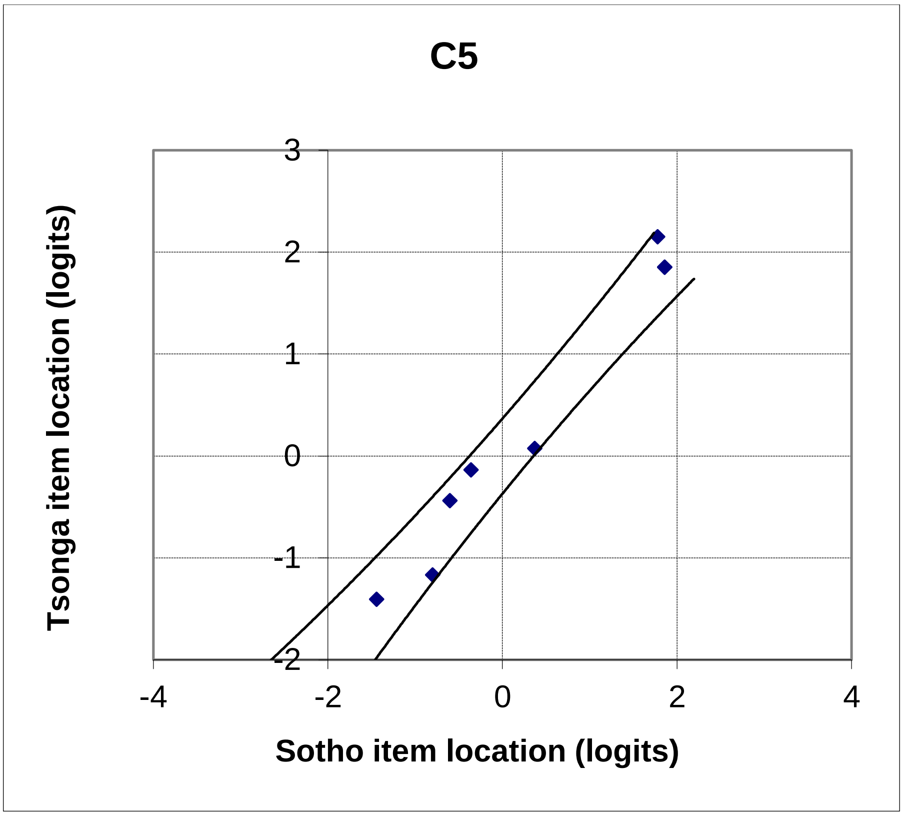

Figure 101: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.6.5.3 Venda Respondents Compared to Sotho Respondents

Table 162 illustrates that the t-values for only three of the scale's items exceed the critical t-value range. Figure 102 shows that these three items are located just outside the 95% confidence intervals. Items C 5 (138) (t=3.06), C 5 (160) (t=-2.29) and C 5 (93) (t=-2.18) do not retain their measurement properties across the ethnic groups, and therefore possess a significant degree of ethnic bias (Bond & Fox, 2001). Only 67% of the scale's items are located inside the 95% confidence intervals, which mean that the C 5 scale functions in an ethnically biased manner (Bond & Fox, 2001).

Table 162: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
C 5 (18)	1.78	1.84	1.84	0.11	0.17	1.61	2.01	2.01	1.61	-0.31
C 5 (50)	-0.60	-0.80	-0.80	0.10	0.18	-0.90	-0.49	-0.49	-0.90	0.96
C 5 (72)	-0.80	-0.48	-0.48	0.11	0.17	-0.84	-0.44	-0.44	-0.84	-1.59
C 5 (93)	-1.44	-0.94	-0.94	0.13	0.19	-1.42	-0.96	-0.96	-1.42	-2.18
C 5 (138)	0.37	-0.22	-0.22	0.09	0.17	-0.12	0.27	0.27	-0.12	3.06
C 5 (160)	-0.36	0.07	0.07	0.10	0.16	-0.33	0.04	0.04	-0.33	-2.29
C 5 (186)	-2.68	-3.35	-3.35	0.19	0.46	-3.51	-2.52	-2.52	-3.51	1.34
C 5 (206)	1.86	1.81	1.81	0.11	0.17	1.63	2.04	2.04	1.63	0.24
C 5 (235)	1.86	2.08	2.08	0.11	0.18	1.76	2.18	2.18	1.76	-1.05

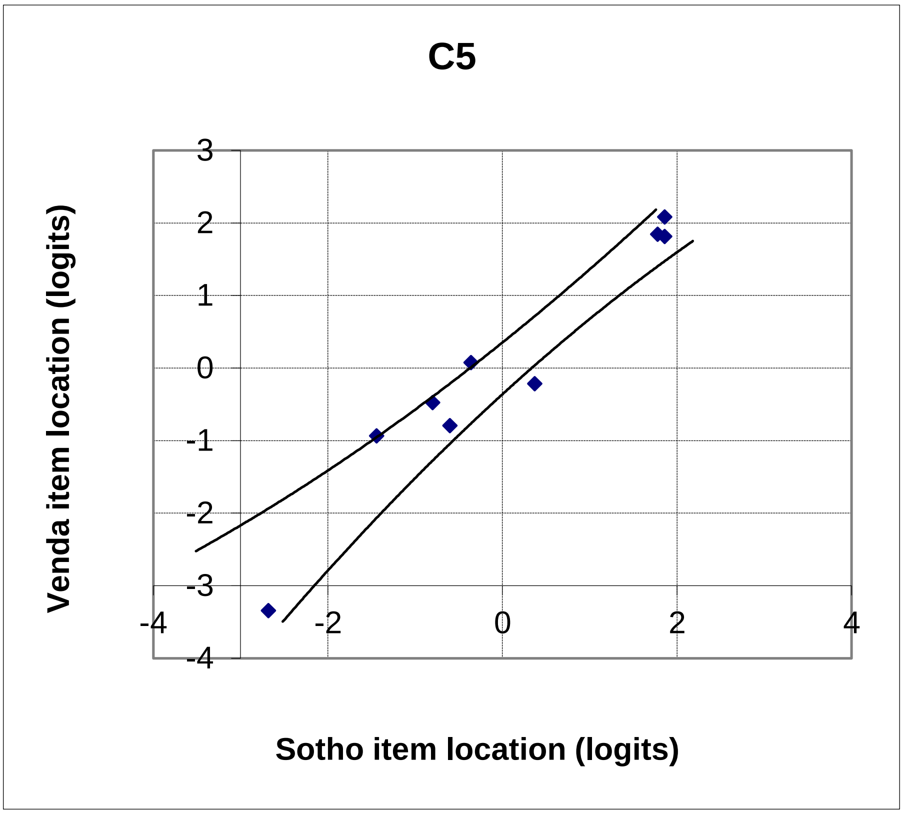

Figure 102: Differential Item Functioning for Venda-Sotho Comparison

4.5.7 Results Illustrating the Degree of Item Invariance in an Ethnic Group Comparisons for the sub-scales of the Primary Self-Transcendence Scale

4.5.7.1 ST 1 Item Functioning across Different Ethnic Groups

4.5.7.1.1 Nguni Respondents Compared to Sotho Respondents

Table 163 illustrates that the t-values for three of the ST 1 scale's items exceed the critical t-value range. Figure 103 depicts these three items and shows that they are located just outside the confidence bands. It is evident from the table and the figure that items ST 3 (228) (t=3.31), ST 1 (8) (t=-2.80), and ST 1 (45) (t=-1.97) do not retain their measurement properties when assessing the construct across the ethnic groups. According to Bond and Fox (2001) these three items possess a significant degree of ethnic bias when assessing the ST 1 construct, as their measurement properties are significantly influenced by the ethnicity of the group which is being measured. Only 73% of the ST 1 items are located inside the 95% confidence bands, which indicate that this sub-scale does not function invariantly across the two ethnic groups. In other words the scale is functioning in an ethnically biased manner, as it has a different effect on an Nguni than on Sotho respondent's scores.

Table 163: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
ST 1 (8)	1.33	2.11	2.11	0.10	0.26	1.44	2.00	2.00	1.44	-2.80
ST 1 (23)	3.54	3.69	3.69	0.17	0.44	3.14	4.09	4.09	3.14	-0.32
ST 1 (45)	0.03	0.47	0.47	0.10	0.20	0.03	0.47	0.47	0.03	-1.97
ST 1 (76)	0.64	0.68	0.68	0.10	0.20	0.44	0.88	0.88	0.44	-0.18
ST 1 (96)	-1.82	-1.75	-1.75	0.13	0.24	-2.06	-1.51	-1.51	-2.06	-0.26
ST 1 (125)	0.93	1.16	1.16	0.10	0.22	0.80	1.29	1.29	0.80	-0.96
ST 1 (152)	0.88	0.64	0.64	0.10	0.20	0.54	0.98	0.98	0.54	1.07
ST 1 (173)	-3.57	-3.96	-3.96	0.25	0.48	-4.31	-3.22	-3.22	-4.31	0.72
ST 1 (195)	-1.66	-1.87	-1.87	0.13	0.25	-2.05	-1.48	-1.48	-2.05	0.74
ST 1 (215)	-1.68	-1.80	-1.80	0.13	0.24	-2.01	-1.47	-1.47	-2.01	0.44
ST 1 (228)	1.38	0.64	0.64	0.10	0.20	0.79	1.23	1.23	0.79	3.31

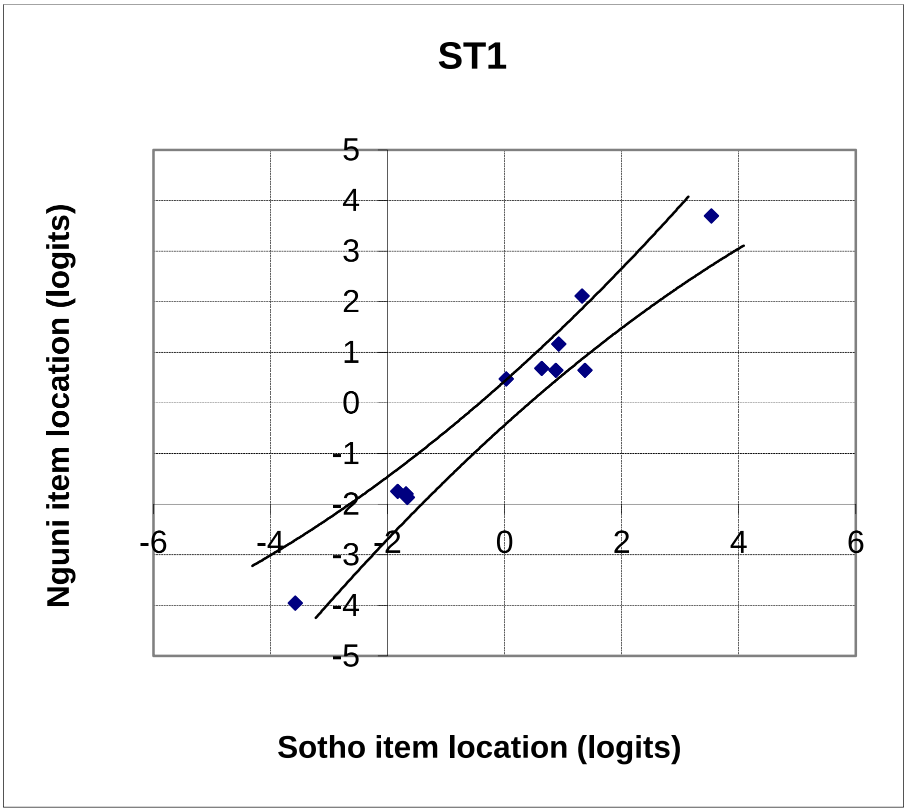

Figure 103: Differential Item Functioning for Nguni-Sotho Comparison

4.5.7.1.2 <u>Tsonga Respondents Compared to Sotho Respondents</u>

Table 164 shows that the t-values for all eleven ST 1 items do not exceed the critical t-value range (also see Figure 104). This indicates that neither the ST 1 scale nor its items functions invariantly in across the Sotho and Tsonga groups, consequently the scale shows no evidence of ethnic bias when measuring the construct across two groups.

Table 164: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
ST 1 (8)	1.33	1.59	1.59	0.10	0.19	1.25	1.68	1.68	1.25	-1.22
ST 1 (23)	3.54	3.53	3.53	0.17	0.34	3.16	3.92	3.92	3.16	0.02
ST 1 (45)	0.03	0.29	0.29	0.10	0.17	-0.04	0.36	0.36	-0.04	-1.32
ST 1 (76)	0.64	0.89	0.89	0.10	0.17	0.57	0.96	0.96	0.57	-1.27
ST 1 (96)	-1.82	-2.29	-2.29	0.13	0.24	-2.33	-1.78	-1.78	-2.33	1.72
ST 1 (125)	0.93	0.92	0.92	0.10	0.17	0.73	1.12	1.12	0.73	0.05
ST 1 (152)	0.88	1.08	1.08	0.10	0.18	0.77	1.19	1.19	0.77	-0.98
ST 1 (173)	-3.57	-3.84	-3.84	0.25	0.39	-4.17	-3.24	-3.24	-4.17	0.58
ST 1 (195)	-1.66	-1.84	-1.84	0.13	0.21	-2.00	-1.50	-1.50	-2.00	0.73
ST 1 (215)	-1.68	-1.63	-1.63	0.13	0.20	-1.89	-1.42	-1.42	-1.89	-0.21
ST 1 (228)	1.38	1.31	1.31	0.10	0.18	1.14	1.55	1.55	1.14	0.34

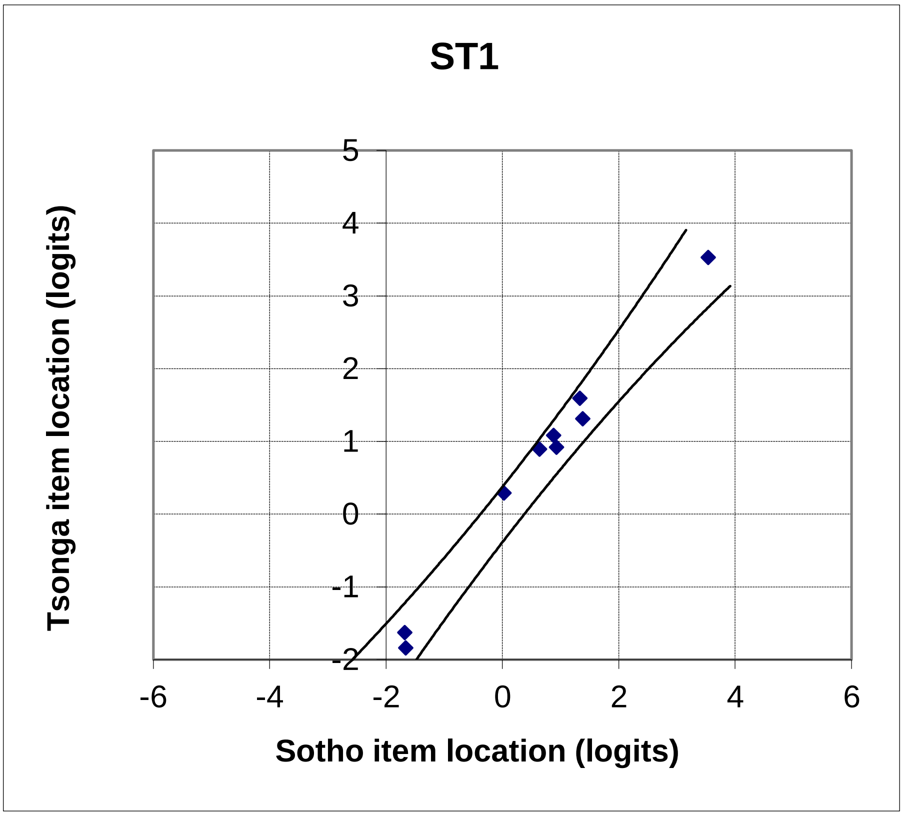

Figure 104: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.7.1.3 <u>Venda Respondents Compared to Sotho Respondents</u>

The results in Table 165 show that the t-values for all the ST 1 items fall within the critical t-value range (also see Figure 105). This means that neither the ST 1 scale nor its items show any evidence of ethnic bias, as they function invariantly irrespective of whether they measure the construct in the Sotho or Venda group.

Table 165: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
ST 1 (8)	1.33	1.04	1.04	0.10	0.17	0.99	1.38	1.38	0.99	1.48
ST 1 (23)	3.54	3.00	3.00	0.17	0.25	2.97	3.57	3.57	2.97	1.79
ST 1 (45)	0.03	0.19	0.19	0.10	0.16	-0.08	0.30	0.30	-0.08	-0.84
ST 1 (76)	0.64	0.47	0.47	0.10	0.16	0.37	0.74	0.74	0.37	0.91
ST 1 (96)	-1.82	-1.55	-1.55	0.13	0.20	-1.92	-1.45	-1.45	-1.92	-1.12
ST 1 (125)	0.93	0.75	0.75	0.10	0.16	0.65	1.03	1.03	0.65	0.96
ST 1 (152)	0.88	0.75	0.75	0.10	0.16	0.63	1.00	1.00	0.63	0.70
ST 1 (173)	-3.57	-3.18	-3.18	0.25	0.33	-3.79	-2.96	-2.96	-3.79	-0.94
ST 1 (195)	-1.66	-1.23	-1.23	0.13	0.18	-1.67	-1.22	-1.22	-1.67	-1.93
ST 1 (215)	-1.68	-1.89	-1.89	0.13	0.21	-2.03	-1.54	-1.54	-2.03	0.86
ST 1 (228)	1.38	1.63	1.63	0.10	0.18	1.30	1.71	1.71	1.30	-1.21

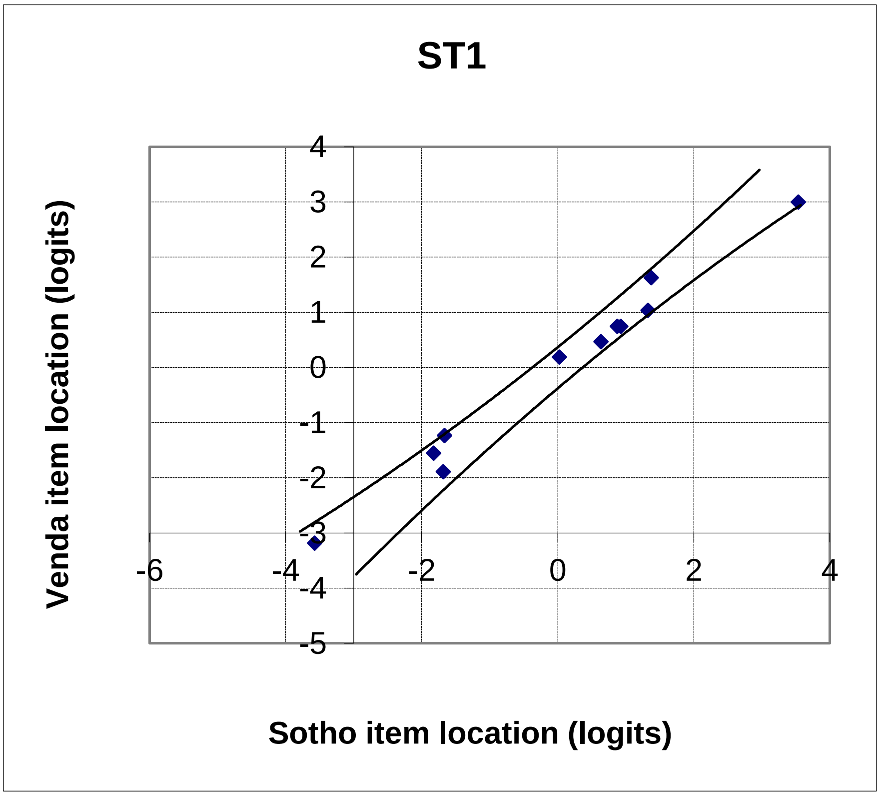

Figure 105: Differential Item Functioning for Venda-Sotho Comparison

4.5.7.2 ST 2 Item Functioning across Different Ethnic Groups

4.5.7.2.1 Nguni Respondents Compared to Sotho Respondents

Table 166 shows that the t-value for only one item exceeds t=-1.96 and 1.96; Figure 106 also shows that this item is located outside the confidence intervals. Item ST 2 (200) (t=-3.60) does not retain its measurement properties across both ethnic groups, which means that it functions in an ethnically biased manner (Bond & Fox, 2001). More than 5% of the scale's items are located outside the confidence boundaries, which mean that the ST 2 sub-scale does not function invariantly across the two groups, and does seem to possess a significant degree of ethnic bias.

Table 166: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
ST 2 (15)	-0.36	-0.45	-0.45	0.14	0.31	-0.75	-0.07	-0.07	-0.75	0.27
ST 2 (31)	0.74	0.76	0.76	0.11	0.24	0.49	1.01	1.01	0.49	-0.07
ST 2 (51)	-0.91	-1.15	-1.15	0.16	0.38	-1.44	-0.62	-0.62	-1.44	0.58
ST 2 (84)	-1.07	-1.01	-1.01	0.17	0.37	-1.45	-0.63	-0.63	-1.45	-0.14
ST 2 (95)	0.34	0.33	0.33	0.12	0.26	0.05	0.62	0.62	0.05	0.04
ST 2 (132)	0.47	0.33	0.33	0.11	0.26	0.12	0.68	0.68	0.12	0.50
ST 2 (163)	-0.12	-0.36	-0.36	0.13	0.30	-0.57	0.09	0.09	-0.57	0.74
ST 2 (200)	0.81	1.73	1.73	0.11	0.23	1.01	1.52	1.52	1.01	-3.60
ST 2 (232)	0.11	-0.18	-0.18	0.12	0.29	-0.35	0.28	0.28	-0.35	0.93

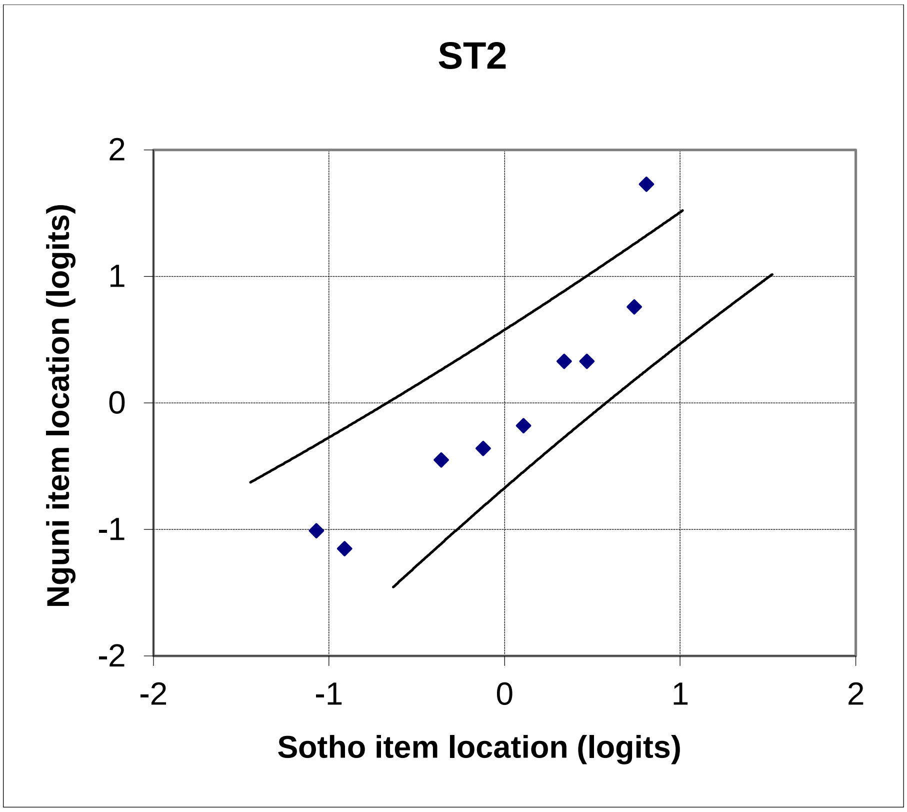

Figure 106: Differential Item Functioning for Nguni-Sotho Comparison

4.5.7.2.2 Tsonga Respondents Compared to Sotho Respondents

Table 167 illustrates that the t-value for one (ST 2-200; t=-2.26) item exceeds the critical t-value range; Figure 107 shows that this item is located just outside the 95% confidence intervals. According to Bond and Fox (2001) this item probably possesses a significant degree of ethnic bias as its measurement properties varies considerably across the two ethnic groups. Only 89% of the scale's items are located inside the confidence intervals, which indicate that the scale functions in an ethnically biased manner.

Table 167: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
ST 2 (15)	-0.36	-0.81	-0.81	0.14	0.27	-0.89	-0.28	-0.28	-0.89	1.49
ST 2 (31)	0.74	1.09	1.09	0.11	0.18	0.70	1.12	1.12	0.70	-1.65
ST 2 (51)	-0.91	-0.74	-0.74	0.16	0.26	-1.13	-0.52	-0.52	-1.13	-0.55
ST 2 (84)	-1.07	-1.56	-1.56	0.17	0.35	-1.71	-0.93	-0.93	-1.71	1.27
ST 2 (95)	0.34	0.49	0.49	0.12	0.20	0.18	0.65	0.65	0.18	-0.63
ST 2 (132)	0.47	0.30	0.30	0.11	0.20	0.16	0.61	0.61	0.16	0.75
ST 2 (163)	-0.12	0.08	0.08	0.13	0.21	-0.27	0.23	0.23	-0.27	-0.80
ST 2 (200)	0.81	1.29	1.29	0.11	0.18	0.84	1.26	1.26	0.84	-2.26
ST 2 (232)	0.11	-0.15	-0.15	0.12	0.22	-0.27	0.23	0.23	-0.27	1.05

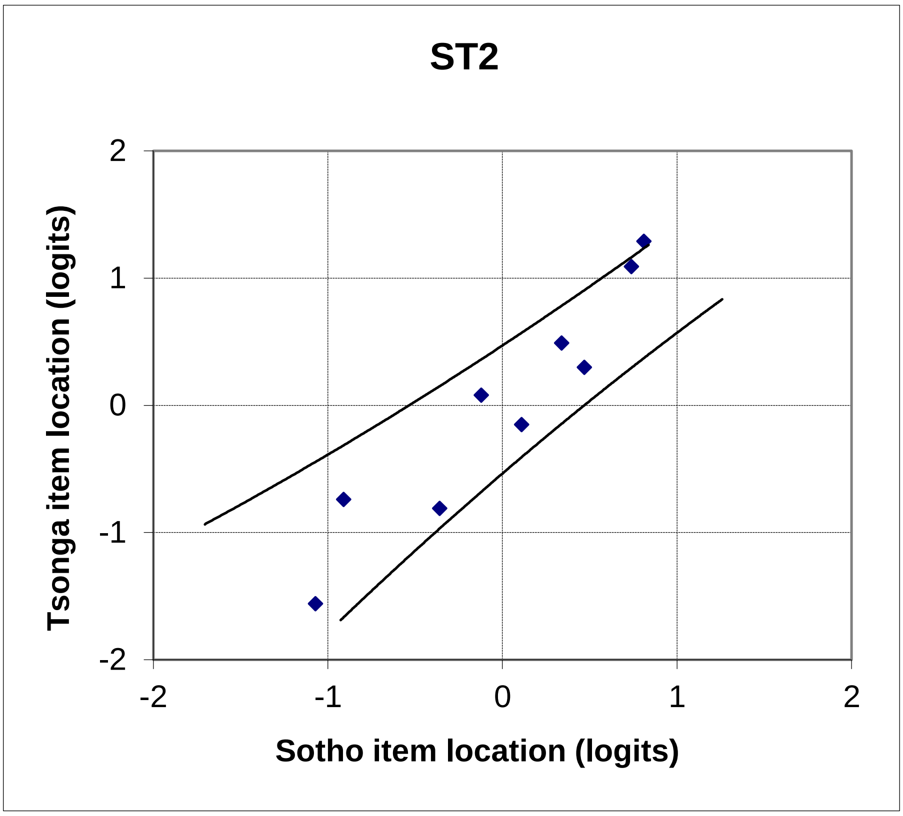

Figure 107: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.7.2.3 Venda Respondents Compared to Sotho Respondents

The results in Table 168 show that the t-values for all nine ST 2 items do not exceed the critical t-value range (also see Figure 108). According to Bond and Fox (2001) this means that the ST 2 scale and its items did not function in an ethnically biased manner as its measurement properties did not vary significantly across the Sotho and Venda groups when measuring the ST 2 construct.

Table 168: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
ST 2 (15)	-0.36	-0.30	-0.30	0.14	0.21	-0.58	-0.08	-0.08	-0.58	-0.23
ST 2 (31)	0.74	0.96	0.96	0.11	0.18	0.64	1.06	1.06	0.64	-1.03
ST 2 (51)	-0.91	-0.95	-0.95	0.16	0.24	-1.22	-0.64	-0.64	-1.22	0.15
ST 2 (84)	-1.07	-1.34	-1.34	0.17	0.27	-1.53	-0.89	-0.89	-1.53	0.85
ST 2 (95)	0.34	0.24	0.24	0.12	0.19	0.06	0.51	0.51	0.06	0.45
ST 2 (132)	0.47	0.31	0.31	0.11	0.19	0.17	0.61	0.61	0.17	0.74
ST 2 (163)	-0.12	0.17	0.17	0.13	0.19	-0.21	0.25	0.25	-0.21	-1.25
ST 2 (200)	0.81	0.77	0.77	0.11	0.18	0.58	1.00	1.00	0.58	0.20
ST 2 (232)	0.11	0.13	0.13	0.12	0.19	-0.11	0.34	0.34	-0.11	-0.08

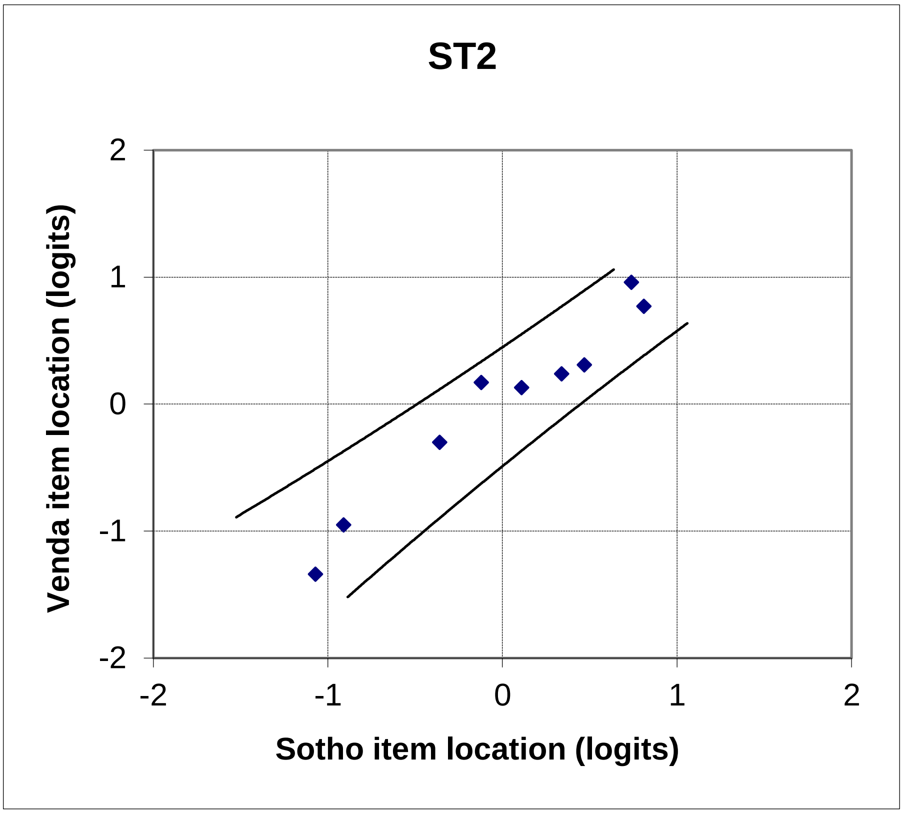

Figure 108: Differential Item Functioning for Venda-Sotho Comparison

4.5.7.3 ST 3 Item Functioning across Different Ethnic Groups

4.5.7.3.1 Nguni Respondents Compared to Sotho Respondents

Table 169 points out that the t-values for two ST 3 items exceed the critical t-value range. Figure 109 illustrates that these two items are located just outside the confidence intervals. Items ST 3 (97) (t=-2.18) and ST 3 (56) (t=2.07) do not retain their measurement properties across the two ethnic groups, and is therefore considered to be biased (Bond & Fox, 2001). The fact that more than 5% of the scale's items are located outside the confidence intervals, indicate that the scale is functioning in an ethnically biased manner when assessing the ST 3 construct.

Table 169: Nguni Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Nguni measure	Nguni adjusted	Sotho error	Nguni error	d-2*esotho	d+2*enguni	d+2*esotho	d-2*enguni	t-value
ST 3 (6)	-0.91	-0.85	-0.85	0.13	0.24	-1.15	-0.61	-0.61	-1.15	-0.21
ST 3 (38)	0.92	1.11	1.11	0.09	0.19	0.80	1.22	1.22	0.80	-0.90
ST 3 (56)	0.15	-0.33	-0.33	0.10	0.21	-0.32	0.14	0.14	-0.32	2.07
ST 3 (77)	-0.22	0.17	0.17	0.11	0.20	-0.25	0.20	0.20	-0.25	-1.70
ST 3 (88)	-3.01	-2.89	-2.89	0.28	0.52	-3.54	-2.36	-2.36	-3.54	-0.20
ST 3 (97)	0.29	0.76	0.76	0.10	0.19	0.31	0.74	0.74	0.31	-2.18
ST 3 (116)	0.17	0.02	0.02	0.10	0.20	-0.13	0.32	0.32	-0.13	0.68
ST 3 (123)	1.11	1.18	1.18	0.09	0.19	0.93	1.35	1.35	0.93	-0.33
ST 3 (145)	1.44	1.29	1.29	0.09	0.19	1.15	1.57	1.57	1.15	0.72
ST 3 (175)	-0.76	-1.17	-1.17	0.12	0.27	-1.26	-0.67	-0.67	-1.26	1.39
ST 3 (194)	-0.63	-0.52	-0.52	0.12	0.22	-0.83	-0.33	-0.33	-0.83	-0.43
ST 3 (208)	-0.28	-0.68	-0.68	0.11	0.23	-0.74	-0.23	-0.23	-0.74	1.57
ST 3 (220)	1.73	1.89	1.89	0.10	0.20	1.59	2.03	2.03	1.59	-0.71

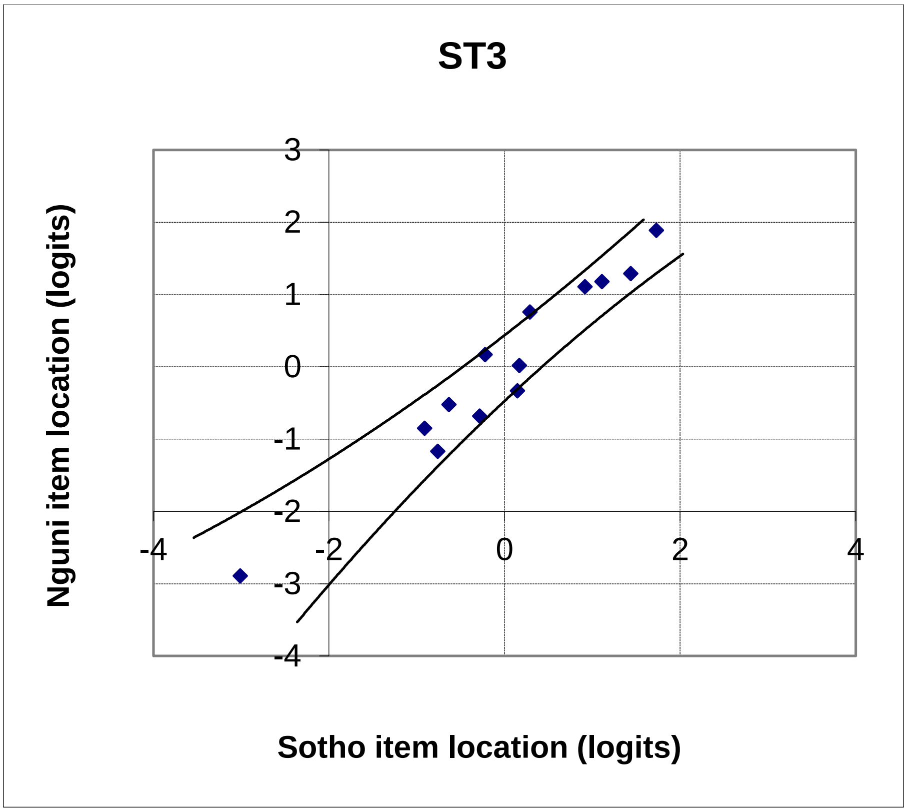

Figure 109: Differential Item Functioning for Nguni-Sotho Comparison

4.5.7.3.2 Tsonga Respondents Compared to Sotho Respondents

Table 170 illustrates that the t-values of five ST 3 items exceed the critical t-value range. Figure 110 shows that the same five items are plotted outside the 95% confidence intervals. Items ST 3 (38) (t=-2.78), ST 3 (145) (t=2.61), ST 3 (123) (t=2.18), ST 3 (175) (t=2.04) and ST 3 (97) (t=-1.96) do not retain their measurement properties across the ethnic groups. According to criteria set out by Bond and Fox (2001) all five these items are considered to possess a significant degree of ethnic bias when assessing the ST 3 construct. Almost 38% of the scale's items are plotted outside the 95% confidence bands, which indicate that the ST 3 scale does not function invariantly across the two groups. In other words the scale has a different effect on Tsonga than on Sotho respondent's scores, which is why this scale is considered to function in an ethnically biased manner (Bond & Fox, 2001).

Table 170: Tsonga Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Tsonga measure	Tsonga adjusted	Sotho error	Tsonga error	d-2*esotho	d+2*etsonga	d+2*esotho	d-2*etsonga	t-value
ST 3 (6)	-0.91	-1.13	-1.13	0.13	0.22	-1.28	-0.76	-0.76	-1.28	0.86
ST 3 (38)	0.92	1.43	1.43	0.09	0.16	0.99	1.36	1.36	0.99	-2.78
ST 3 (56)	0.15	0.44	0.44	0.10	0.16	0.11	0.48	0.48	0.11	-1.54
ST 3 (77)	-0.22	-0.32	-0.32	0.11	0.18	-0.48	-0.06	-0.06	-0.48	0.47
ST 3 (88)	-3.01	-2.81	-2.81	0.28	0.42	-3.41	-2.41	-2.41	-3.41	-0.40
ST 3 (97)	0.29	0.66	0.66	0.10	0.16	0.29	0.66	0.66	0.29	-1.96
ST 3 (116)	0.17	0.34	0.34	0.10	0.16	0.07	0.44	0.44	0.07	-0.90
ST 3 (123)	1.11	0.71	0.71	0.09	0.16	0.73	1.09	1.09	0.73	2.18
ST 3 (145)	1.44	0.96	0.96	0.09	0.16	1.02	1.38	1.38	1.02	2.61
ST 3 (175)	-0.76	-1.29	-1.29	0.12	0.23	-1.28	-0.77	-0.77	-1.28	2.04
ST 3 (194)	-0.63	-0.59	-0.59	0.12	0.19	-0.83	-0.39	-0.39	-0.83	-0.18
ST 3 (208)	-0.28	0.04	0.04	0.11	0.17	-0.32	0.08	0.08	-0.32	-1.58
ST 3 (220)	1.73	1.56	1.56	0.10	0.16	1.46	1.83	1.83	1.46	0.90

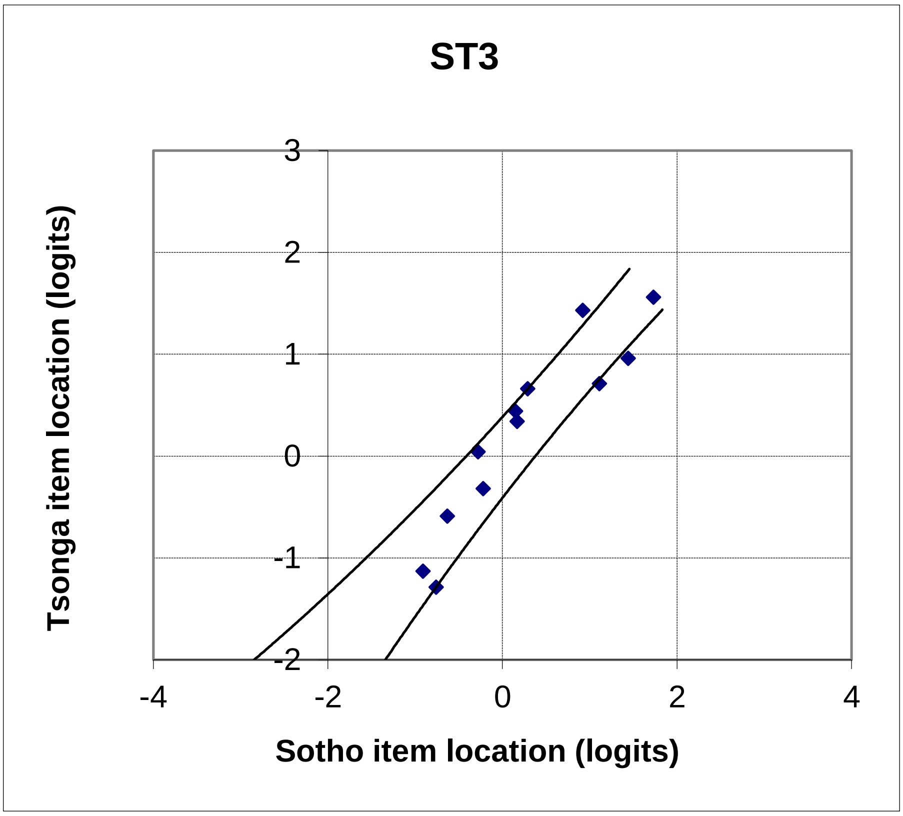

Figure 110: Differential Item Functioning for Tsonga-Sotho Comparison

4.5.7.3.3 Venda Respondents Compared to Sotho Respondents

Table 171 points out that the t-values for four of the ST 3 items exceed the critical t-value range (also see Figure 111). Items ST 3 (220) (t=3.10), ST 3 (145) (t=2.74), ST 3 (6) (t=-2.53) and ST 3 (77) (t=2.03) do not retain their measurement properties across the ethnic groups. All four these items are considered to possess a significant degree of ethnic bias when assessing the ST 3 construct (Bond & Fox, 2001). Almost 31% of the scale's items are located outside the 95% confidence bands, which imply that the ST 3 scale functions in an ethnically biased manner as it does not retain its measurement properties across the two groups when assessing the ST 3 construct.

Table 171: Venda Item Functioning vs. Sotho Item Functioning

Item name	Sotho measure	Venda measure	Venda adjusted	Sotho error	Venda error	d-2*esotho	d+2*evenda	d+2*esotho	d-2*evenda	t-value
ST 3 (6)	-0.91	-0.37	-0.37	0.13	0.17	-0.85	-0.43	-0.43	-0.85	-2.53
ST 3 (38)	0.92	0.98	0.98	0.09	0.15	0.78	1.13	1.13	0.78	-0.35
ST 3 (56)	0.15	-0.07	-0.07	0.10	0.16	-0.15	0.23	0.23	-0.15	1.16
ST 3 (77)	-0.22	-0.65	-0.65	0.11	0.18	-0.65	-0.22	-0.22	-0.65	2.03
ST 3 (88)	-3.01	-2.22	-2.22	0.28	0.30	-3.02	-2.20	-2.20	-3.02	-1.93
ST 3 (97)	0.29	0.36	0.36	0.10	0.15	0.15	0.51	0.51	0.15	-0.39
ST 3 (116)	0.17	0.36	0.36	0.10	0.15	0.09	0.45	0.45	0.09	-1.06
ST 3 (123)	1.11	1.10	1.10	0.09	0.15	0.93	1.28	1.28	0.93	0.05
ST 3 (145)	1.44	0.96	0.96	0.09	0.15	1.03	1.38	1.38	1.03	2.74
ST 3 (175)	-0.76	-0.75	-0.75	0.12	0.18	-0.97	-0.54	-0.54	-0.97	-0.05
ST 3 (194)	-0.63	-0.52	-0.52	0.12	0.18	-0.79	-0.36	-0.36	-0.79	-0.51
ST 3 (208)	-0.28	-0.34	-0.34	0.11	0.17	-0.51	-0.11	-0.11	-0.51	0.29
ST 3 (220)	1.73	1.17	1.17	0.10	0.15	1.27	1.63	1.63	1.27	3.10

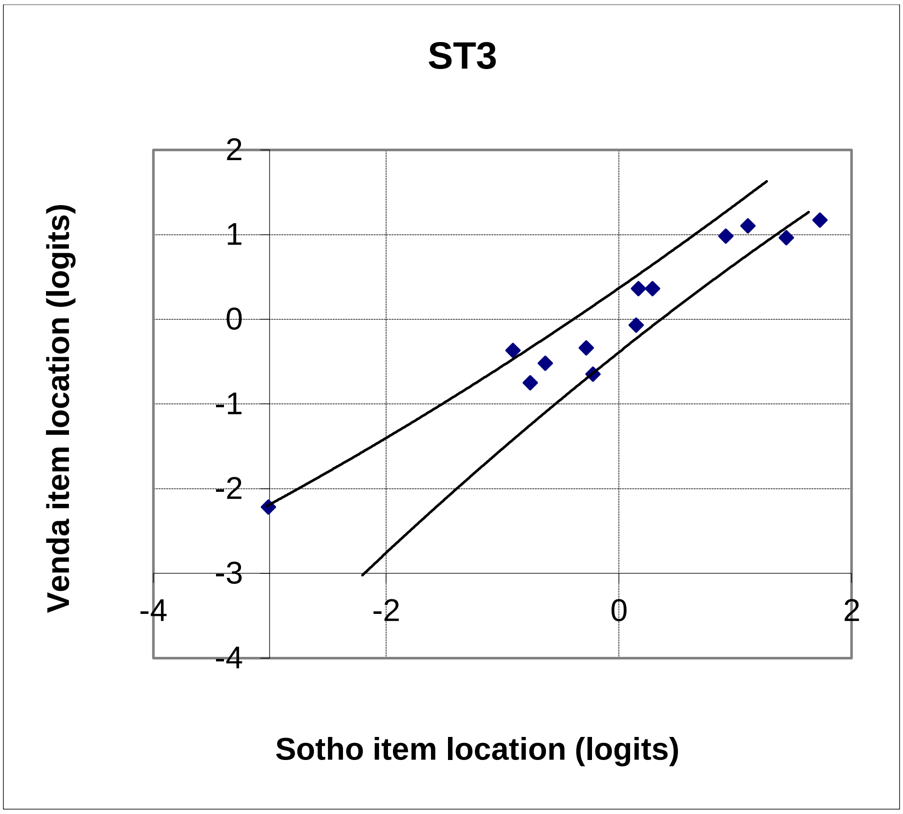

Figure 111: Differential Item Functioning for Venda-Sotho Comparison

4.6 RESULTS ILLUSTRATING THE DEGREE OF ITEM INVARIANCE ACROSS GENDER GROUP COMPARISONS

This section presents the results generated by the invariance analyses, which compared the performance of male and female groups on the TCI's primary scales and their respective sub-scales. Each invariance analysis will show whether the particular scale and its items functions invariantly across the gender groups. For example the performance of items of a particular sub-scale in the male group will be compared to the performance of the items in the female group. This comparison will indicate whether the scale and/or its items retain their measurement properties across the groups. An item comparison graph and table is illustrated for each scale. The male sub-sample was selected as the anchor group for the gender comparisons, as they rendered data that fitted the predictions of Rasch model better than the data rendered by the female group. The evidence from these comparisons will test the following hypotheses:

H1: There will be no evidence of item bias between male and female groups on items of the different sub-scales of the TCI

H3: There will be no evidence of construct bias between male and female groups on the different sub-scales of each primary scale of the TCI

H5: There will be no evidence of construct bias between male and female groups on the seven primary personality scales of the TCI

4.6.1 Results Illustrating the Degree of Item Invariance across Gender Group Comparisons for the Primary Novelty Seeking Scale and Sub-scales

4.6.1.1 <u>Primary NS Scale - Male Respondents Compared to Female Respondents</u>

Table 172 illustrates that the t-values for nine of the 40 NS items exceed the critical t-value range. Figure 112 shows that these items are located just outside the 95% confidence intervals. These items do not retain their measurement properties across the gender groups. According to Bond and Fox (2001) all these items possess some degree of gender bias when assessing the NS construct. In other words these items have a different effect on female than male scores. Just less than 23% of the scale's items are located outside the confidence boundaries. According to Bond and Fox (2001) this indicates that the NS scale does not function invariantly across the two groups and possess some degree of gender bias.

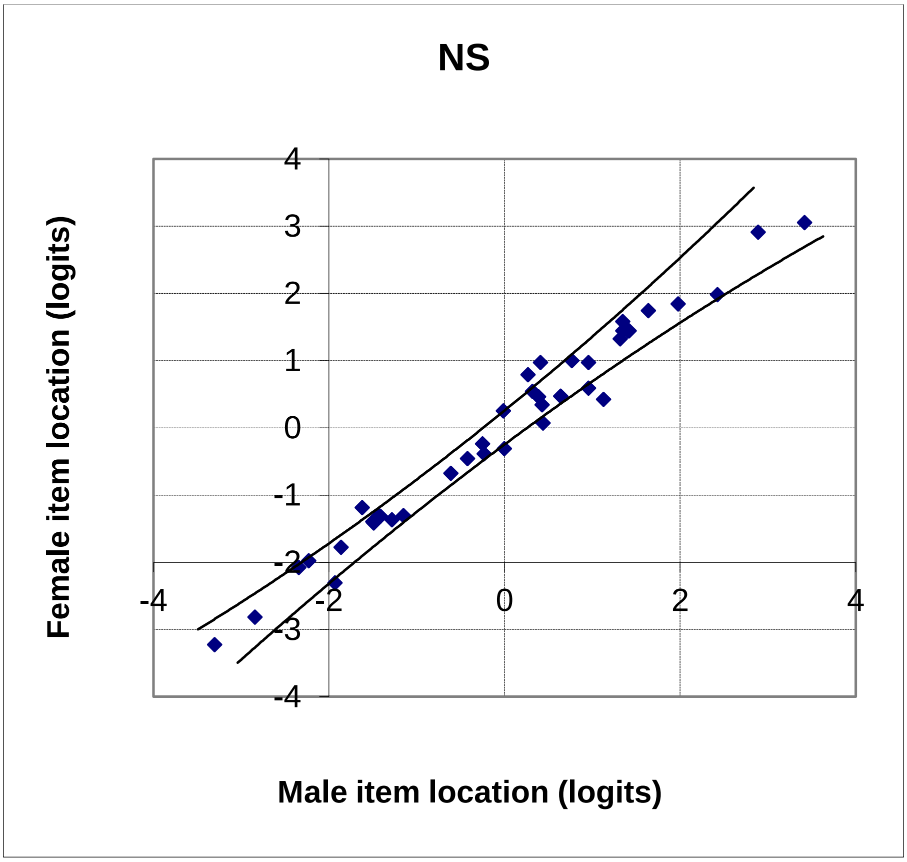

Figure 112: Differential Item Functioning for Female-Male Comparison

Table 172: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
NS 1 (1)	-1.86	-1.78	-1.78	0.09	0.11	-1.96	-1.68	-1.68	-1.96	-0.56
NS 1 (29)	-1.41	-1.32	-1.32	0.09	0.10	-1.50	-1.23	-1.23	-1.50	-0.67
NS 1 (52)	0.41	0.97	0.97	0.09	0.12	0.54	0.84	0.84	0.54	-3.73
NS 1 (70)	-2.34	-2.08	-2.08	0.11	0.11	-2.37	-2.05	-2.05	-2.37	-1.67
NS 1 (99)	0.64	0.47	0.47	0.10	0.11	0.41	0.70	0.70	0.41	1.15
NS 1 (114)	0.32	0.54	0.54	0.09	0.11	0.29	0.57	0.57	0.29	-1.54
NS 1 (144)	-2.23	-1.98	-1.98	0.10	0.11	-2.25	-1.96	-1.96	-2.25	-1.68
NS 1 (167)	-1.43	-1.31	-1.31	0.09	0.10	-1.50	-1.24	-1.24	-1.50	-0.89
NS 1 (191)	-3.30	-3.23	-3.23	0.15	0.17	-3.49	-3.04	-3.04	-3.49	-0.31
NS 1 (211)	-1.93	-2.31	-2.31	0.10	0.12	-2.28	-1.96	-1.96	-2.28	2.44
NS 1 (238)	-2.84	-2.82	-2.82	0.13	0.15	-3.03	-2.63	-2.63	-3.03	-0.10
NS 2 (13)	-0.25	-0.24	-0.24	0.08	0.09	-0.37	-0.12	-0.12	-0.37	-0.08
NS 2 (35)	-0.23	-0.39	-0.39	0.08	0.09	-0.43	-0.19	-0.19	-0.43	1.33
NS 2 (61)	0.77	1.00	1.00	0.10	0.12	0.73	1.04	1.04	0.73	-1.47
NS 2 (82)	3.42	3.05	3.05	0.29	0.27	2.84	3.63	3.63	2.84	0.94
NS 2 (108)	-0.42	-0.46	-0.46	0.08	0.09	-0.56	-0.32	-0.32	-0.56	0.34
NS 2 (130)	0.43	0.34	0.34	0.09	0.10	0.25	0.52	0.52	0.25	0.67
NS 2 (148)	2.43	1.98	1.98	0.19	0.17	1.95	2.46	2.46	1.95	1.77
NS 2 (187)	-1.50	-1.40	-1.40	0.09	0.10	-1.58	-1.32	-1.32	-1.58	-0.74
NS 2 (203)	1.35	1.58	1.58	0.12	0.15	1.27	1.66	1.66	1.27	-1.19
NS 2 (237)	2.89	2.91	2.91	0.23	0.26	2.55	3.25	3.25	2.55	-0.06
NS 3 (19)	0.96	0.59	0.59	0.11	0.11	0.62	0.93	0.93	0.62	2.38
NS 3 (41)	1.98	1.84	1.84	0.15	0.16	1.69	2.13	2.13	1.69	0.64
NS 3 (66)	-1.15	-1.31	-1.31	0.08	0.10	-1.36	-1.10	-1.10	-1.36	1.25
NS 3 (109)	1.35	1.44	1.44	0.12	0.14	1.21	1.58	1.58	1.21	-0.49
NS 3 (139)	0.39	0.46	0.46	0.09	0.11	0.28	0.57	0.57	0.28	-0.49
NS 3 (155)	1.64	1.74	1.74	0.13	0.16	1.48	1.90	1.90	1.48	-0.48
NS 3 (174)	-1.28	-1.37	-1.37	0.08	0.10	-1.45	-1.20	-1.20	-1.45	0.71
NS 3 (192)	0.96	0.97	0.97	0.11	0.12	0.80	1.13	1.13	0.80	-0.06
NS 3 (219)	0.00	-0.31	-0.31	0.08	0.09	-0.28	-0.03	-0.03	-0.28	2.58
NS 4 (34)	1.13	0.42	0.42	0.11	0.10	0.63	0.92	0.92	0.63	4.78
NS 4 (53)	1.42	1.44	1.44	0.12	0.14	1.25	1.61	1.61	1.25	-0.11
NS 4 (79)	0.44	0.07	0.07	0.09	0.10	0.12	0.39	0.39	0.12	2.75
NS 4 (91)	0.27	0.79	0.79	0.09	0.11	0.39	0.67	0.67	0.39	-3.66
NS 4 (110)	-1.49	-1.42	-1.42	0.09	0.10	-1.59	-1.32	-1.32	-1.59	-0.52
NS 4 (141)	1.41	1.44	1.44	0.12	0.14	1.24	1.61	1.61	1.24	-0.16
NS 4 (165)	-0.01	0.25	0.25	0.08	0.10	-0.01	0.25	0.25	-0.01	-2.03
NS 4 (183)	1.32	1.32	1.32	0.12	0.13	1.14	1.50	1.50	1.14	0.00
NS 4 (204)	-1.62	-1.19	-1.19	0.09	0.10	-1.54	-1.27	-1.27	-1.54	-3.19
NS 4 (212)	-0.61	-0.68	-0.68	0.08	0.09	-0.77	-0.52	-0.52	-0.77	0.59

4.6.1.2 NS Sub-scales – Male Respondents Compared to Female Respondents

4.6.1.2.1 NS 1 Item Functioning across Different Gender Groups

Table 173 illustrates that the t-values for three of the eleven items exceed the critical values of -1.96 and 1.96. Figure 113 shows that the same three items are located just outside the 95% confidence intervals. Items NS 1 (52) (t=-3.16), NS 1 (99) (t=2.16) and NS 1 (211) (t=3.24) all exceed the critical values of +/-1.96 and do not retain their measurement properties across the gender groups (Bond & Fox, 2001). All these items are considered to possess a significant degree of gender bias when assessing the NS 1 construct. In other words these items have a different effect on female than on male scores. Eight of the eleven NS 1 items are located inside the 95% confidence bands, which mean that just more than 28% of the scale's items are located outside the confidence boundaries. This points out that the NS 1 sub-scale does not function invariantly across the two gender groups (Bond & Fox, 2001).

Table 173: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
NS 1 (1)	-0.47	-0.50	-0.50	0.10	0.11	-0.63	-0.34	-0.34	-0.63	0.21
NS 1 (29)	0.03	0.02	0.02	0.09	0.10	-0.11	0.16	0.16	-0.11	0.09
NS 1 (52)	2.11	2.63	2.63	0.10	0.13	2.21	2.53	2.53	2.21	-3.16
NS 1 (70)	-1.01	-0.84	-0.84	0.11	0.12	-1.09	-0.76	-0.76	-1.09	-1.03
NS 1 (99)	2.38	2.06	2.06	0.10	0.11	2.07	2.37	2.37	2.07	2.16
NS 1 (114)	2.00	2.14	2.14	0.10	0.11	1.92	2.22	2.22	1.92	-0.93
NS 1 (144)	-0.89	-0.72	-0.72	0.11	0.12	-0.97	-0.64	-0.64	-0.97	-1.03
NS 1 (167)	0.00	0.03	0.03	0.09	0.10	-0.12	0.15	0.15	-0.12	-0.21
NS 1 (191)	-2.04	-2.10	-2.10	0.16	0.18	-2.31	-1.83	-1.83	-2.31	0.26
NS 1 (211)	-0.55	-1.08	-1.08	0.10	0.13	-0.98	-0.65	-0.65	-0.98	3.24
NS 1 (238)	-1.55	-1.65	-1.65	0.13	0.15	-1.80	-1.40	-1.40	-1.80	0.51

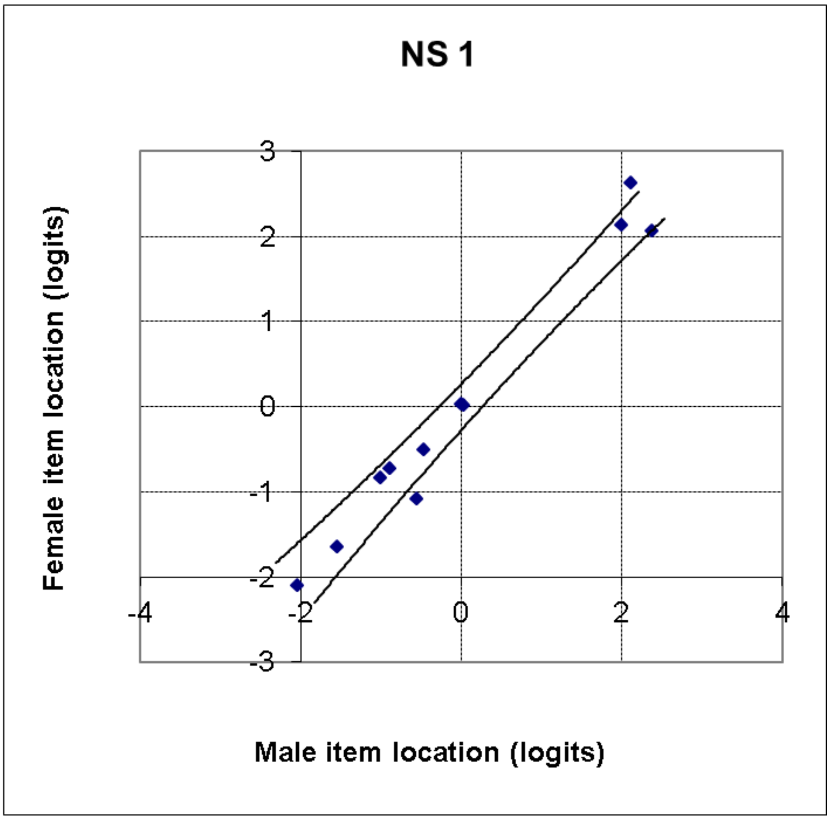

Figure 113: Differential Item Functioning for Female-Male Comparison

4.6.1.2.2 NS 2 Item Functioning across Different Gender Groups

Table 174 shows that the t-values for all eleven NS 2 items fall within the critical t-value range. The graph in Figure 114 also depicts that no items are located outside the 95% confidence intervals. This means that the NS 2 scale and its items function invariantly across both male and female groups. This provides evidence that the NS 2 scale possess no gender bias (Bond & Fox, 2001).

Table 174: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
NS 2 (13)	-1.23	-1.20	-1.20	0.09	0.10	-1.35	-1.08	-1.08	-1.35	-0.22
NS 2 (35)	-1.21	-1.38	-1.38	0.09	0.10	-1.43	-1.16	-1.16	-1.43	1.26
NS 2 (61)	-0.08	0.22	0.22	0.11	0.13	-0.10	0.24	0.24	-0.10	-1.76
NS 2 (87)	2.72	2.47	2.47	0.30	0.28	2.18	3.01	3.01	2.18	0.61
NS 2 (108)	-1.43	-1.45	-1.45	0.09	0.10	-1.57	-1.31	-1.31	-1.57	0.15
NS 2 (130)	-0.46	-0.53	-0.53	0.10	0.11	-0.64	-0.35	-0.35	-0.64	0.47
NS 2 (148)	1.70	1.30	1.30	0.19	0.18	1.24	1.76	1.76	1.24	1.53
NS 2 (187)	-2.74	-2.61	-2.61	0.10	0.11	-2.82	-2.53	-2.53	-2.82	-0.87
NS 2 (203)	0.55	0.86	0.86	0.12	0.15	0.51	0.90	0.90	0.51	-1.61
NS 2 (237)	2.18	2.32	2.32	0.23	0.27	1.90	2.60	2.60	1.90	-0.39

Figure 114: Differential Item Functioning for Female-Male Comparison

4.6.1.2.3 NS 3 Item Functioning across Different Gender Groups

Table 174 illustrates that the t-values for all the items except one falls between the -1.96 and 1.96 critical values. Figure 115 also shows that one item is plotted just outside the 95% confidence intervals. Item NS 3 (19) (t=2.06) exceeds the critical t-value of 1.96 and does not retain its measurement properties across the gender groups; this means that the item possess some degree of gender bias. Despite the fact that eight of the nine items are located within the 95% confidence bands, more than 5% of the scale's items are located outside the boundary. This implies that the NS 3 sub-scale does not function invariantly across the two gender groups, and does possess a certain degree of gender bias (Bond & Fox, 2001).

Table 175: Female Item Functioning vs. Male Item Functioning

Item name	Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale
NS 3 (19)	0.53	0.18	0.18	0.12	0.12	0.19	0.52	0.52	0.19	2.06
NS 3 (41)	1.81	1.71	1.71	0.17	0.18	1.51	2.01	2.01	1.51	0.40
NS 3 (66)	-2.12	-2.18	-2.18	0.09	0.11	-2.29	-2.01	-2.01	-2.29	0.42
NS 3 (109)	1.02	1.22	1.22	0.13	0.15	0.92	1.32	1.32	0.92	-1.01
NS 3 (139)	-0.19	0.02	0.02	0.10	0.12	-0.24	0.07	0.07	-0.24	-1.34
NS 3 (155)	1.38	1.59	1.59	0.15	0.17	1.26	1.71	1.71	1.26	-0.93
NS 3 (174)	-2.29	-2.26	-2.26	0.09	0.11	-2.42	-2.13	-2.13	-2.42	-0.21
NS 3 (192)	0.53	0.65	0.65	0.12	0.13	0.41	0.77	0.77	0.41	-0.68
NS 3 (219)	-0.68	-0.94	-0.94	0.10	0.11	-0.96	-0.66	-0.66	-0.96	1.75

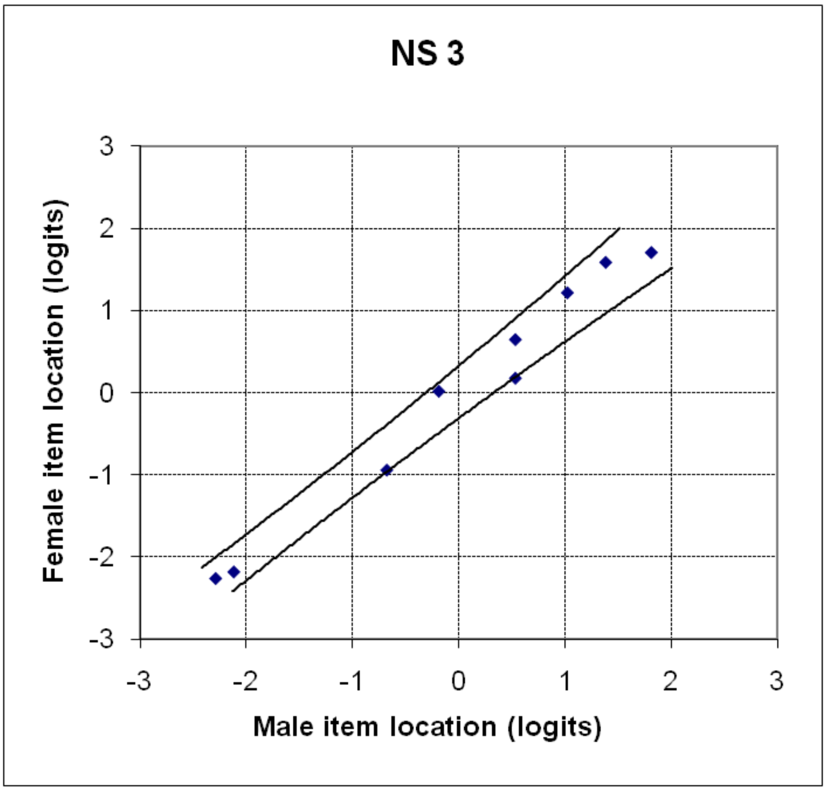

Figure 115: Differential Item Functioning for Female-Male Comparison

4.6.1.2.4 NS 4 Item Functioning across Different Gender Groups

Table 176 shows that the t-values for only half of the items of the NS 4 sub-scale falls within the critical t-value range of -1.96 and 1.96. Figure 116 shows that the other four items are located outside the confidence intervals. Items NS 4 (34) (t=5.07), NS 4(79) (t=3.03), NS 4(91) (t=-3.61), and NS4 (204) (t=-3.58) exceed the critical values of +/-1.96. This points out that these four items do not retain their measurement properties across the two groups, and are therefore considered to be biased in the way they measure the NS 4 construct across gender groups (Bond & Fox, 2001). Four of the scale's items are located outside the 95% confidence bands. According to Bond and Fox (2001) this implies that the NS 4 sub-scale does not function invariantly across the two groups, and that it measures the construct differently across gender groups.

Table 176: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
NS 4 (34)	0.99	0.20	0.20	0.11	0.11	0.44	0.75	0.75	0.44	5.07
NS 4 (53)	1.29	1.28	1.28	0.13	0.14	1.09	1.48	1.48	1.09	0.05
NS 4 (79)	0.25	-0.18	-0.18	0.10	0.10	-0.11	0.18	0.18	-0.11	3.03
NS 4 (91)	0.06	0.60	0.60	0.09	0.12	0.18	0.48	0.48	0.18	-3.61
NS 4 (110)	-1.88	-1.81	-1.81	0.09	0.10	-1.98	-1.71	-1.71	-1.98	-0.53
NS 4 (141)	1.28	1.28	1.28	0.13	0.14	1.09	1.47	1.47	1.09	-0.01
NS 4 (165)	-0.24	0.02	0.02	0.09	0.10	-0.24	0.03	0.03	-0.24	-1.94
NS 4 (183)	1.18	1.16	1.16	0.12	0.14	0.99	1.35	1.35	0.99	0.10
NS 4 (204)	-2.03	-1.55	-1.55	0.09	0.10	-1.92	-1.65	-1.65	-1.92	-3.58
NS 4 (212)	-0.90	-0.99	-0.99	0.09	0.10	-1.08	-0.81	-0.81	-1.08	0.66

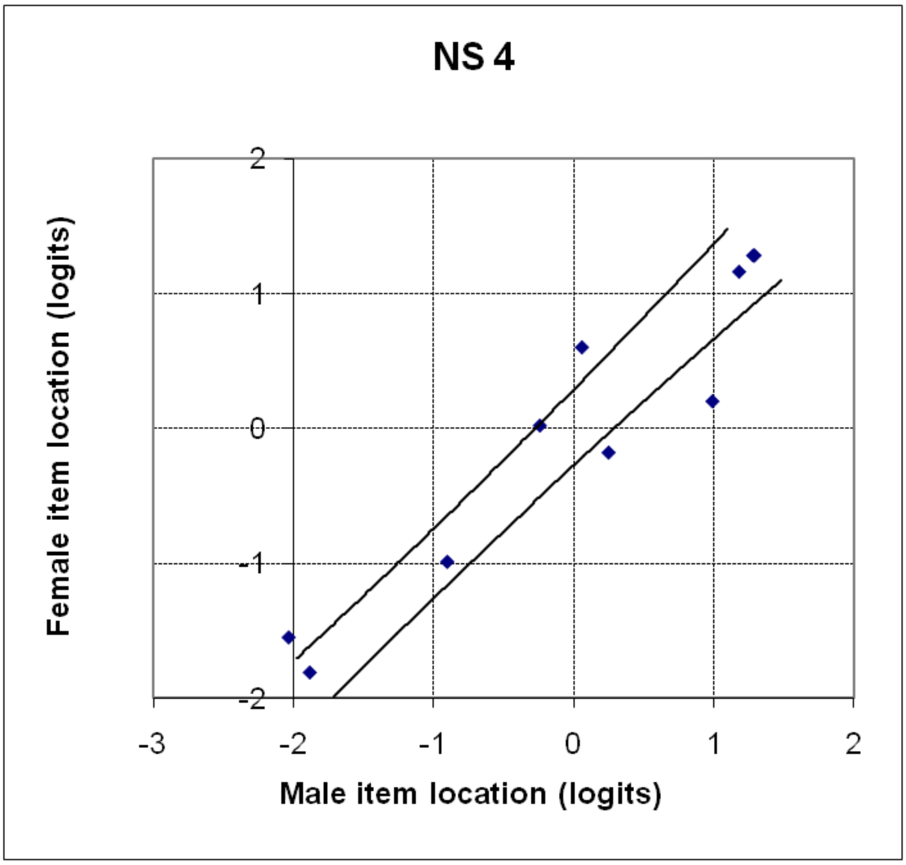

Figure 116: Differential Item Functioning for Female-Male Comparison

4.6.2 Results Illustrating the Degree of Item Invariance across Gender Group Comparisons for the Primary Harm Avoidance Scale and Sub-scales

4.6.2.1 <u>Primary HA Scale - Male Respondents Compared to Female Respondents</u>

Table 172 illustrate that the t-values for five of the 35 HA items exceed the critical values of -1.96 and 1.96. Figure 112 shows that most of these items are plotted just outside the 95% confidence intervals. These items do not retain their measurement properties across the gender groups. All of these items possess some degree of gender bias when assessing the HA construct (Bond & Fox, 2001). Just less than 14% of the scale's items are located outside the confidence boundaries. According to Bond and Fox (2001) this indicates that the HA scale does not function invariantly across the two groups and possess some degree of gender bias.

Table 177: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
HA 1 (2)	1.90	2.13	2.13	0.17	0.20	1.75	2.28	2.28	1.75	-0.87
HA 1 (20)	-0.37	-0.26	-0.26	0.09	0.10	-0.45	-0.18	-0.18	-0.45	-0.81
HA 1 (42)	2.80	2.77	2.77	0.26	0.27	2.41	3.16	3.16	2.41	0.08
HA 1 (65)	1.55	2.02	2.02	0.15	0.19	1.54	2.03	2.03	1.54	-1.94
HA 1 (81)	-0.73	-0.72	-0.72	0.09	0.10	-0.86	-0.59	-0.59	-0.86	-0.07
HA 1 (112)	-0.37	-0.13	-0.13	0.09	0.10	-0.38	-0.12	-0.12	-0.38	-1.78
HA 1 (119)	-0.93	-0.96	-0.96	0.08	0.10	-1.07	-0.82	-0.82	-1.07	0.24
HA 1 (149)	0.52	0.69	0.69	0.11	0.12	0.44	0.77	0.77	0.44	-1.04
HA 1 (164)	-1.22	-1.04	-1.04	0.08	0.10	-1.26	-1.00	-1.00	-1.26	-1.40
HA 1 (188)	0.73	0.98	0.98	0.11	0.13	0.68	1.03	1.03	0.68	-1.46
HA 1 (225)	-1.42	-1.43	-1.43	0.08	0.10	-1.55	-1.30	-1.30	-1.55	0.08
HA 2 (12)	-1.08	-1.01	-1.01	0.08	0.10	-1.17	-0.92	-0.92	-1.17	-0.54
HA 2 (26)	-1.15	-1.23	-1.23	0.08	0.10	-1.32	-1.06	-1.06	-1.32	0.63
HA 2 (67)	-0.22	-0.45	-0.45	0.09	0.10	-0.47	-0.20	-0.20	-0.47	1.71
HA 2 (129)	-0.62	-0.74	-0.74	0.09	0.10	-0.81	-0.55	-0.55	-0.81	0.90
HA 2 (154)	-1.01	-0.93	-0.93	0.08	0.10	-1.10	-0.84	-0.84	-1.10	-0.62
HA 2 (189)	-1.14	-1.22	-1.22	0.08	0.10	-1.31	-1.05	-1.05	-1.31	0.63
HA 2 (217)	-0.32	-0.39	-0.39	0.09	0.10	-0.49	-0.22	-0.22	-0.49	0.52
HA 3 (27)	0.35	0.33	0.33	0.10	0.11	0.19	0.49	0.49	0.19	0.14
HA 3 (54)	0.48	0.41	0.41	0.10	0.11	0.30	0.59	0.59	0.30	0.47
HA 3 (80)	-0.94	-0.76	-0.76	0.08	0.10	-0.98	-0.72	-0.72	-0.98	-1.40
HA 3 (100)	1.61	1.69	1.69	0.15	0.17	1.42	1.88	1.88	1.42	-0.35
HA 3 (142)	1.79	1.81	1.81	0.16	0.18	1.56	2.04	2.04	1.56	-0.08
HA 3 (157)	0.31	0.23	0.23	0.10	0.11	0.12	0.42	0.42	0.12	0.54
HA 3 (209)	-0.23	-0.16	-0.16	0.09	0.10	-0.33	-0.06	-0.06	-0.33	-0.52
HA 3 (231)	0.52	0.49	0.49	0.11	0.12	0.34	0.67	0.67	0.34	0.19
HA 4 (22)	1.55	1.07	1.07	0.15	0.14	1.10	1.51	1.51	1.10	2.34
HA 4 (43)	0.57	0.49	0.49	0.11	0.12	0.37	0.69	0.69	0.37	0.49
HA 4 (63)	0.93	0.36	0.36	0.12	0.11	0.48	0.81	0.81	0.48	3.50
HA 4 (92)	-0.91	-1.26	-1.26	0.08	0.10	-1.21	-0.96	-0.96	-1.21	2.74
HA 4 (113)	0.64	0.28	0.28	0.11	0.11	0.30	0.62	0.62	0.30	2.32
HA 4 (147)	-1.03	-0.94	-0.94	0.08	0.10	-1.11	-0.86	-0.86	-1.11	-0.70
HA 4 (182)	0.96	0.70	0.70	0.12	0.12	0.66	1.00	1.00	0.66	1.54
HA 4 (202)	-0.39	-0.13	-0.13	0.09	0.10	-0.39	-0.13	-0.13	-0.39	-1.93
HA 4 (236)	-3.11	-2.69	-2.69	0.12	0.12	-3.07	-2.73	-2.73	-3.07	-2.47

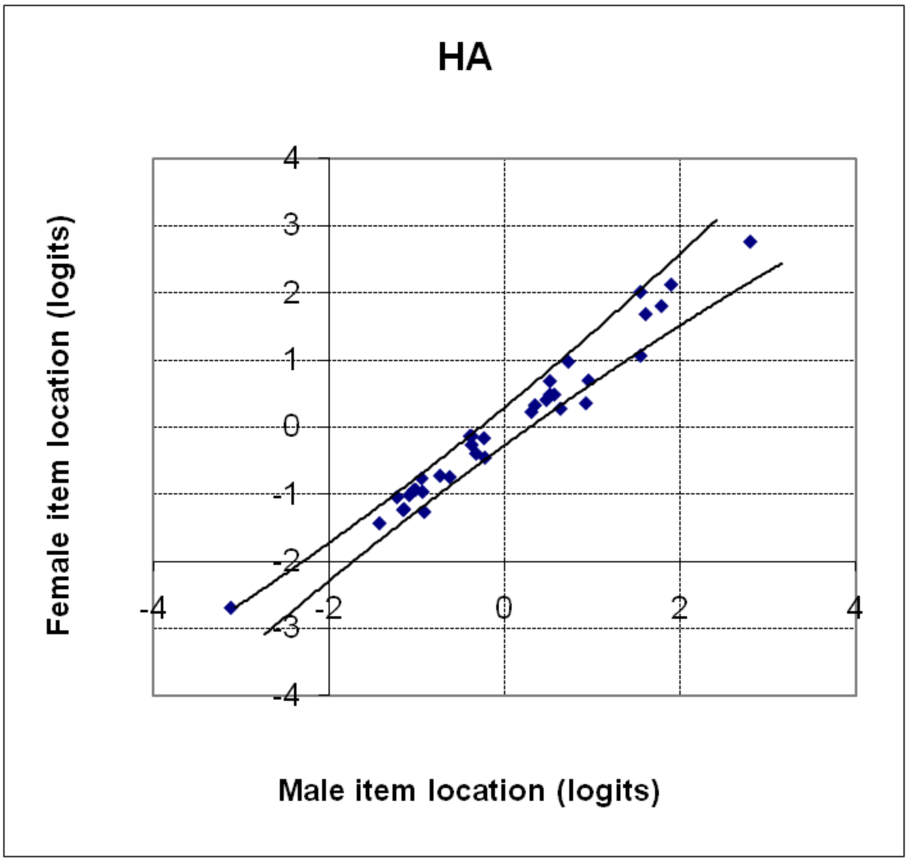

Figure 117: Differential Item Functioning for Female-Male Comparison

4.6.2.2 HA Sub-scales – Male Respondents Compared to Female Respondents

4.6.2.2.1 HA 1 Item Functioning across Different Gender Groups

Table 178 shows that the t-values for all eleven HA 1 items fall within the critical t-value range of -1.96 and 1.96. Figure 118 also depicts that no items are located outside the confidence intervals. According to Bond and Fox (2001) this means that the HA 1 scale and its items functions invariantly across both male and female groups, which implies that there is no significant evidence of gender bias.

Table 178: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
HA 1 (2)	1.79	1.92	1.92	0.18	0.21	1.58	2.13	2.13	1.58	-0.47
HA 1 (20)	-0.62	-0.67	-0.67	0.09	0.11	-0.79	-0.50	-0.50	-0.79	0.35
HA 1 (42)	2.71	2.59	2.59	0.26	0.27	2.28	3.02	3.02	2.28	0.32
HA 1 (65)	1.41	1.79	1.79	0.15	0.20	1.35	1.85	1.85	1.35	-1.52
HA 1 (81)	-1.01	-1.18	-1.18	0.09	0.10	-1.23	-0.96	-0.96	-1.23	1.26
HA 1 (112)	-0.62	-0.52	-0.52	0.09	0.11	-0.71	-0.43	-0.43	-0.71	-0.70
HA 1 (119)	-1.23	-1.45	-1.45	0.09	0.10	-1.47	-1.21	-1.21	-1.47	1.64
HA 1 (149)	0.34	0.37	0.37	0.11	0.13	0.18	0.53	0.53	0.18	-0.18
HA 1 (164)	-1.54	-1.53	-1.53	0.09	0.10	-1.67	-1.40	-1.40	-1.67	-0.07
HA 1 (188)	0.55	0.68	0.68	0.12	0.14	0.43	0.80	0.80	0.43	-0.71
HA 1 (225)	-1.77	-1.99	-1.99	0.09	0.11	-2.02	-1.74	-1.74	-2.02	1.55

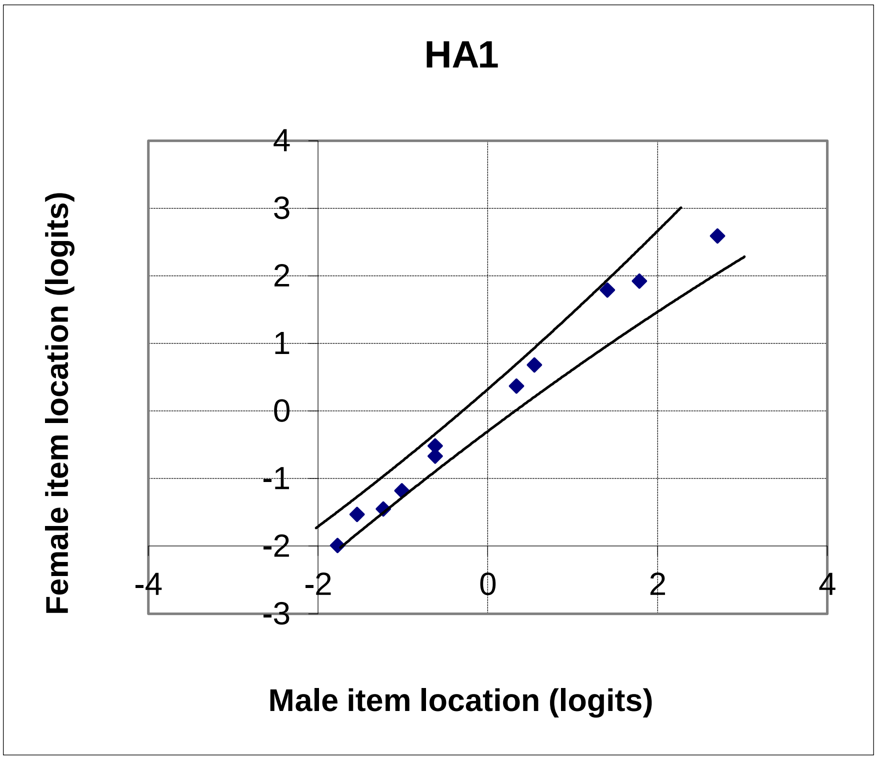

Figure 118: Differential Item Functioning for Female-Male Comparison

4.6.2.2.2 HA 2 Item Functioning across Different Gender Groups

Table 179 shows that the t-values for all seven HA 2 items fall within the critical range of -1.96 and 1.96 (also see Figure 119). According to Bond and Fox (2001) this indicate that the HA 2 items and sub-scale functions invariantly across both the male and female groups, which implies that the scale and its items are not biased to either gender.

Table 179: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
HA 2 (12)	-0.34	-0.18	-0.18	0.09	0.11	-0.40	-0.12	-0.12	-0.40	-1.14
HA 2 (26)	-0.43	-0.45	-0.45	0.09	0.11	-0.58	-0.30	-0.30	-0.58	0.13
HA 2 (67)	0.68	0.48	0.48	0.10	0.11	0.43	0.73	0.73	0.43	1.34
HA 2 (129)	0.21	0.14	0.14	0.09	0.11	0.03	0.32	0.32	0.03	0.48
HA 2 (154)	-0.26	-0.08	-0.08	0.09	0.11	-0.31	-0.03	-0.03	-0.31	-1.28
HA 2 (189)	-0.41	-0.44	-0.44	0.09	0.11	-0.57	-0.28	-0.28	-0.57	0.20
HA 2 (217)	0.56	0.55	0.55	0.10	0.11	0.41	0.70	0.70	0.41	0.06

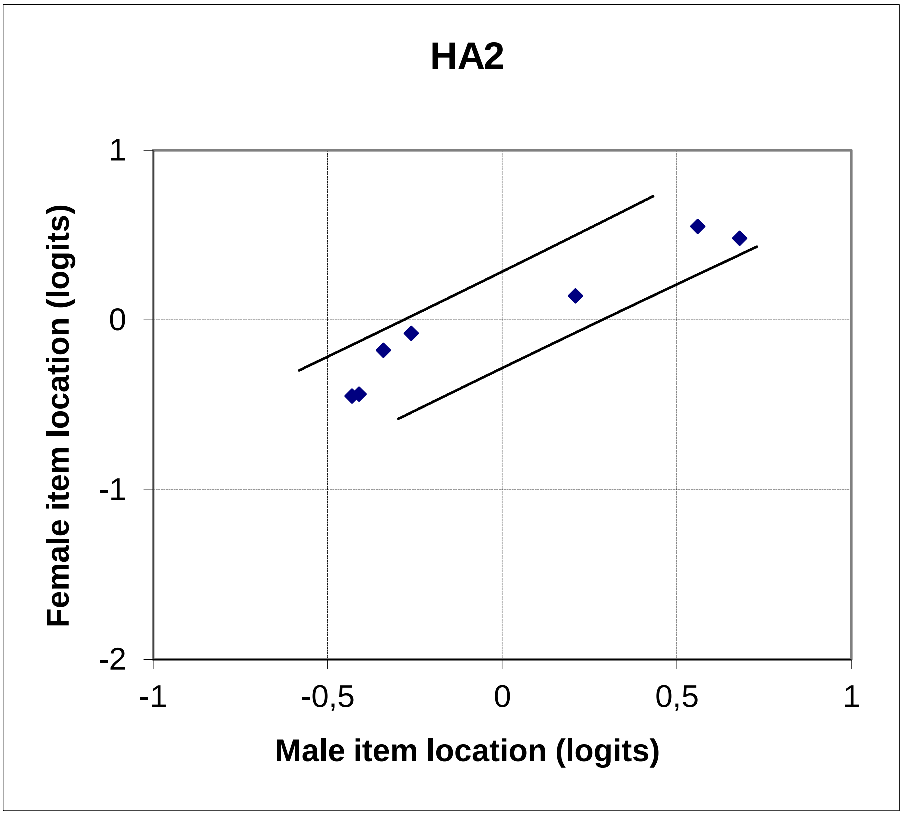

Figure 119: Differential Item Functioning for Female-Male Comparison

4.6.2.2.3 HA 3 Item Functioning across Different Gender Groups

Table 180 points out that the t-values for all the items except one falls within the -1.96 and 1.96 critical t-values; Figure 120 corroborates this and shows the location of the outlying item. The t-value for HA 3 (80) (t=-2.20) exceeds the critical value of -1.96 and does not retain its measurement properties across the gender groups, which means that the item possess a certain degree of gender bias (Bond & Fox, 2001). Despite the fact that seven of the eight items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the boundary. This means that the HA 3 sub-scale does not function invariantly across the two gender groups. According to Bond and Fox (2001) this scale's measurement properties are probably confounded by the gender of the groups it is assessing.

Table 180: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
HA 3 (27)	-0.12	-0.18	-0.18	0.12	0.13	-0.33	0.03	0.03	-0.33	0.35
HA 3 (54)	0.05	-0.09	-0.09	0.12	0.13	-0.20	0.16	0.16	-0.20	0.80
HA 3 (80)	-2.00	-1.64	-1.64	0.11	0.12	-1.98	-1.66	-1.66	-1.98	-2.20
HA 3 (100)	1.42	1.44	1.44	0.16	0.18	1.19	1.67	1.67	1.19	-0.08
HA 3 (142)	1.62	1.57	1.57	0.17	0.19	1.34	1.85	1.85	1.34	0.20
HA 3 (157)	-0.17	-0.31	-0.31	0.12	0.12	-0.41	-0.07	-0.07	-0.41	0.83
HA 3 (209)	-0.90	-0.81	-0.81	0.11	0.12	-1.02	-0.69	-0.69	-1.02	-0.55
HA 3 (231)	0.10	0.01	0.01	0.12	0.13	-0.12	0.23	0.23	-0.12	0.52

Figure 120: Differential Item Functioning for Female-Male Comparison

4.6.2.2.4 <u>HA 4 Item Functioning across Different Gender Groups</u>

Table 181 illustrates that the t-values for four items exceed the critical t-value range. Figure 121 shows that the four items are located just outside the 95% confidence intervals. Items HA 4 (236) (t=-3.45), HA 4 (202) (t=-3.17), HA 4 (63) (t=2.70) and HA 4 (147) (t=-2.02) all exceed the critical values of +/-1.96 and do not retain their measurement properties across the gender groups. Each of the aforementioned items possesses a significant degree of gender bias when assessing the HA 4 construct. Only 44% of HA 4 items are located outside the 95% confidence bands, which mean that the HA 4 sub-scale does not function invariantly across the two gender groups, and does function with a large degree of gender bias.

Table 181: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
HA 4 (22)	1.77	1.41	1.41	0.15	0.14	1.39	1.80	1.80	1.39	1.75
HA 4 (43)	0.72	0.79	0.79	0.11	0.12	0.59	0.92	0.92	0.59	-0.44
HA 4 (63)	1.11	0.65	0.65	0.12	0.12	0.71	1.05	1.05	0.71	2.70
HA 4 (92)	-0.90	-1.12	-1.12	0.09	0.10	-1.14	-0.87	-0.87	-1.14	1.63
HA 4 (113)	0.80	0.57	0.57	0.11	0.12	0.52	0.85	0.85	0.52	1.41
HA 4 (147)	-1.04	-0.77	-0.77	0.09	0.10	-1.04	-0.77	-0.77	-1.04	-2.02
HA 4 (182)	1.14	1.02	1.02	0.13	0.13	0.90	1.26	1.26	0.90	0.65
HA 4 (202)	-0.33	0.12	0.12	0.09	0.11	-0.25	0.04	0.04	-0.25	-3.17
HA 4 (236)	-3.27	-2.66	-2.66	0.12	0.13	-3.14	-2.79	-2.79	-3.14	-3.45

Figure 121: Differential Item Functioning for Female-Male Comparison

4.6.3 Results Illustrating the Degree of Item Invariance across Gender Group Comparisons for the Primary Reward Dependence Scale and Sub-scales

4.6.3.1 Primary Scale - Male Respondents Compared to Female Respondents

Table 182 illustrates that the t-values for only four of the scale's 24 items exceed the critical t-value range; Figure 122 shows that these items are located just outside the 95% confidence intervals. These items do not retain their measurement properties across gender groups, which mean that they do possess a significant degree of gender bias when assessing the RD construct (Bond & Fox, 2001). Just less than 23% of the scale's items are located outside the confidence boundaries. According to Bond and Fox (2001) this indicates that the RD scale does not function invariantly across the two groups and does function with some degree of gender bias.

Table 182: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
RD 1 (3)	-1.73	-1.77	-1.77	0.18	0.22	-2.03	-1.47	-1.47	-2.03	0.14
RD 1 (28)	-1.09	-0.40	-0.40	0.14	0.13	-0.94	-0.55	-0.55	-0.94	-3.61
RD 1 (55)	0.20	0.09	0.09	0.09	0.11	0.00	0.29	0.29	0.00	0.78
RD 1 (83)	-2.71	-2.64	-2.64	0.28	0.32	-3.10	-2.25	-2.25	-3.10	-0.16
RD 1 (102)	-0.18	-0.06	-0.06	0.10	0.12	-0.28	0.04	0.04	-0.28	-0.77
RD 1 (120)	-0.72	-0.47	-0.47	0.12	0.13	-0.77	-0.42	-0.42	-0.77	-1.41
RD 1 (158)	-2.07	-2.22	-2.22	0.21	0.26	-2.48	-1.81	-1.81	-2.48	0.45
RD 1 (181)	1.64	1.20	1.20	0.08	0.09	1.30	1.54	1.54	1.30	3.66
RD 1 (210)	-0.19	-0.45	-0.45	0.10	0.13	-0.48	-0.16	-0.16	-0.48	1.59
RD 1 (224)	-0.02	0.13	0.13	0.10	0.11	-0.09	0.20	0.20	-0.09	-1.01
RD 3 (21)	-1.07	-1.28	-1.28	0.14	0.18	-1.40	-0.95	-0.95	-1.40	0.92
RD 3 (44)	0.14	0.08	0.08	0.09	0.11	-0.03	0.25	0.25	-0.03	0.43
RD 3 (68)	-0.52	-0.73	-0.73	0.11	0.14	-0.80	-0.45	-0.45	-0.80	1.18
RD 3 (117)	0.90	1.36	1.36	0.08	0.09	1.01	1.25	1.25	1.01	-3.82
RD 3 (143)	2.33	2.38	2.38	0.09	0.10	2.22	2.49	2.49	2.22	-0.37
RD 3 (180)	-2.63	-2.30	-2.30	0.27	0.27	-2.85	-2.08	-2.08	-2.85	-0.86
RD 3 (201)	3.10	3.08	3.08	0.11	0.12	2.93	3.25	3.25	2.93	0.13
RD 3 (226)	0.26	-0.06	-0.06	0.09	0.12	-0.05	0.25	0.25	-0.05	2.14
RD 4 (14)	-1.99	-2.22	-2.22	0.20	0.26	-2.43	-1.78	-1.78	-2.43	0.70
RD 4 (46)	-2.50	-1.97	-1.97	0.25	0.24	-2.58	-1.89	-1.89	-2.58	-1.53
RD 4 (71)	2.46	2.58	2.58	0.09	0.11	2.38	2.66	2.66	2.38	-0.84
RD 4 (131)	-1.00	-0.71	-0.71	0.13	0.14	-1.05	-0.66	-0.66	-1.05	-1.52
RD 4 (156)	2.41	2.52	2.52	0.09	0.11	2.32	2.61	2.61	2.32	-0.77
RD 4 (193)	-1.26	-1.48	-1.48	0.15	0.19	-1.61	-1.13	-1.13	-1.61	0.91

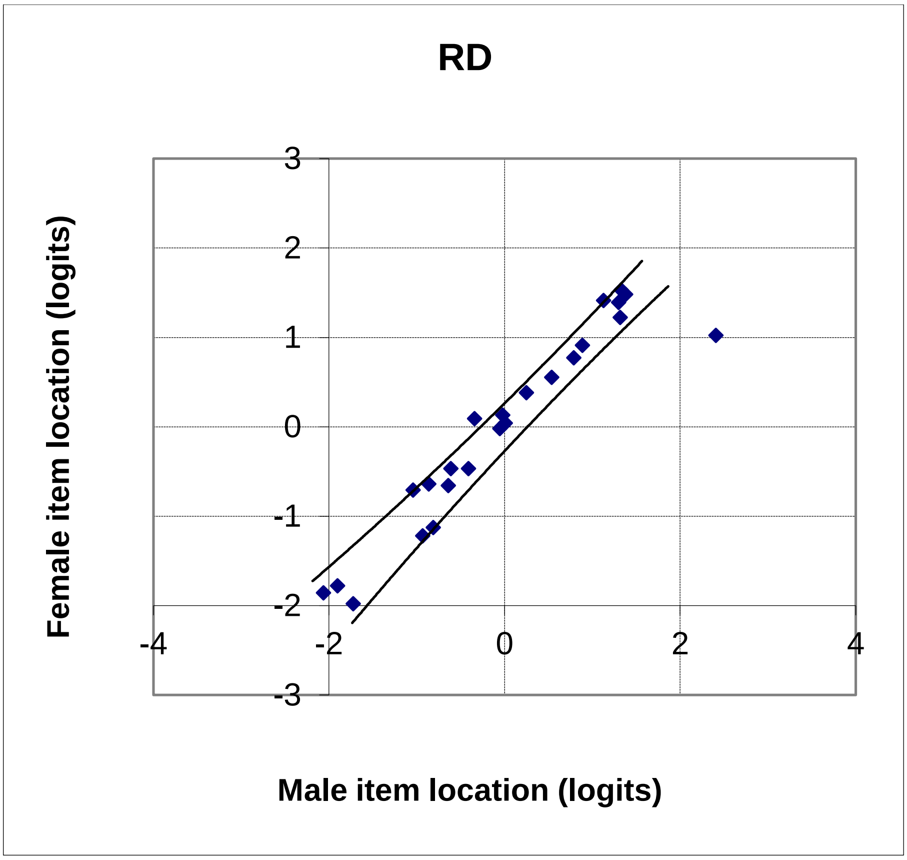

Figure 122: Differential Item Functioning for Female-Male Comparison

4.6.3.2 Sub-scales – Male Respondents Compared to Female Respondents

4.6.3.2.1 RD 1 Item Functioning across Different Gender Groups

The results presented in Table 183 points out that the t-values for two of the 10 RD 1 items fall outside the critical t-value range; Figure 123 shows that these two items are located way outside the 95% confidence bands. Items RD 1 (181) (t=9.75) and RD 1 (3) (t=-3.97) do not retain their measurement properties across the gender groups. These items measurement properties are significantly confounded by the gender of the group it is measuring, which mean that they do possess a considerable degree of gender bias (Bond & Fox, 2001). Despite the fact that eight of the ten items are located within the 95% confidence bands, more than 5% of the scale's items are located outside the boundary, which implies that the sub-scale does not function invariantly across the two gender groups (Bond & Fox, 2001).

Table 183: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
RD 1 (3)	-0.12	0.44	0.44	0.10	0.10	0.02	0.30	0.30	0.02	-3.97
RD 1 (28)	0.25	0.39	0.39	0.09	0.10	0.19	0.46	0.46	0.19	-1.05
RD 1 (55)	1.75	1.96	1.96	0.09	0.11	1.71	2.00	2.00	1.71	-1.48
RD 1 (83)	-1.93	-1.62	-1.62	0.16	0.17	-2.01	-1.54	-1.54	-2.01	-1.33
RD 1 (102)	-0.62	-0.87	-0.87	0.11	0.13	-0.91	-0.57	-0.57	-0.91	1.46
RD 1 (120)	-0.20	-0.16	-0.16	0.10	0.11	-0.33	-0.03	-0.03	-0.33	-0.28
RD 1 (158)	0.19	0.32	0.32	0.09	0.10	0.12	0.39	0.39	0.12	-0.97
RD 1 (181)	2.90	1.45	1.45	0.11	0.10	2.03	2.32	2.32	2.03	9.75
RD 1 (210)	-1.77	-1.54	-1.54	0.15	0.17	-1.88	-1.43	-1.43	-1.88	-1.02
RD 1 (224)	-0.45	-0.36	-0.36	0.10	0.12	-0.56	-0.25	-0.25	-0.56	-0.58

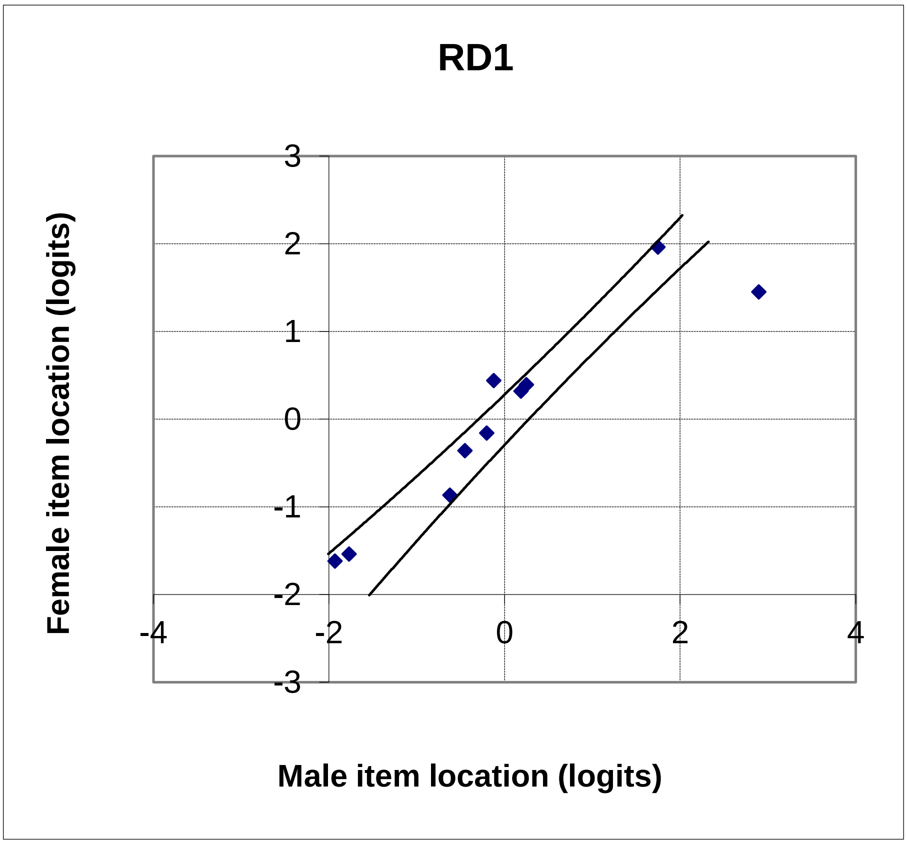

Figure 123: Differential Item Functioning for Female-Male Comparison

4.6.3.2.2 RD 3 Item Functioning across Different Gender Groups

Table 184 illustrates that the t-values for all the items except one falls within the critical t-value range. Figure 124 also shows that one item is located just outside the 95% confidence bands. Item RD 3 (68) (t=2.20) does not retain its measurement properties across the gender groups, which means that the item possesses a considerable degree of gender bias. This also implies that more than 5% of the scale's items are located outside the confidence bands, which means that the RD 3 sub-scale does possess a considerable degree of gender bias.

Table 184: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
RD 3 (21)	-1.74	-2.13	-2.13	0.15	0.20	-2.18	-1.68	-1.68	-2.18	1.56
RD 3 (44)	0.59	0.71	0.71	0.09	0.11	0.51	0.79	0.79	0.51	-0.85
RD 3 (68)	-0.82	-1.23	-1.23	0.11	0.15	-1.21	-0.84	-0.84	-1.21	2.20
RD 3 (117)	-0.43	-0.32	-0.32	0.11	0.12	-0.54	-0.21	-0.21	-0.54	-0.68
RD 3 (143)	0.27	0.41	0.41	0.10	0.11	0.19	0.49	0.49	0.19	-0.95
RD 3 (180)	1.91	2.17	2.17	0.10	0.12	1.88	2.20	2.20	1.88	-1.67
RD 3 (201)	0.94	0.92	0.92	0.09	0.11	0.79	1.07	1.07	0.79	0.13
RD 3 (226)	-0.73	-0.53	-0.53	0.11	0.13	-0.80	-0.46	-0.46	-0.80	-1.18

Figure 124: Differential Item Functioning for Female-Male Comparison

4.6.3.2.3 RD 4 Item Functioning across Different Gender Groups

The t-values for all six the RD 4 items fall within the critical t-value range; consequently no items are located outside the 95% confidence intervals (see Table 185 and Figure 125). According to Bond and Fox (2001) this means that the RD 4 scale and its items do not possess considerable gender bias, as all the items function invariantly across the male and female groups.

Table 185: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
RD 4 (14)	0.07	-0.07	-0.07	0.09	0.10	-0.14	0.13	0.13	-0.14	1.05
RD 4 (46)	0.73	0.47	0.47	0.10	0.11	0.45	0.75	0.75	0.45	1.76
RD 4 (71)	-2.20	-1.88	-1.88	0.12	0.13	-2.22	-1.86	-1.86	-2.22	-1.80
RD 4 (131)	0.20	0.09	0.09	0.09	0.11	0.00	0.29	0.29	0.00	0.79
RD 4 (156)	0.50	0.71	0.71	0.09	0.11	0.46	0.75	0.75	0.46	-1.47
RD 4 (193)	0.71	0.68	0.68	0.10	0.11	0.55	0.84	0.84	0.55	0.21

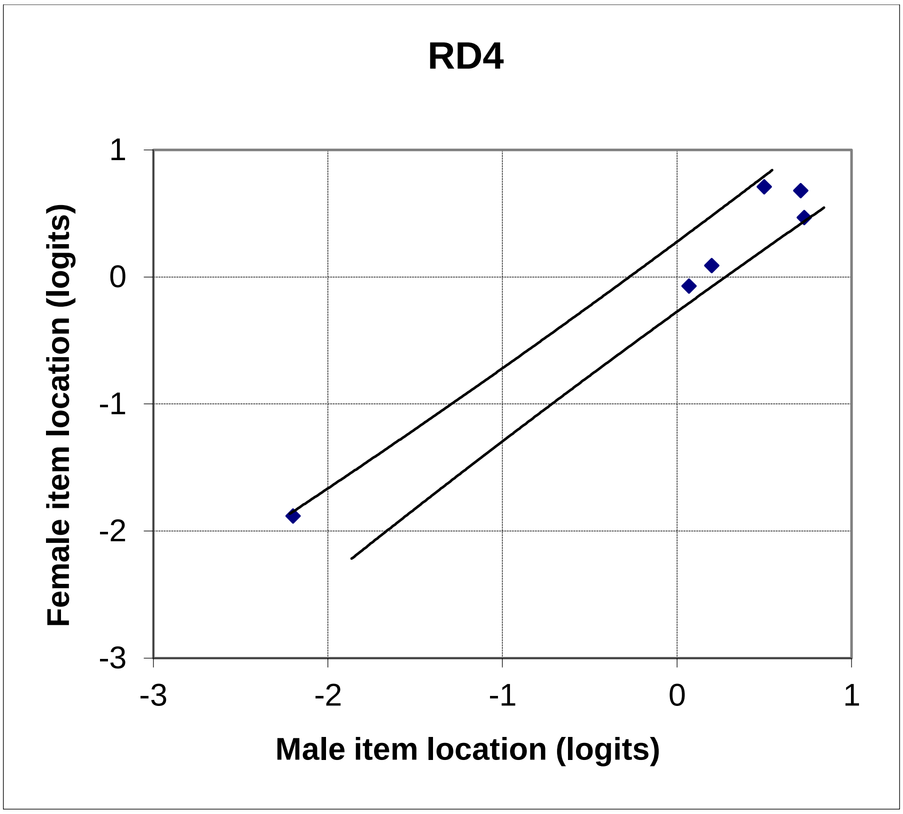

Figure 125: Differential Item Functioning for Female-Male Comparison

4.6.4 Results Illustrating the Degree of Item Invariance across Gender Group Comparisons for the Persistence Scale

The results presented in Table 186 illustrates that the t-values for only two of the scale's eight items falls outside the critical t-value range. Figure 126 also shows the two items which are located outside the 95% confidence bands. Items PS (11) (t=2.97) and PS (205) (t=-2.38) do not retain their measurement properties across the gender groups. These items do possess a significant degree of gender bias, as their measurement properties are significantly confounded by the gender of the respondent it is measuring (Bond & Fox, 2001). More than 5% of the scale's items are located outside the boundary, which means that the persistence scale does possess a significant degree of gender bias (Bond & Fox, 2001).

Table 186: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
PS (11)	1.15	0.75	0.75	0.09	0.10	0.82	1.08	1.08	0.82	2.97
PS (37)	-0.62	-0.72	-0.72	0.12	0.13	-0.85	-0.49	-0.49	-0.85	0.57
PS (62)	-0.37	-0.46	-0.46	0.11	0.12	-0.58	-0.25	-0.25	-0.58	0.55
PS (103)	-2.21	-1.91	-1.91	0.20	0.18	-2.33	-1.79	-1.79	-2.33	-1.11
PS (128)	2.12	2.31	2.31	0.10	0.12	2.06	2.37	2.37	2.06	-1.22
PS (166)	-0.89	-1.13	-1.13	0.13	0.14	-1.20	-0.82	-0.82	-1.20	1.26
PS (205)	1.16	1.48	1.48	0.09	0.10	1.19	1.45	1.45	1.19	-2.38
PS (218)	-0.34	-0.32	-0.32	0.11	0.12	-0.49	-0.17	-0.17	-0.49	-0.12

Figure 126: Differential Item Functioning for Female-Male Comparison

4.6.5 Results Illustrating the Degree of Item Invariance across Gender Group Comparisons for the Primary Self-Directedness Scale and Sub-scales

4.6.5.1 Primary Scale - Male Respondents Compared to Female Respondents

Table 187 illustrates that the t-values of 13 of the 42 SD items exceed the critical t-value range. Figure 127 shows that most of these items are located only just outside the 95% confidence intervals. These items do not retain their measurement properties across the gender groups. All these items possess some degree of gender bias when assessing the SD construct (Bond & Fox, 2001). In other words these items have a different effect on female than male scores when measuring the SD items. A simple division calculation shows that 30% of the scale's items are plotted outside the confidence boundaries. According to Bond and Fox (2001) this indicates that the SD scale does not function invariantly across the two groups and possess a significant degree of gender bias.

Table 187: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
SD 1 (4)	0.43	0.21	0.21	0.09	0.11	0.18	0.46	0.46	0.18	1.57
SD 1 (24)	2.91	2.44	2.44	0.10	0.11	2.52	2.82	2.82	2.52	3.19
SD 1 (58)	0.27	0.28	0.28	0.09	0.11	0.13	0.42	0.42	0.13	-0.05
SD 1 (86)	-0.72	-1.07	-1.07	0.12	0.16	-1.10	-0.70	-0.70	-1.10	1.77
SD 1 (121)	0.74	1.16	1.16	0.09	0.10	0.81	1.08	1.08	0.81	-3.10
SD 1 (151)	-1.88	-1.80	-1.80	0.19	0.21	-2.12	-1.56	-1.56	-2.12	-0.27
SD 1 (169)	0.70	0.85	0.85	0.09	0.10	0.64	0.91	0.91	0.64	-1.09
SD 1 (198)	-0.37	-0.52	-0.52	0.11	0.13	-0.62	-0.28	-0.28	-0.62	0.90
SD 2 (9)	0.80	1.20	1.20	0.09	0.10	0.86	1.13	1.13	0.86	-2.95
SD 2 (30)	-0.30	-0.16	-0.16	0.11	0.12	-0.39	-0.07	-0.07	-0.39	-0.84
SD 2 (59)	-3.22	-3.28	-3.28	0.36	0.41	-3.80	-2.71	-2.71	-3.80	0.12
SD 2 (105)	0.18	0.42	0.42	0.10	0.10	0.16	0.44	0.44	0.16	-1.67
SD 2 (126)	-1.43	-1.43	-1.43	0.16	0.18	-1.67	-1.19	-1.19	-1.67	0.01
SD 2 (159)	0.39	-0.03	-0.03	0.09	0.11	0.04	0.32	0.32	0.04	2.98
SD 2 (177)	-1.88	-1.75	-1.75	0.19	0.20	-2.09	-1.54	-1.54	-2.09	-0.46
SD 2 (223)	-2.90	-2.99	-2.99	0.31	0.36	-3.42	-2.47	-2.47	-3.42	0.20
SD 3 (40)	-0.41	-0.41	-0.41	0.11	0.12	-0.57	-0.25	-0.25	-0.57	0.02
SD 3 (106)	-1.45	-0.93	-0.93	0.16	0.15	-1.41	-0.97	-0.97	-1.41	-2.35
SD 3 (171)	-0.17	0.26	0.26	0.10	0.11	-0.11	0.19	0.19	-0.11	-2.87
SD 3 (197)	0.62	0.68	0.68	0.09	0.10	0.51	0.78	0.78	0.51	-0.42
SD 3 (233)	-1.88	-1.93	-1.93	0.19	0.22	-2.20	-1.62	-1.62	-2.20	0.18
SD 4 (32)	0.92	0.50	0.50	0.09	0.10	0.57	0.84	0.84	0.57	3.15
SD 4 (60)	2.11	2.24	2.24	0.09	0.10	2.04	2.31	2.31	2.04	-0.94
SD 4 (74)	1.27	1.64	1.64	0.08	0.10	1.33	1.58	1.58	1.33	-2.86
SD 4 (85)	1.68	1.66	1.66	0.08	0.10	1.54	1.80	1.80	1.54	0.18
SD 4 (94)	0.76	0.60	0.60	0.09	0.10	0.54	0.81	0.81	0.54	1.22
SD 4 (107)	-0.05	0.41	0.41	0.10	0.10	0.04	0.32	0.32	0.04	-3.23
SD 4 (136)	0.98	0.80	0.80	0.08	0.10	0.76	1.02	1.02	0.76	1.43
SD 4 (150)	1.58	1.63	1.63	0.08	0.10	1.48	1.73	1.73	1.48	-0.36
SD 4 (179)	3.17	3.64	3.64	0.11	0.15	3.22	3.59	3.59	3.22	-2.51
SD 4 (214)	1.10	0.81	0.81	0.08	0.10	0.83	1.08	1.08	0.83	2.29
SD 4 (229)	0.82	0.60	0.60	0.09	0.10	0.57	0.84	0.84	0.57	1.66
SD 5 (17)	-2.13	-1.80	-1.80	0.21	0.21	-2.26	-1.67	-1.67	-2.26	-1.10
SD 5 (36)	-0.73	-0.77	-0.77	0.12	0.14	-0.94	-0.57	-0.57	-0.94	0.24
SD 5 (39)	0.00	-0.07	-0.07	0.10	0.11	-0.19	0.11	0.11	-0.19	0.49
SD 5 (90)	-1.78	-2.15	-2.15	0.18	0.24	-2.27	-1.67	-1.67	-2.27	1.25
SD 5 (104)	-0.46	-0.29	-0.29	0.11	0.12	-0.54	-0.21	-0.21	-0.54	-1.02
SD 5 (115)	1.75	1.66	1.66	0.08	0.10	1.58	1.83	1.83	1.58	0.73
SD 5 (135)	0.20	-0.11	-0.11	0.09	0.11	-0.10	0.19	0.19	-0.10	2.21
SD 5 (162)	-0.11	0.02	0.02	0.10	0.11	-0.20	0.10	0.10	-0.20	-0.85
SD 5 (184)	1.50	1.67	1.67	0.08	0.10	1.46	1.71	1.71	1.46	-1.30
SD 5 (196)	-1.96	-2.99	-2.99	0.20	0.36	-2.89	-2.06	-2.06	-2.89	2.51
SD 5 (207)	-1,38	-1,17	-1,17	0,16	0,16	-1,50	-1,05	-1,05	-1,50	-0,93
SD 5 (221)	0,33	0,29	0,29	0,09	0,11	0,17	0,45	0,45	0,17	0,28

Figure 127: Differential Item Functioning for Female-Male Comparison

4.6.5.2 Sub-scales – Male Respondents Compared to Female Respondents

4.6.5.2.1 SD 1 Item Functioning across Different Gender Groups

Table 188 points out that the t-values for two of the SD 1 items falls outside the critical t-value range. Figure 128 shows that these two items are located just outside the 95% confidence bands. Items SD 1 (121) (t=-4.09) and SD 1 (24) (t=2.88) do not retain their measurement properties across the gender groups. According to Bond and Fox (2001) these items possess a considerable degree of gender bias, as their measurement properties are significantly confounded by the gender of the respondent it is measuring. Despite the fact that six of the eight items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the acceptable boundaries. This means that the SD 1 sub-scale does not function invariantly across the two gender groups, and does possess a significant degree of gender bias (Bond & Fox, 2001).

Table 188: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
SD 1 (4)	0.15	-0.02	-0.02	0.10	0.12	-0.09	0.22	0.22	-0.09	1.08
SD 1 (24)	3.21	2.72	2.72	0.12	0.12	2.80	3.14	3.14	2.80	2.88
SD 1 (58)	-0.02	0.06	0.06	0.10	0.11	-0.13	0.17	0.17	-0.13	-0.55
SD 1 (86)	-1.17	-1.47	-1.47	0.13	0.16	-1.53	-1.11	-1.11	-1.53	1.45
SD 1 (121)	0.53	1.11	1.11	0.09	0.11	0.68	0.96	0.96	0.68	-4.09
SD 1 (151)	-2.43	-2.27	-2.27	0.20	0.22	-2.65	-2.05	-2.05	-2.65	-0.54
SD 1 (169)	0.48	0.73	0.73	0.09	0.11	0.46	0.75	0.75	0.46	-1.77
SD 1 (198)	-0.76	-0.86	-0.86	0.12	0.14	-0.99	-0.62	-0.62	-0.99	0.54

Figure 128: Differential Item Functioning for Female-Male Comparison

4.6.5.2.2 SD 2 Item Functioning across Different Gender Groups

Table 189 illustrate that the t-values for two of the SD 2 items falls outside the -1.96 and +1.96 critical t-value range (also see Figure 129). Items SD 2 (159) (t=3.91) and SD 2 (9) (t=-2.69) both exceed the critical t-value range and do not retain their measurement properties across the gender groups. These items possess a considerable degree of gender bias, as their measurement properties are significantly confounded by the gender of the group they are measuring. Despite the fact that six items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the boundaries. This means that the SD 2 sub-scale does not function invariantly across the two gender groups, which imply that the scale does not measure the construct in the same way across both male and female groups. According to Bond and Fox (2001) this points out gender bias.

Table 189: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
SD 2 (9)	2.13	2.53	2.53	0.10	0.11	2.18	2.48	2.48	2.18	-2.69
SD 2 (30)	0.77	0.85	0.85	0.12	0.12	0.64	0.98	0.98	0.64	-0.47
SD 2 (59)	-2.40	-2.31	-2.31	0.36	0.39	-2.89	-1.82	-1.82	-2.89	-0.17
SD 2 (105)	1.37	1.54	1.54	0.10	0.11	1.31	1.60	1.60	1.31	-1.14
SD 2 (126)	-0.50	-0.55	-0.55	0.17	0.18	-0.77	-0.28	-0.28	-0.77	0.20
SD 2 (159)	1.61	1.00	1.00	0.10	0.12	1.15	1.46	1.46	1.15	3.91
SD 2 (177)	-0.92	-0.89	-0.89	0.19	0.21	-1.19	-0.62	-0.62	-1.19	-0.11
SD 2 (223)	-2.06	-2.17	-2.17	0.31	0.36	-2.59	-1.64	-1.64	-2.59	0.23

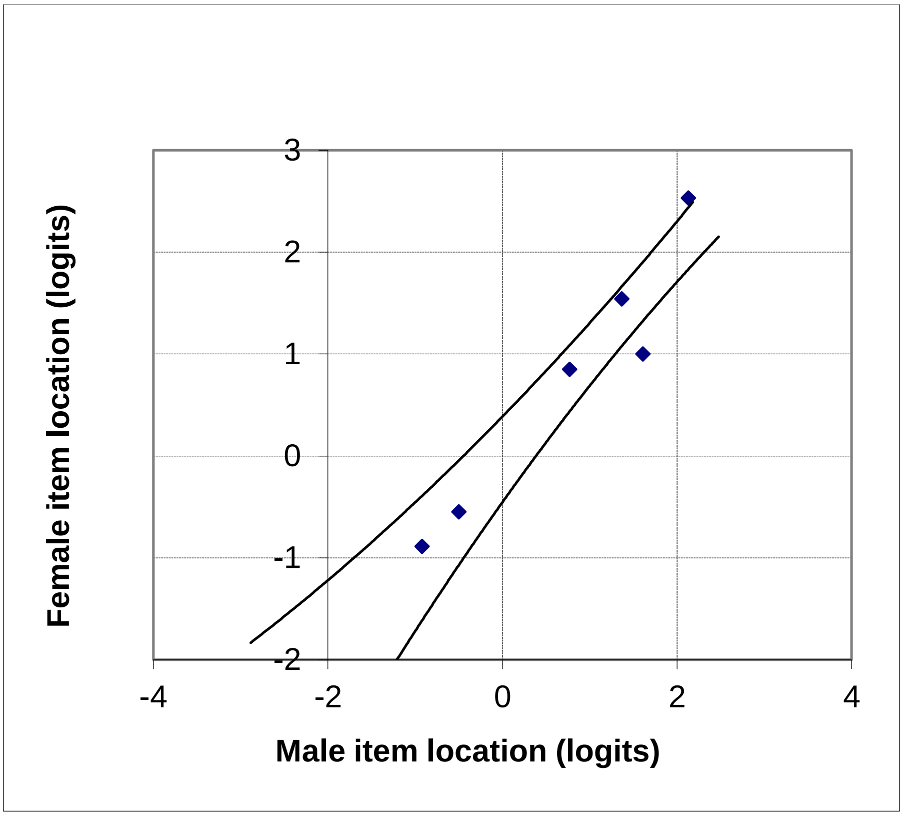

Figure 129: Differential Item Functioning for Female-Male Comparison

4.6.5.2.3 SD 3 Item Functioning across Different Gender Groups

Table 190 illustrates that the t-values for all the items except one falls within the critical t-value range. Figure 130 depicts the item which is located outside the 95% confidence bands. Item SD 3 (171) (t=-2.02) does not retain its measurement properties across the gender groups, which implies that the item's measurement properties are significantly confounded by the gender of the group it is assessing. Despite the fact that four of the five items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside. According to Bond and Fox (2001) this means that the SD 3 scale does possess a significant degree of gender bias, as it does not function invariantly across the two gender groups.

Table 190: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
SD 3 (40)	0.24	0.01	0.01	0.13	0.14	-0.07	0.32	0.32	-0.07	1.21
SD 3 (106)	-1.04	-0.65	-0.65	0.17	0.16	-1.08	-0.61	-0.61	-1.08	-1.66
SD 3 (171)	0.56	0.92	0.92	0.12	0.13	0.56	0.92	0.92	0.56	-2.02
SD 3 (197)	1.74	1.55	1.55	0.12	0.13	1.47	1.82	1.82	1.47	1.09
SD 3 (233)	-1.50	-1.84	-1.84	0.20	0.24	-1.98	-1.36	-1.36	-1.98	1.09

Figure 130: Differential Item Functioning for Female-Male Comparison

4.6.5.2.4 SD 4 Item Functioning across Different Gender Groups

Table 191 illustrates that the t-values for almost half of the scale's items exceed the critical t-values of -1.96 and +1.96 (also see Figure 131). Items SD 4 (32) (t=3.44), SD 4 (107) (t=-3.41), SD 4 (74) (t=-3.05), SD 4 (214) (t=2.46), and SD 4 (179) (t=-2.25) do not retain their measurement properties across both gender groups. All five of these items are considered to possess a significant degree of gender bias when assessing the SD 4 construct (Bond & Fox, 2001). Approximately 45% of SD 4 items are located outside the 95% confidence bands, which suggest that the SD 4 sub-scale does not function invariantly across the two gender groups. In other words the SD 4 scale has a different effect on female than on male scores, which according to Bond and Fox (2001) points out that the scale possesses a significant degree of gender bias.

Table 191: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
SD 4 (32)	-0.47	-0.96	-0.96	0.09	0.11	-0.86	-0.57	-0.57	-0.86	3.44
SD 4 (60)	0.96	1.08	1.08	0.10	0.11	0.87	1.17	1.17	0.87	-0.81
SD 4 (74)	-0.04	0.37	0.37	0.09	0.10	0.03	0.30	0.30	0.03	-3.05
SD 4 (85)	0.44	0.40	0.40	0.09	0.10	0.29	0.55	0.55	0.29	0.29
SD 4 (94)	-0.64	-0.83	-0.83	0.09	0.11	-0.88	-0.59	-0.59	-0.88	1.33
SD 4 (107)	-1.60	-1.07	-1.07	0.11	0.11	-1.49	-1.18	-1.18	-1.49	-3.41
SD 4 (136)	-0.37	-0.60	-0.60	0.09	0.11	-0.63	-0.34	-0.34	-0.63	1.61
SD 4 (150)	0.32	0.37	0.37	0.09	0.10	0.21	0.48	0.48	0.21	-0.38
SD 4 (179)	2.23	2.68	2.68	0.12	0.16	2.26	2.66	2.66	2.26	-2.25
SD 4 (214)	-0.25	-0.60	-0.60	0.09	0.11	-0.57	-0.28	-0.28	-0.57	2.46
SD 4 (229)	-0.58	-0.83	-0.83	0.09	0.11	-0.85	-0.56	-0.56	-0.85	1.75

Figure 131: Differential Item Functioning for Female-Male Comparison

4.6.5.2.5 SD 5 Item Functioning across Different Gender Groups

The results presented in Table 192 illustrates that the t-values for only two of the SD 5 items exceed the critical t-value range. This is also evident in Figure 132, which depicts that the two items that are located just outside the 95% confidence bands. Items SD 5 (196) (t=2.38) and SD 5 (184) (t=-2.25) do not retain their measurement properties across the gender groups. These items measurement properties are significantly confounded by the gender of the group it is assessing, which implies that they possess a significant degree of gender bias. Despite the fact that ten of the twelve items are located inside the 95% confidence bands, more than 5% of the scale's items are located outside the boundaries. According to Bond and Fox (2001) this means that the SD 5 sub-scale does not function invariantly across the two gender groups; and consequently possesses a significant degree of gender bias.

Table 192: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
SD 5 (17)	-1.87	-1.46	-1.46	0.22	0.21	-1.97	-1.36	-1.36	-1.97	-1.35
SD 5 (36)	-0.41	-0.36	-0.36	0.13	0.14	-0.58	-0.19	-0.19	-0.58	-0.26
SD 5 (39)	0.39	0.38	0.38	0.10	0.12	0.23	0.54	0.54	0.23	0.07
SD 5 (90)	-1.47	-1.76	-1.76	0.18	0.24	-1.92	-1.32	-1.32	-1.92	0.97
SD 5 (104)	-0.11	0.14	0.14	0.12	0.13	-0.16	0.19	0.19	-0.16	-1.41
SD 5 (115)	2.43	2.43	2.43	0.09	0.11	2.29	2.57	2.57	2.29	0.01
SD 5 (135)	0.64	0.36	0.36	0.10	0.12	0.34	0.66	0.66	0.34	1.80
SD 5 (162)	0.26	0.48	0.48	0.11	0.12	0.21	0.53	0.53	0.21	-1.35
SD 5 (184)	2.11	2.43	2.43	0.09	0.11	2.13	2.41	2.41	2.13	-2.25
SD 5 (196)	-1.69	-2.67	-2.67	0.20	0.36	-2.59	-1.77	-1.77	-2.59	2.38
SD 5 (207)	-1.06	-0.78	-0.78	0.16	0.16	-1.15	-0.69	-0.69	-1.15	-1.23
SD 5 (221)	0.78	0.80	0.80	0.10	0.11	0.64	0.94	0.94	0.64	-0.13

Figure 132: Differential Item Functioning for Female-Male Comparison

4.6.6 Results Illustrating the Degree of Item Invariance across Gender Group Comparisons for the Primary Cooperativeness Scale and Sub-scales

4.6.6.1 <u>Primary Scale - Male Respondents Compared to Female Respondents</u>

Table 193 illustrates that the t-values for nine of the 41 items of the Cooperativeness scale exceed the critical t-value range. Figure 133 shows that most of these items are located just outside the 95% confidence intervals; these items do not retain their measurement properties across the gender groups, and therefore possess a considerable degree of gender bias when assessing this construct. Just less than 23% of the scale's items are located outside the confidence boundaries, which indicates that the C scale does not function invariantly across the two groups and possess some degree of gender bias when assessing the C construct (Bond & Fox, 2001).

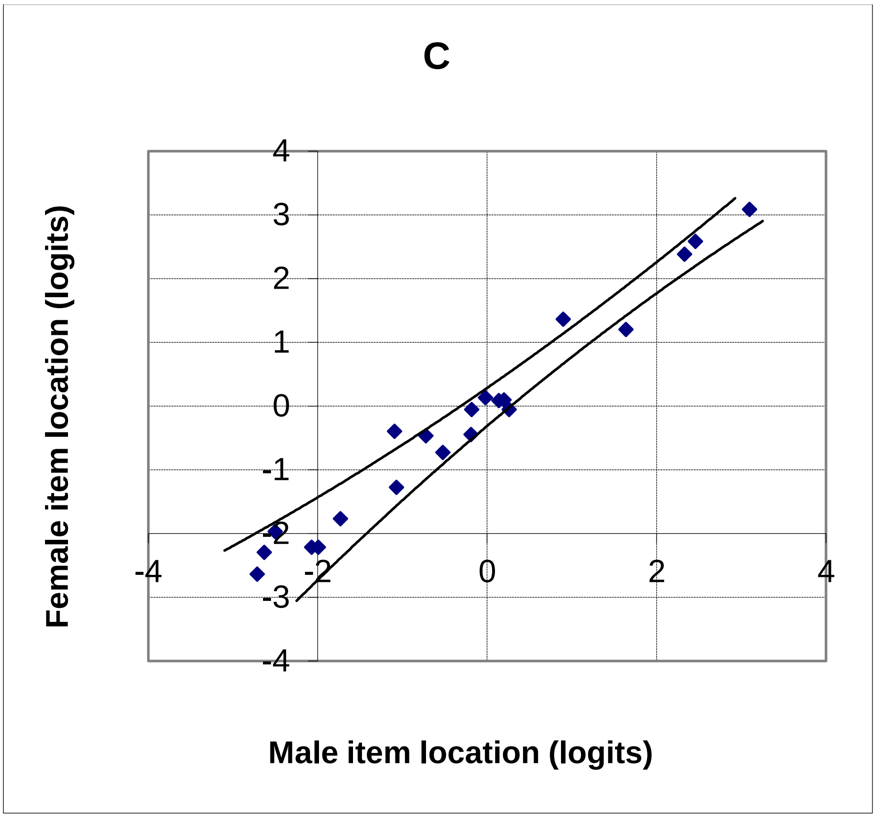

Figure 133: Differential Item Functioning for Female-Male Comparison

Table 193: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
C 1 (5)	-1.73	-1.77	-1.77	0.18	0.22	-2.03	-1.47	-1.47	-2.03	0.14
C 1 (16)	-1.09	-0.40	-0.40	0.14	0.13	-0.94	-0.55	-0.55	-0.94	-3.61
C 1 (48)	0.20	0.09	0.09	0.09	0.11	0.00	0.29	0.29	0.00	0.78
C 1 (89)	-2.71	-2.64	-2.64	0.28	0.32	-3.10	-2.25	-2.25	-3.10	-0.16
C 1 (122)	-0.18	-0.06	-0.06	0.10	0.12	-0.28	0.04	0.04	-0.28	-0.77
C 1 (133)	-0.72	-0.47	-0.47	0.12	0.13	-0.77	-0.42	-0.42	-0.77	-1.41
C 1 (172)	-2.07	-2.22	-2.22	0.21	0.26	-2.48	-1.81	-1.81	-2.48	0.45
C 1 (234)	1.64	1.20	1.20	0.08	0.09	1.30	1.54	1.54	1.30	3.66
C 2 (25)	-0.19	-0.45	-0.45	0.10	0.13	-0.48	-0.16	-0.16	-0.48	1.59
C 2 (49)	-0.02	0.13	0.13	0.10	0.11	-0.09	0.20	0.20	-0.09	-1.01
C 2 (73)	-1.07	-1.28	-1.28	0.14	0.18	-1.40	-0.95	-0.95	-1.40	0.92
C 2 (137)	0.14	0.08	0.08	0.09	0.11	-0.03	0.25	0.25	-0.03	0.43
C 2 (161)	-0.52	-0.73	-0.73	0.11	0.14	-0.80	-0.45	-0.45	-0.80	1.18
C 2 (185)	0.90	1.36	1.36	0.08	0.09	1.01	1.25	1.25	1.01	-3.82
C 2 (227)	2.33	2.38	2.38	0.09	0.10	2.22	2.49	2.49	2.22	-0.37
C 3 (10)	-2.63	-2.30	-2.30	0.27	0.27	-2.85	-2.08	-2.08	-2.85	-0.86
C 3 (47)	3.10	3.08	3.08	0.11	0.12	2.93	3.25	3.25	2.93	0.13
C 3 (64)	0.26	-0.06	-0.06	0.09	0.12	-0.05	0.25	0.25	-0.05	2.14
C 3 (87)	-1.99	-2.22	-2.22	0.20	0.26	-2.43	-1.78	-1.78	-2.43	0.70
C 3 (127)	-2.50	-1.97	-1.97	0.25	0.24	-2.58	-1.89	-1.89	-2.58	-1.53
C 3 (153)	2.46	2.58	2.58	0.09	0.11	2.38	2.66	2.66	2.38	-0.84
C 3 (178)	-1.00	-0.71	-0.71	0.13	0.14	-1.05	-0.66	-0.66	-1.05	-1.52
C 3 (216)	2.41	2.52	2.52	0.09	0.11	2.32	2.61	2.61	2.32	-0.77
C 4 (7)	-1.26	-1.48	-1.48	0.15	0.19	-1.61	-1.13	-1.13	-1.61	0.91
C 4 (33)	-0.03	-0.47	-0.47	0.10	0.13	-0.41	-0.09	-0.09	-0.41	2.69
C 4 (57)	1.30	1.70	1.70	0.08	0.10	1.37	1.63	1.63	1.37	-3.12
C 4 (78)	-1.28	-1.25	-1.25	0.15	0.17	-1.49	-1.04	-1.04	-1.49	-0.13
C 4 (98)	2.74	2.48	2.48	0.10	0.10	2.47	2.75	2.75	2.47	1.84
C 4 (124)	-0.42	-0.49	-0.49	0.11	0.13	-0.63	-0.28	-0.28	-0.63	0.41
C 4 (146)	-0.30	-0.60	-0.60	0.11	0.14	-0.63	-0.27	-0.27	-0.63	1.69
C 4 (168)	-0.69	-0.65	-0.65	0.12	0.14	-0.85	-0.49	-0.49	-0.85	-0.21
C 4 (199)	-1.07	-1.16	-1.16	0.14	0.17	-1.34	-0.90	-0.90	-1.34	0.41
C 4 (222)	-1.61	-1.82	-1.82	0.17	0.22	-1.99	-1.44	-1.44	-1.99	0.76
C 5 (18)	2.66	2.33	2.33	0.10	0.10	2.35	2.64	2.64	2.35	2.34
C 5 (50)	0.43	0.18	0.18	0.09	0.11	0.16	0.45	0.45	0.16	1.76
C 5 (72)	0.43	-0.09	-0.09	0.09	0.12	0.02	0.32	0.32	0.02	3.47
C 5 (93)	-0.31	-0.47	-0.47	0.11	0.13	-0.56	-0.22	-0.22	-0.56	0.94
C 5 (138)	0.93	1.12	1.12	0.08	0.10	0.90	1.15	1.15	0.90	-1.48
C 5 (160)	0.64	0.79	0.79	0.09	0.10	0.58	0.85	0.85	0.58	-1.11
C 5 (186)	-1.80	-1.82	-1.82	0.19	0.22	-2.10	-1.52	-1.52	-2.10	0.07
C 5 (206)	2.25	2.73	2.73	0.09	0.11	2.35	2.63	2.63	2.35	-3.37
C 5 (235)	2.41	2.85	2.85	0.09	0.11	2.49	2.77	2.77	2.49	-3.09

4.6.6.2 Sub-scales – Male Respondents Compared to Female Respondents

4.6.6.2.1 C 1 Item Functioning across Different Gender Groups

Table 194 illustrates that the t-values for only two items exceed the critical t-value range (t=-1.96/1.96). Figure 134 shows that these two items are located outside the 95% confidence bands. The measurement properties of items C 1 (16) (t=-3.98) and C 1 (234) (t=5.26) are significantly confounded by the gender of the group it is assessing, this is evident in the fact that both these items do not retain the same measurement properties when assessing the construct across both gender groups. More than 5% of the scale's items are located outside the confidence boundaries, which indicate that the C 1 sub-scale does not function invariantly across the two gender groups. According to Bond and Fox (2001) this variance can be ascribed to a significant degree of bias.

Table 194: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
C 1 (5)	-1.18	-1.21	-1.21	0.19	0.23	-1.49	-0.90	-0.90	-1.49	0.11
C 1 (16)	-0.43	0.39	0.39	0.15	0.14	-0.23	0.18	0.18	-0.23	-3.98
C 1 (48)	1.22	1.02	1.02	0.11	0.13	0.95	1.29	1.29	0.95	1.19
C 1 (89)	-2.24	-2.19	-2.19	0.29	0.34	-2.66	-1.77	-1.77	-2.66	-0.11
C 1 (122)	0.71	0.82	0.82	0.12	0.13	0.59	0.94	0.94	0.59	-0.61
C 1 (133)	0.02	0.31	0.31	0.14	0.14	-0.03	0.36	0.36	-0.03	-1.45
C 1 (172)	-1.55	-1.72	-1.72	0.22	0.28	-1.99	-1.28	-1.28	-1.99	0.48
C 1 (234)	3.47	2.58	2.58	0.12	0.12	2.85	3.19	3.19	2.85	5.26

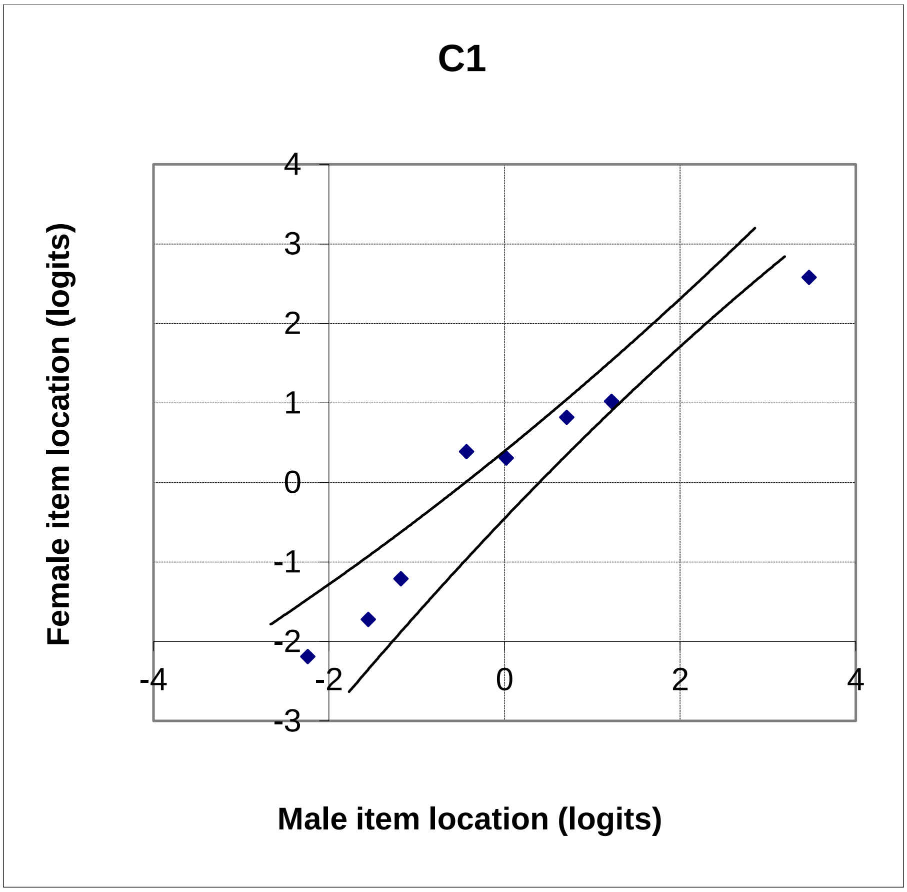

Figure 134: Differential Item Functioning for Female-Male Comparison

4.6.6.2.2 C 2 Item Functioning across Different Gender Groups

Table 195 illustrates that the t-values for all the items except one does not exceed the critical t-value range (also see Figure 135). According to Bond and Fox (2001) item C 2 (185) (t=-3.75) possesses a considerable degree of gender bias as its measurement properties vary significantly across the gender groups which are being assessed. Despite the fact that six of the seven items are located within the confidence bands, more than 5% of the scale's items are located outside the confidence boundaries, this means that the C 2 sub-scale does not function invariantly across the two gender groups.

Table 195: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
C 2 (25)	-0.48	-0.75	-0.76	0.11	0.13	-0.79	-0.45	-0.45	-0.79	1.62
C 2 (49)	-0.29	-0.12	-0.13	0.10	0.12	-0.36	-0.05	-0.05	-0.36	-1.05
C 2 (73)	-1.42	-1.62	-1.63	0.14	0.18	-1.75	-1.29	-1.29	-1.75	0.90
C 2 (137)	-0.12	-0.17	-0.18	0.10	0.12	-0.30	0.01	0.01	-0.30	0.36
C 2 (161)	-0.83	-1.04	-1.05	0.12	0.15	-1.13	-0.75	-0.75	-1.13	1.12
C 2 (185)	0.74	1.25	1.24	0.09	0.10	0.86	1.13	1.13	0.86	-3.75
C 2 (227)	2.42	2.43	2.42	0.10	0.11	2.27	2.57	2.57	2.27	-0.03

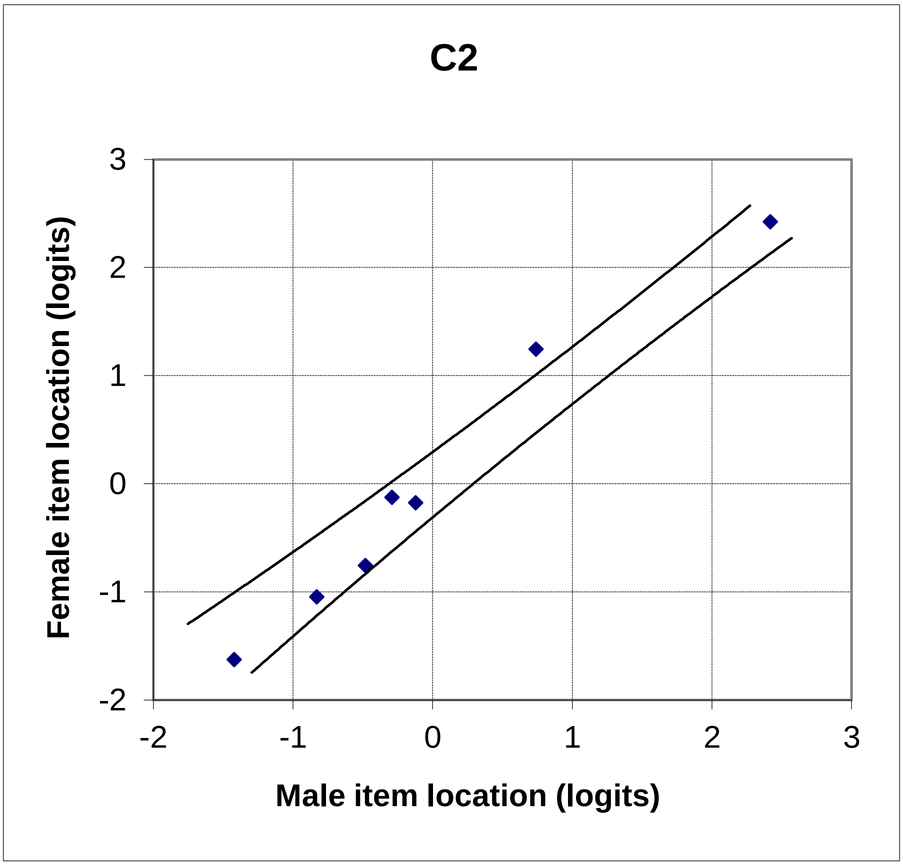

Figure 135: Differential Item Functioning for Female-Male Comparison

4.6.6.2.3 C 3 Item Functioning across Different Gender Groups

The t-value for only one item of the C 3 scale exceeds the critical t-value range (see Table 196 and Figure 136). Item C 3 (64) (t=3.06) measurement properties vary significantly across the two gender groups, which means that the item possesses a considerable degree of gender bias. More than 5% of the scale's items are located outside the boundary, which according to Bond and Fox (2001) is enough evidence to prove that the scale is functioning in a biased manner.

Table 196: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
C 3 (10)	-3.11	-2.78	-2.78	0.28	0.28	-3.34	-2.55	-2.55	-3.34	-0.83
C 3 (47)	3.75	3.52	3.52	0.12	0.13	3.46	3.81	3.81	3.46	1.31
C 3 (64)	0.20	-0.30	-0.30	0.10	0.13	-0.22	0.11	0.11	-0.22	3.06
C 3 (87)	-2.41	-2.70	-2.70	0.21	0.27	-2.90	-2.21	-2.21	-2.90	0.86
C 3 (127)	-2.96	-2.43	-2.43	0.26	0.24	-3.05	-2.34	-2.34	-3.05	-1.49
C 3 (153)	2.95	2.90	2.90	0.10	0.12	2.77	3.08	3.08	2.77	0.34
C 3 (178)	-1.30	-1.05	-1.05	0.14	0.15	-1.38	-0.97	-0.97	-1.38	-1.21
C 3 (216)	2.89	2.83	2.83	0.10	0.12	2.70	3.01	3.01	2.70	0.40

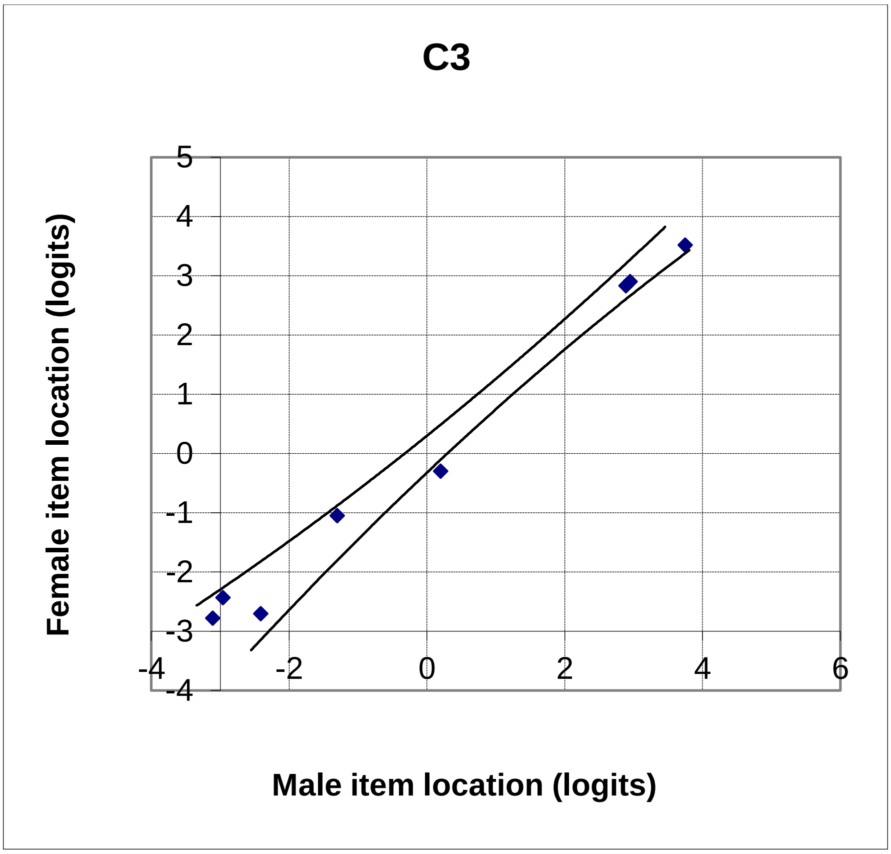

Figure 136: Differential Item Functioning for Female-Male Comparison

4.6.6.2.4 C 4 Item Functioning across Different Gender Groups

Table 197 illustrates that the t-values for two of C 4 scale's items exceed the critical t-value range. This is also evident in Figure 137, which shows that the same two items are located just outside the 95% confidence intervals. Item's C 4 (57) (t=-5.81) and C 4 (33) (t=2.04) do not retain their measurement properties across the gender groups, and are functioning in a biased manner. Only 80% of the scale's items are located inside the 95% confidence intervals, which mean that the C 4 sub-scale does not function invariantly across the two gender groups. Consequently it could be argued that the scale functions with a significant level of gender bias (Bond & Fox, 2001).

Table 197: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
C 4 (7)	-1.28	-1.35	-1.35	0.16	0.19	-1.56	-1.07	-1.07	-1.56	0.27
C 4 (33)	0.26	-0.09	-0.09	0.11	0.13	-0.08	0.26	0.26	-0.08	2.04
C 4 (57)	1.99	2.77	2.77	0.09	0.10	2.25	2.52	2.52	2.25	-5.81
C 4 (78)	-1.31	-1.22	-1.22	0.17	0.18	-1.51	-1.02	-1.02	-1.51	-0.37
C 4 (98)	4.00	3.82	3.82	0.12	0.12	3.74	4.08	4.08	3.74	1.05
C 4 (124)	-0.23	-0.12	-0.12	0.12	0.13	-0.35	0.00	0.00	-0.35	-0.63
C 4 (146)	-0.09	-0.29	-0.29	0.12	0.14	-0.37	0.00	0.00	-0.37	1.07
C 4 (168)	-0.58	-0.43	-0.43	0.13	0.15	-0.70	-0.31	-0.31	-0.70	-0.77
C 4 (199)	-1.06	-1.06	-1.06	0.15	0.17	-1.29	-0.83	-0.83	-1.29	-0.01
C 4 (222)	-1.71	-2.02	-2.02	0.19	0.24	-2.17	-1.56	-1.56	-2.17	1.01

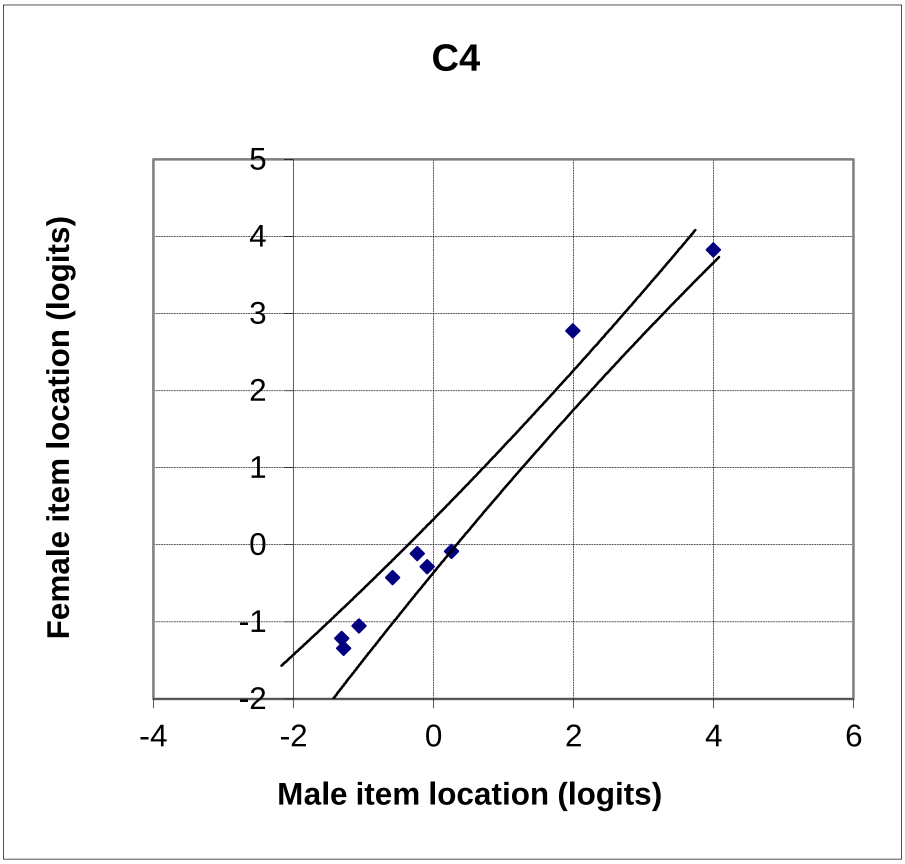

Figure 137: Differential Item Functioning for Female-Male Comparison

4.6.6.2.5 C 5 Item Functioning across Different Gender Groups

The t-values for only two of the C 5 items (C 5-72, t=3.74 and C 5-18, t=2.70) exceed the critical t-value range, which implies a significant degree of gender bias when assessing the C 5 construct (see Table 198 and Figure 138). Consequently more than 5% of the scale's items are located outside the confidence boundaries. This means that the C 5 sub-scale does not function invariantly across the two gender groups. According to Bond and Fox (2001) this scale's measurement properties are probably confounded by the gender of the groups it is assessing.

Table 198: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
C 5 (18)	2.03	1.63	1.63	0.10	0.11	1.68	1.98	1.98	1.68	2.70
C 5 (50)	-0.48	-0.75	-0.75	0.09	0.11	-0.76	-0.47	-0.47	-0.76	1.91
C 5 (72)	-0.48	-1.04	-1.04	0.09	0.12	-0.91	-0.61	-0.61	-0.91	3.74
C 5 (93)	-1.30	-1.45	-1.45	0.11	0.14	-1.55	-1.20	-1.20	-1.55	0.85
C 5 (138)	0.08	0.28	0.28	0.09	0.10	0.04	0.31	0.31	0.04	-1.48
C 5 (160)	-0.24	-0.08	-0.08	0.09	0.10	-0.30	-0.03	-0.03	-0.30	-1.18
C 5 (186)	-2.89	-2.87	-2.87	0.19	0.22	-3.17	-2.59	-2.59	-3.17	-0.06
C 5 (206)	1.56	2.08	2.08	0.09	0.12	1.67	1.97	1.97	1.67	-3.46
C 5 (235)	1.74	2.21	2.21	0.10	0.12	1.82	2.13	2.13	1.82	-3.00

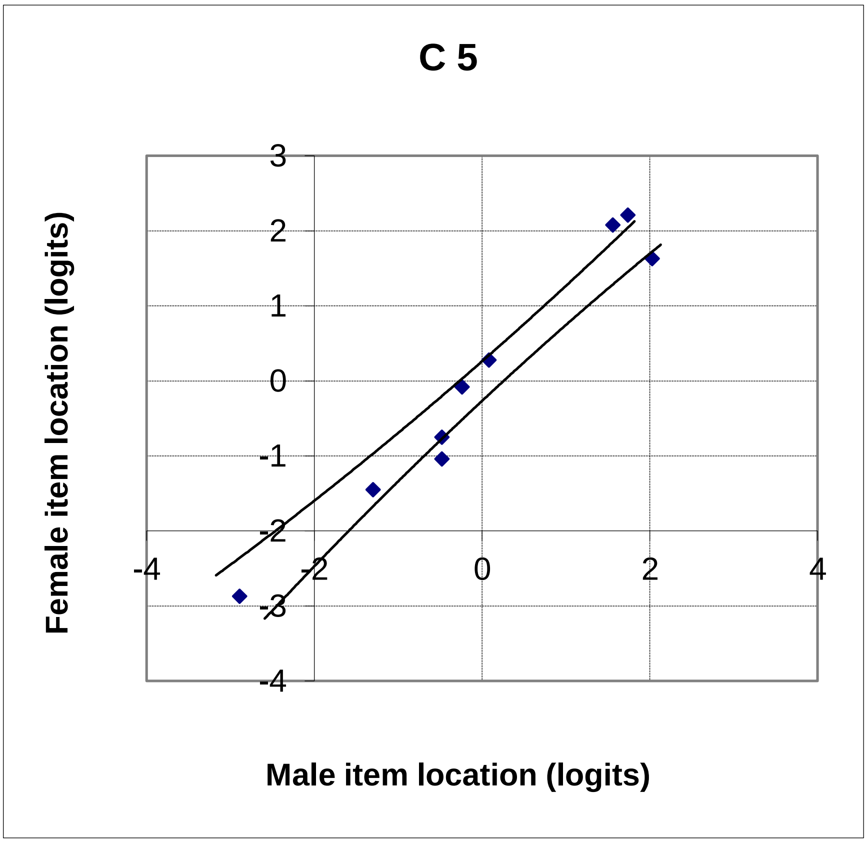

Figure 138: Differential Item Functioning for Female-Male Comparison

4.6.7 Results Illustrating the Degree of Item Invariance across Gender Group Comparisons for the Primary Self-Transcendence Scale and Sub-scales

4.6.7.1 Primary Scale - Male Respondents Compared to Female Respondents

Table 199 illustrates that the t-values for six of the 33 ST items exceed the critical t-value range (t=-1.96 and 1.96). Figure 139 shows that most of these items are located just outside the 95% confidence intervals. These items do not retain their measurement properties across the gender groups. All these items are considered to possess some degree of gender bias when assessing the ST construct (Bond & Fox, 2001). Just less than 18% of the scale's items are plotted outside the confidence boundaries. According to Bond and Fox (2001) this indicates that the ST scale does not function invariantly across the two groups. In other words the primary ST scale has a different effect on female scores than male scores.

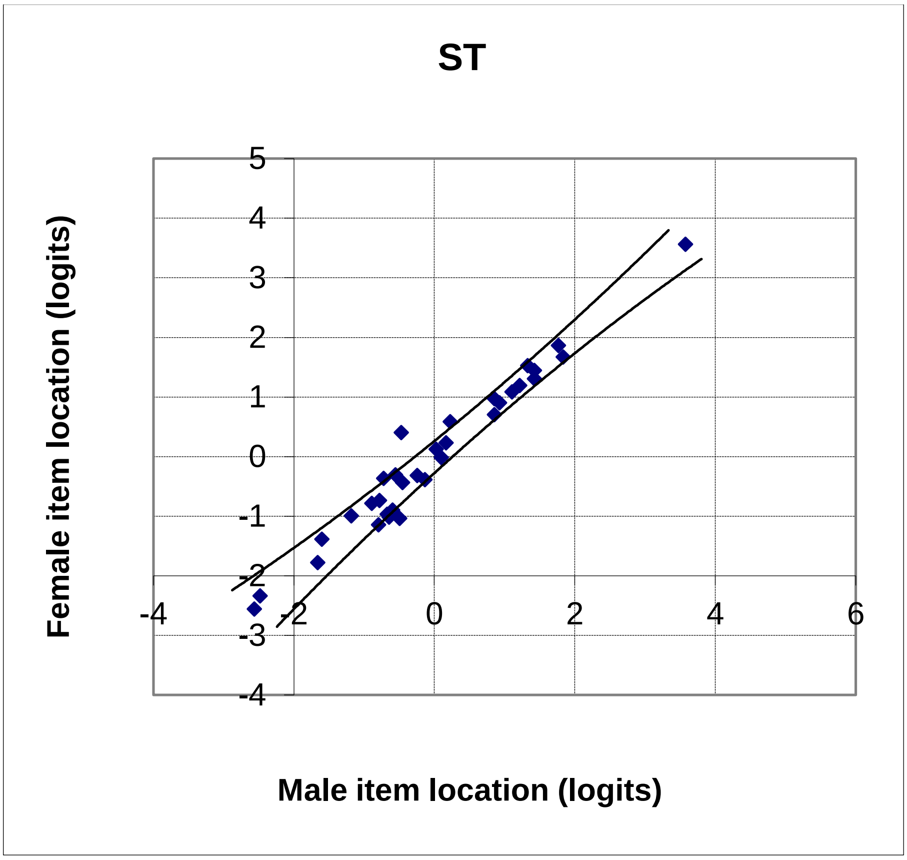

Figure 139: Differential Item Functioning for Female-Male Comparison

Table 199: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
ST 1 (8)	-1.73	-1.77	-1.77	0.18	0.22	-2.03	-1.47	-1.47	-2.03	0.14
ST 1 (23)	-1.09	-0.40	-0.40	0.14	0.13	-0.94	-0.55	-0.55	-0.94	-3.61
ST 1 (45)	0.20	0.09	0.09	0.09	0.11	0.00	0.29	0.29	0.00	0.78
ST 1 (76)	-2.71	-2.64	-2.64	0.28	0.32	-3.10	-2.25	-2.25	-3.10	-0.16
ST 1 (96)	-0.18	-0.06	-0.06	0.10	0.12	-0.28	0.04	0.04	-0.28	-0.77
ST 1 (125)	-0.72	-0.47	-0.47	0.12	0.13	-0.77	-0.42	-0.42	-0.77	-1.41
ST 1 (152)	-2.07	-2.22	-2.22	0.21	0.26	-2.48	-1.81	-1.81	-2.48	0.45
ST 1 (173)	1.64	1.20	1.20	0.08	0.09	1.30	1.54	1.54	1.30	3.66
ST 1 (195)	-0.19	-0.45	-0.45	0.10	0.13	-0.48	-0.16	-0.16	-0.48	1.59
ST 1 (215)	-0.02	0.13	0.13	0.10	0.11	-0.09	0.20	0.20	-0.09	-1.01
ST 1 (228)	-1.07	-1.28	-1.28	0.14	0.18	-1.40	-0.95	-0.95	-1.40	0.92
ST 2 (15)	0.14	0.08	0.08	0.09	0.11	-0.03	0.25	0.25	-0.03	0.43
ST 2 (31)	-0.52	-0.73	-0.73	0.11	0.14	-0.80	-0.45	-0.45	-0.80	1.18
ST 2 (51)	0.90	1.36	1.36	0.08	0.09	1.01	1.25	1.25	1.01	-3.82
ST 2 (84)	2.33	2.38	2.38	0.09	0.10	2.22	2.49	2.49	2.22	-0.37
ST 2 (95)	-2.63	-2.30	-2.30	0.27	0.27	-2.85	-2.08	-2.08	-2.85	-0.86
ST 2 (132)	3.10	3.08	3.08	0.11	0.12	2.93	3.25	3.25	2.93	0.13
ST 2 (163)	0.26	-0.06	-0.06	0.09	0.12	-0.05	0.25	0.25	-0.05	2.14
ST 2 (200)	-1.99	-2.22	-2.22	0.20	0.26	-2.43	-1.78	-1.78	-2.43	0.70
ST 2 (232)	-2.50	-1.97	-1.97	0.25	0.24	-2.58	-1.89	-1.89	-2.58	-1.53
ST 3 (6)	2.46	2.58	2.58	0.09	0.11	2.38	2.66	2.66	2.38	-0.84
ST 3 (38)	-1.00	-0.71	-0.71	0.13	0.14	-1.05	-0.66	-0.66	-1.05	-1.52
ST 3 (56)	2.41	2.52	2.52	0.09	0.11	2.32	2.61	2.61	2.32	-0.77
ST 3 (77)	-1.26	-1.48	-1.48	0.15	0.19	-1.61	-1.13	-1.13	-1.61	0.91
ST 3 (88)	-0.03	-0.47	-0.47	0.10	0.13	-0.41	-0.09	-0.09	-0.41	2.69
ST 3 (97)	1.30	1.70	1.70	0.08	0.10	1.37	1.63	1.63	1.37	-3.12
ST 3 (116)	-1.28	-1.25	-1.25	0.15	0.17	-1.49	-1.04	-1.04	-1.49	-0.13
ST 3 (123)	2.74	2.48	2.48	0.10	0.10	2.47	2.75	2.75	2.47	1.84
ST 3 (145)	-0.42	-0.49	-0.49	0.11	0.13	-0.63	-0.28	-0.28	-0.63	0.41
ST 3 (175)	-0.30	-0.60	-0.60	0.11	0.14	-0.63	-0.27	-0.27	-0.63	1.69
ST 3 (194)	-0.69	-0.65	-0.65	0.12	0.14	-0.85	-0.49	-0.49	-0.85	-0.21
ST 3 (208)	-1.07	-1.16	-1.16	0.14	0.17	-1.34	-0.90	-0.90	-1.34	0.41
ST 3 (220)	-1.61	-1.82	-1.82	0.17	0.22	-1.99	-1.44	-1.44	-1.99	0.76

4.6.7.2 Sub-scales – Male Respondents Compared to Female Respondents

4.6.7.2.1 ST 1 Item Functioning across Different Gender Groups

Table 200 shows that the t-values for all eleven ST 1 items do not exceed the critical t-value range (also see Figure 140). According to Bond and Fox (2001) this means that the ST 1 scale and its items functions invariantly across the male and female groups, and consequently does not possess a significant degree of gender bias.

Table 200: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
ST 1 (8)	1.27	1.52	1.52	0.10	0.11	1.25	1.54	1.54	1.25	-1.68
ST 1 (23)	3.41	3.46	3.46	0.16	0.18	3.19	3.68	3.68	3.19	-0.21
ST 1 (45)	0.19	0.14	0.14	0.09	0.10	0.03	0.30	0.30	0.03	0.37
ST 1 (76)	0.61	0.72	0.72	0.09	0.10	0.53	0.80	0.80	0.53	-0.82
ST 1 (96)	-1.76	-2.03	-2.03	0.12	0.15	-2.09	-1.70	-1.70	-2.09	1.41
ST 1 (125)	0.87	1.02	1.02	0.09	0.11	0.80	1.09	1.09	0.80	-1.06
ST 1 (152)	0.86	0.86	0.86	0.09	0.10	0.73	0.99	0.99	0.73	0.00
ST 1 (173)	-3.65	-3.39	-3.39	0.21	0.23	-3.83	-3.21	-3.21	-3.83	-0.83
ST 1 (195)	-1.53	-1.75	-1.75	0.11	0.14	-1.82	-1.46	-1.46	-1.82	1.24
ST 1 (215)	-1.62	-1.83	-1.83	0.11	0.14	-1.90	-1.55	-1.55	-1.90	1.18
ST 1 (228)	1.36	1.29	1.29	0.10	0.11	1.18	1.47	1.47	1.18	0.47

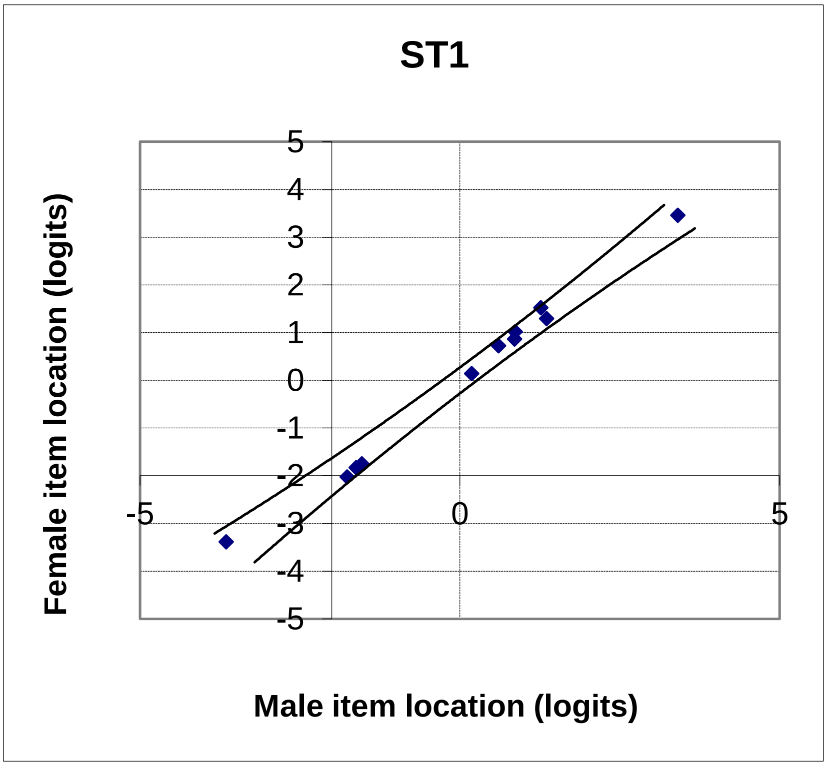

Figure 140: Differential Item Functioning for Female-Male Comparison

4.6.7.2.2 ST 2 Item Functioning across Different Gender Groups

Table 201 illustrates that the t-values for only two ST 2 items exceeds the critical t-value range. Figure 141 depicts these two items, and shows that they are located relatively far outside the 95% confidence bands. Items ST 2 (31) (t=-6.26) and ST 2 (232) (t=4.36) do not retain their measurement properties across the gender groups. According to Bond and Fox (2001) these items do possess a significant degree of gender bias, as their measurement properties are significantly confounded by the gender of the group it is evaluating. More than 5% of the scale's items are located outside the confidence boundaries, which points out that the ST 2 sub-scale does not function invariantly across the two gender groups. Consequently it can be argued that the scale does possess a considerable degree of gender bias.

Table 201: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
ST 2 (15)	-0.47	-0.39	-0.39	0.13	0.14	-0.62	-0.24	-0.24	-0.62	-0.44
ST 2 (31)	0.37	1.34	1.34	0.11	0.11	0.70	1.01	1.01	0.70	-6.26
ST 2 (51)	-0.95	-0.84	-0.84	0.15	0.16	-1.11	-0.67	-0.67	-1.11	-0.52
ST 2 (84)	-1.02	-1.28	-1.28	0.15	0.18	-1.38	-0.91	-0.91	-1.38	1.10
ST 2 (95)	0.28	0.44	0.44	0.11	0.12	0.20	0.52	0.52	0.20	-1.00
ST 2 (132)	0.41	0.28	0.28	0.11	0.12	0.18	0.51	0.51	0.18	0.78
ST 2 (163)	0.00	-0.08	-0.08	0.12	0.13	-0.22	0.14	0.14	-0.22	0.43
ST 2 (200)	1.02	0.98	0.98	0.10	0.11	0.85	1.15	1.15	0.85	0.25
ST 2 (232)	0.35	-0.43	-0.43	0.11	0.14	-0.22	0.14	0.14	-0.22	4.36

Figure 141: Differential Item Functioning for Female-Male Comparison

4.6.7.2.3 <u>ST 3 Item Functioning across Different Gender Groups</u>

Table 202 illustrates that the t-values for five items exceed the critical t-value range. Figure 141 shows that these items are plotted outside the 95% confidence intervals. Items ST 3 (77) (t=-4.44), ST 3 (6) (t=3.78), ST 3 (38) (t=-3.55), ST 3 (88) (t=2.98) and ST 3 (175) (t=-2.69) do not retain their measurement properties across the gender groups. According to Bond and Fox (2001) all five these items probably possess a significant degree of gender bias when assessing the ST 3 construct. In other words these items have a different effect on male than on female scores. Almost 38% of the ST 3 items are located outside the 95% confidence bands. According to Bond and Fox (2001) this means that the ST 3 sub-scale does not function invariantly across the two gender groups, which probably points out a certain degree of gender bias.

Table 202: Female Item Functioning vs. Male Item Functioning

Item name	Male measure	Female measure	Fem adjusted	Male error	Fem error	d-2*emale	d+2*efemale	d+2*emale	d-2*efemale	t-value
ST 3 (6)	-0.57	-1.28	-1.28	0.10	0.16	-1.11	-0.74	-0.74	-1.11	3.78
ST 3 (38)	0.84	1.32	1.32	0.09	0.10	0.94	1.21	1.21	0.94	-3.55
ST 3 (56)	-0.16	0.44	0.44	0.09	0.10	0.00	0.27	0.27	0.00	-4.44
ST 3 (77)	-0.18	-0.27	-0.27	0.09	0.12	-0.38	-0.08	-0.08	-0.38	0.62
ST 3 (88)	-2.34	-3.78	-3.78	0.18	0.45	-3.55	-2.58	-2.58	-3.55	2.98
ST 3 (97)	0.36	0.61	0.61	0.09	0.10	0.35	0.62	0.62	0.35	-1.84
ST 3 (116)	0.18	0.38	0.38	0.09	0.10	0.14	0.41	0.41	0.14	-1.47
ST 3 (123)	1.08	0.97	0.97	0.09	0.10	0.89	1.16	1.16	0.89	0.83
ST 3 (145)	1.14	1.38	1.38	0.09	0.10	1.12	1.39	1.39	1.12	-1.77
ST 3 (175)	-1.06	-0.60	-0.60	0.11	0.13	-1.00	-0.66	-0.66	-1.00	-2.69
ST 3 (194)	-0.46	-0.73	-0.73	0.10	0.13	-0.76	-0.43	-0.43	-0.76	1.66
ST 3 (208)	-0.31	-0.16	-0.16	0.10	0.11	-0.38	-0.09	-0.09	-0.38	-0.99
ST 3 (220)	1.50	1.71	1.71	0.09	0.10	1.47	1.74	1.74	1.47	-1.54

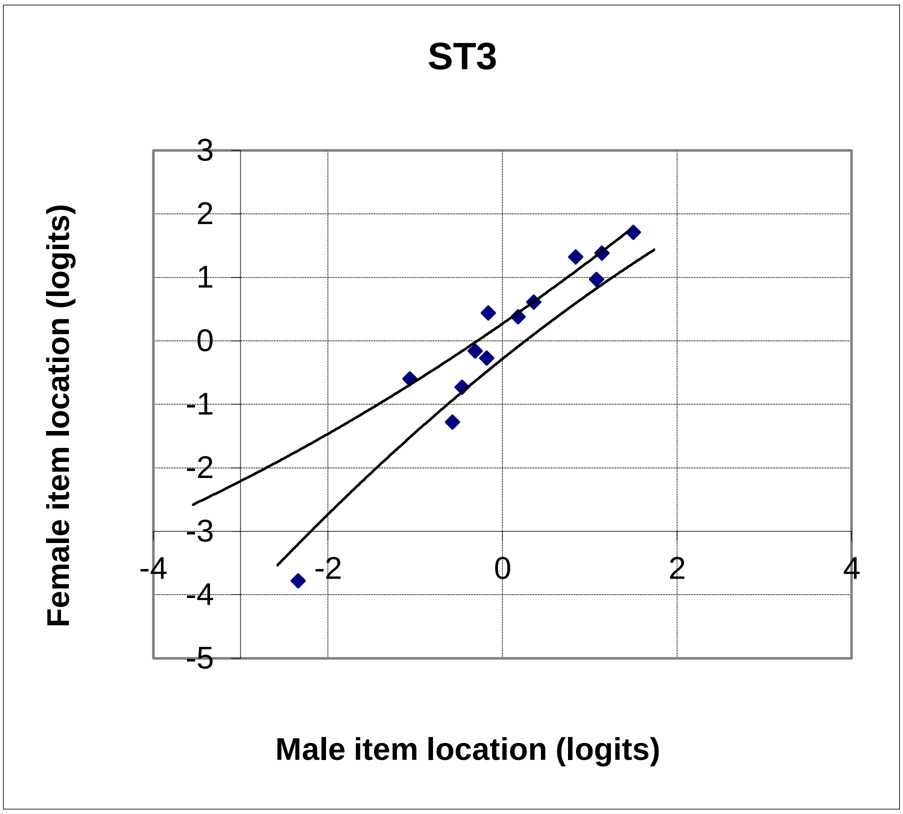

Figure 142: Differential Item Functioning for Female-Male Comparison

4.7 CONCLUSION

This section provides a summary of the results for each primary scale of the TCI. Each summary briefly discusses the results that relates to the validity, unidimensionality and reliability of each scale and sub-scale. Also included are the results derived from a revised analysis of the evidence indicating bias (see Section 4.5 and 4.6) for each item, sub-scale and primary scale, these results are also related to the respective hypotheses they pertain to (see Table 23).

4.7.1 Summary of the Novelty Seeking Scale

Several items of the NS scale are surplus and should either be flagged as problematic items or modified to occupy under represented logit regions (see Section 4.4.1). The primary NS scale's reliability value is relatively low, while item separation and reliability are high. The NS scale is proven to be unidimensional, which means that the scale exclusively measures one construct. The unidimensionality of the scale supports both the construct and content validity of the scale. This evidence provides some support for the H6 hypothesis. The novelty seeking scale's four sub-scales NS 1, NS 2, NS 3, and NS 4 all proved to be unidimensional, and showed a high degree of construct validity and item reliability.

A summary of the results derived from the invariance analyses' comparing the performance of the primary and four NS sub-scales between the different ethnic and gender groups is presented in Table 203. The table also indicates which columns of data pertain to the respective hypotheses (H1 – H5). The table shows the number of times each item functioned in a biased manner, such a biased occurrence is indicated with a one, while a zero points out that the item functioned in an invariant/unbiased manner. The criteria for variant or biased functioning are based on standards set out by Bond and Fox (2001). It is argued in this dissertation that these standards are extremely sensitive it was therefore revised as follows.

To establish ethnic bias on an item level, the performance of the item is evaluated in all three ethnic comparisons, if an item behaved in a biased manner in two or more instances the item is considered ethnically biased. According to this criteria only three items showed a high level of ethnic bias, these items are NS 1 (99), NS 2 (203), NS 3 (174), and NS 3 (219). This provides additional evidence to the evaluate hypothesis H 2 (see Section 3.4.2). To establish ethnic bias on a sub-scale or construct level, the sub-scale's items should function in a biased manner in more than 20% of the total item comparisons across groups. Only the NS 3 sub-scale performed in a biased manner (22%) according to the aforementioned criteria. This provides additional evidence to evaluate hypothesis H 4 (see Section 3.4.2). The items of the primary NS scale only performed in a biased/variant manner in 18% of comparisons (22/120), therefore the NS construct does not seem to show a significant degree of ethnic bias.

To establish gender bias on an item level, an item's performance is evaluated in both the primary scale and sub-scale comparisons, if an item behaved in a biased manner in one or more instances the item is categorised as being biased. The following items showed a high degree of gender bias NS 1 (52), NS 1 (211), NS 3 (19), NS 4 (34), NS 4 (79), NS 4 (91), and NS 4 (204). This provides additional evidence to evaluate hypothesis H 1 (see Section 3.4.2).

To establish gender bias on a sub-scale or construct level, the sub-scale's items should function in a biased manner in more than 20% of item comparisons across gender groups. Similarly to establish gender bias on a primary-scale or construct level, the NS scale's items should function in a biased manner in more than 20% of total item comparisons across gender groups. This evaluation renders additional evidence to evaluate hypotheses H 3 and H 5 (see Section 3.4.2)

Only the NS 4 sub-scale performed in a biased way (22%) according to the aforementioned criteria. The items of the primary NS scale performed in a biased/variant manner in 21% of comparisons (17/80), therefore the NS construct does seem to show a significant degree of gender bias.

Table 203: Occurrences of biased ethnic and gender measurements on the NS scale and sub-scales[4]

Sub scale (H3+H4)	Item (H1+H2)	Occurrences of ethnic bias				Occurrence of gender bias		
		Sotho-Nguni (H2)	Sotho-Tsonga (H2)	Sotho-Venda (H2)	**Total (H2+H4)**	Primary NS Scale Male-Female (H5)	Male-Female (H1+H3)	**Total (H5)**
NS 1 - Exploratory Excitability vs. Stoic Rigidity	NS 1 (1)	0	1	0	1	0	0	0
	NS 1 (29)	0	0	0	0	0	0	0
	NS 1 (52)	0	0	0	0	1	1	2
	NS 1 (70)	0	0	0	0	0	0	0
	NS 1 (99)	1	1	0	2	0	1	1
	NS 1 (114)	0	0	0	0	0	0	0
	NS 1 (144)	0	0	0	0	0	0	0
	NS 1 (167)	0	0	0	0	0	0	0
	NS 1 (191)	0	0	0	0	0	0	0
	NS 1 (211)	0	0	0	0	1	1	2
	NS 1 (238)	0	0	0	0	0	0	0
					9%			**18%**
NS 2 - Impulsiveness vs. Reflection	NS 2 (13)	0	0	1	1	0	0	0
	NS 2 (35)	1	0	0	1	0	0	0
	NS 2 (61)	1	0	0	1	0	0	0
	NS 2 (82)	0	0	0	0	0	0	0
	NS 2 (108)	0	0	0	0	0	0	0
	NS 2 (130)	1	0	0	1	0	0	0
	NS 2 (148)	0	1	0	1	0	0	0
	NS 2 (187)	1	0	0	1	0	0	0
	NS 2 (203)	1	0	1	2	0	0	0
	NS 2 (237)	0	0	0	0	0	0	0
					10%			**0%**
NS 3 - Extravagance vs. Reserve	NS 3 (19)	1	0	0	1	1	1	2
	NS 3 (41)	0	0	0	0	0	0	0
	NS 3 (66)	0	0	0	0	0	0	0
	NS 3 (109)	0	0	0	0	0	0	0
	NS 3 (139)	0	0	1	1	0	0	0
	NS 3 (155)	0	0	0	0	0	0	0
	NS 3 (174)	1	1	1	3	0	0	0
	NS 3 (192)	0	0	0	0	0	0	0
	NS 3 (219)	1	1	0	2	1	0	1
					22%			**11%**
NS 4 - Disorderliness vs. Regimentation	NS 4 (34)	0	0	0	0	1	1	2
	NS 4 (53)	0	0	0	0	0	0	0
	NS 4 (79)	0	0	1	1	1	1	2
	NS 4 (91)	0	0	0	0	1	1	2
	NS 4 (110)	0	1	0	1	0	0	0
	NS 4 (141)	0	0	0	0	0	0	0
	NS 4 (165)	1	0	0	1	1	0	1
	NS 4 (183)	0	0	0	0	0	0	0
	NS 4 (204)	1	0	0	1	1	1	2
	NS 4 (212)	0	0	0	0	0	0	0
					0%			**40%**
Total biased measurements		11	6	5	22	9	8	17
% bias measurements		**28%**	**15%**	**13%**	**18%**	**23%**	**20%**	**21%**

4 For Table 203 to Table 209 all cell's highlighted with pink indicates significant ethnic bias, all cell's highlighted with blue marks items or scale's with significant levels of gender bias; while purple cell's highlights items or sub-scales that functioned in a biased manner across both ethnic and gender groups.

4.7.2 Summary of the Harm Avoidance Scale

Several items of the HA scale are surplus and should either be flagged as problematic items or modified to occupy under represented logit regions (see Section 4.4.2). The primary HA scale's respondent and item reliability value is relatively high. The HA scale is proven to be unidimensional, which means that the scale exclusively measures one construct. The unidimensionality of the scale supports both the construct and content validity of the entire scale. This evidence provides some support for the H6 hypothesis. The HA scale's four sub-scales HA 1, HA 2, HA 3, and HA 4 all proved to be unidimensional, and showed a high degree of construct validity and item reliability.

Table 204 below provides a summary of the results of the invariance analyses comparing the performance of the primary HA and its four sub-scales across the different ethnic and gender groups. The table shows the number of times each item functioned in a biased manner, such a biased occurrence is indicated with a one, and while a zero means that the item functioned in an invariant/unbiased manner. The criteria for biased functioning are based on standards set out by Bond and Fox (2001). These standards are extremely sensitive and were therefore revised.

To establish ethnic bias on an item level, the performance of the item is evaluated in all three ethnic comparisons, if an item behaved in a biased manner in two or more instances the item is considered ethnically biased. According to these criteria only two items showed a high level of ethnic bias, these items are HA 1 (112) and HA 4 (147) (see Table 204). To establish ethnic bias on a sub-scale or construct level, the sub-scale's items should function in a biased manner in more than 20% of item comparisons across groups. None of the HA sub-scales performed in a biased manner (see Table 204). The items of the primary HA scale only performed in a biased/variant manner in 16% of comparisons (17/105), which points out that the entire HA construct does not possess a significant degree of ethnic bias. However the scale showed a high degree of bias (23%) when assessing the construct across the Sotho and the Tsonga ethnic groups.

To establish gender bias on an item level, an item's performance is evaluated in both the primary scale and sub-scale comparisons, if an item behaved in a biased manner in one or more instances the item is categorised as biased. The following items showed a high degree of gender bias: HA 3 (54), HA 4 (22), HA 4 (63), HA 4 (147), HA 4 (92), HA 4 (113), HA 4 (202) and HA 4 (236). To establish gender bias on a sub-scale or construct level, the sub-scale's items should function in a biased manner in more than 20% of all item comparisons across gender groups. Only the HA 4 sub-scale performed in a biased way (78%) when the revised criteria was applied (see Table 204).

To establish gender bias on a primary-scale or construct level, the HA scale's items should function in a biased manner in more than 20% of item comparisons across gender groups. The items of the primary HA scale only performed in a biased/variant manner in 16% of comparisons (11/70), therefore the HA construct did not function with a significant degree of gender bias within the current sample.

Table 204: Occurrences of biased ethnic and gender measurements on the HA scale and sub-scales

Sub scale (H3+H4)	Item (H1+H2)	Occurrences of ethnic bias				Occurrence of gender bias		
		Sotho-Nguni (H2)	Sotho-Tsonga (H2)	Sotho-Venda (H2)	**Total (H2+H4)**	Primary HA Scale Male-Female (H5)	Male-Female (H1 + H3)	**Total (H5)**
HA 1 - Anticipatory worry and pessimism vs. uninhibited optimism	HA 1 (2)	0	0	0	0	0	0	0
	HA 1 (20)	0	0	0	0	0	0	0
	HA 1 (42)	0	0	0	0	0	0	0
	HA 1 (65)	0	0	0	0	0	0	0
	HA 1 (81)	0	0	0	0	0	0	0
	HA 1 (112)	0	1	1	2	0	0	0
	HA 1 (119)	0	1	0	1	0	0	0
	HA 1 (149)	0	1	0	1	0	0	0
	HA 1 (164)	1	0	0	1	0	0	0
	HA 1 (188)	0	0	0	0	0	0	0
	HA 1 (225)	1	0	0	1	0	0	0
					9%			**0%**
HA 2 - Fear of uncertainty	HA 2 (12)	0	1	0	1	0	0	0
	HA 2 (26)	0	0	0	0	0	0	0
	HA 2 (67)	0	0	0	0	0	0	0
	HA 2 (129)	0	0	0	0	0	0	0
	HA 2 (154)	0	1	0	1	0	0	0
	HA 2 (189)	0	0	0	0	0	0	0
	HA 2 (217)	0	0	0	0	0	0	0
					0%			**0%**
HA 3 - Shyness with strangers	HA 3 (27)	0	1	0	1	0	0	0
	HA 3 (54)	1	0	0	1	0	0	0
	HA 3 (80)	0	0	1	1	0	1	1
	HA 3 (100)	1	0	0	1	0	0	0
	HA 3 (142)	0	0	0	0	0	0	0
	HA 3 (157)	0	0	0	0	0	0	0
	HA 3 (209)	0	0	0	0	0	0	0
	HA 3 (231)	0	0	1	1	0	0	0
					0%			**13%**
HA 4 - Fatigue vs. Rigour	HA 4 (22)	0	0	0	0	1	0	1
	HA 4 (43)	0	0	0	0	0	0	0
	HA 4 (63)	0	0	0	0	1	1	2
	HA 4 (92)	0	0	0	0	1	0	1
	HA 4 (113)	0	1	0	1	1	0	1
	HA 4 (147)	1	1	1	3	0	1	1
	HA 4 (182)	0	0	0	0	0	0	0
	HA 4 (202)	0	0	0	0	0	1	1
	HA 4 (236)	0	0	0	0	1	1	2
					11%			**22%**
Total biased measurements		5	8	4	17	5	5	10
% bias measurements		**14%**	**23%**	**11%**	**16%**	**14%**	**14%**	**16%**

4.7.3 Summary of the Reward Dependence Scale

Several of the RD scale's items are surplus and should either be flagged as problematic items or modified to occupy under represented logit regions (see Section 4.4.3). The RD scale's respondent and item reliability values are relatively high. The scale functioned in a unidimensional manner, which means that the scale exclusively measures one construct. The unidimensionality of the scale supports both the construct and content validity of the entire scale. This evidence provides some support for the H6 hypothesis (see Section 3.4.2). The scale's, sub-scales (RD 1, RD 3, and RD 4) all proved to be unidimensional, and showed a high degree of construct validity and item reliability.

Table 205 below provides a summary of the results of the invariance analyses comparing the performance of the RD scale and its four sub-scales between the different ethnic and gender groups. The table shows the number of times each item functioned in a biased manner, such a biased occurrence is indicated with a one, while a zero means that the item function in an invariant/unbiased way. The criteria for variant or biased functioning are based on standards set out by Bond and Fox (2001). As mentioned earlier these standards are extremely sensitive and were therefore revised.

According to the revised criteria six items showed a high level of ethnic bias; these items are RD 1 (28), RD 1 (181), RD 1 (224), RD 3 (180), RD 3 (226) and RD 4 (156) (see Table 205). Two of the three RD scales, RD 1 (30%) and RD 3 (25%), also functioned with a high degree of ethnic bias. The items of the primary RD scale performed in a biased/variant manner in 28% of comparisons (20/72), which points out that the entire RD construct possess a significant degree of ethnic bias when assessing the construct. The scale showed a high degree of bias when measuring the construct between the Sotho and all the other ethnic groups (see Table 205).

After applying the revised criteria it became clear that the following items functioned with a high degree of gender bias: RD 1 (3), RD 1 (28), RD 1 (181), RD 3 (68), RD 3 (117) and RD 3 (226) (see Table 205). Two sub-scales functioned with a high degree of gender bias, these are RD 1 (30%) and RD 3 (30%), it is noteworthy that these two scales also functioned in an ethnically biased manner (see Table 205).

Table 205: Occurrences of biased ethnic and gender measurements on the RD scale and sub-scales

Sub scale (H3+H4)	Item (H1+H2)	Occurrences of ethnic bias				Occurrence of gender bias		
		Sotho-Nguni (H2)	Sotho-Tsonga (H2)	Sotho-Venda (H2)	**Total (H2+H4)**	Primary HA Scale Male-Female (H5)	Male-Female (H1 + H3)	**Total (H5)**
RD 1 - Sentimentality	RD 1 (3)	0	0	0	0	0	1	1
	RD 1 (28)	1	1	0	2	1	0	1
	RD 1 (55)	0	0	0	0	0	0	0
	RD 1 (83)	0	0	0	0	0	0	0
	RD 1 (102)	0	0	0	0	0	0	0
	RD 1 (120)	0	0	1	1	0	0	0
	RD 1 (158)	0	0	0	0	0	0	0
	RD 1 (181)	1	0	1	2	1	1	2
	RD 1 (210)	0	0	0	0	0	0	0
	RD 1 (224)	0	1	1	2	0	0	0
					30%			**30%**
RD 3 - Attachment vs. Detachment	RD 3 (21)	0	0	0	0	0	0	0
	RD 3 (44)	0	0	1	1	0	0	0
	RD 3 (68)	1	0	0	1	0	1	1
	RD 3 (117)	0	0	0	0	1	0	1
	RD 3 (143)	0	0	0	0	0	0	0
	RD 3 (180)	1	1	0	2	0	0	0
	RD 3 (201)	0	1	0	1	0	0	0
	RD 3 (226)	1	0	1	2	1	0	1
					25%			**38%**
RD 4 - Dependence vs. Independence	RD 4 (14)	0	1	0	1	0	0	0
	RD 4 (46)	0	0	1	1	0	0	0
	RD 4 (71)	0	1	0	1	0	0	0
	RD 4 (131)	0	0	0	0	0	0	0
	RD 4 (156)	1	1	0	2	0	0	0
	RD 4 (193)	0	1	0	1	0	0	0
					17%			**0%**
Total biased measurements		6	8	6	20	4	3	7
% bias measurements		**25%**	**33%**	**25%**	**28%**	**17%**	**12%**	**15%**

4.7.4 Summary of the Persistence Scale

Only one of the Persistence scale's items proved to be surplus, which could serve as motivation for flagging them as problematic items; or modifying it to occupy any of the underrepresented logit regions (see 4.4.4). The scale's respondent and item reliability values are relatively high. The scale functioned in a unidimensional manner, which points out that the scale exclusively measures one construct. The unidimensionality of the scale supports both the construct and content validity of the entire scale; this evidence provides some support for the H6 hypothesis.

Table 206 below provides a summary of the results of the invariance analyses comparing the performance of the persistence scale between the different ethnic and gender groups. The table shows the number of times each item functioned in a biased manner, such a biased occurrence is indicated with a one, while a zero means that the item function in an invariant/unbiased manner. The criteria for variant or biased functioning are based on standards set out by Bond and Fox (2001). These standards are extremely sensitive and were revised (see Section 4.7.1).

According to the revised criteria none of the PS individual items functioned with a significant degree of ethnic bias. The items of the persistence scale performed in a biased/variant manner in 8% of ethnic comparisons (2/24); therefore the persistence construct does not show a significant degree of ethnic bias. However, the PS scale did show a high degree of ethnic bias when its functioning was compared across the Sotho and Nguni groups.

With regards to gender bias on an item level, items PS (11) and PS (205) functioned with a high degree of gender bias. To establish gender bias on a construct level, the scale's items should function in a biased manner in more than 20% of all item comparisons across gender groups. The persistence scale showed a high degree of gender bias as items functioned in a biased manner in 25% of all item comparisons (see Table 206).

Table 206: Occurrences of biased ethnic and gender measurements on the Persistence Scale

Primary scale	Item (H1+H2)	Occurrences of ethnic bias				Occurrence of gender bias	
		Sotho-Nguni (H2)	Sotho-Tsonga (H2)	Sotho-Venda (H2)	**Total (H2)**	Primary HA Scale Male-Female (H5)	**Total (H5)**
P - Persistence	PS (11)	0	0	0	0	1	1
	PS (37)	0	0	0	0	0	0
	PS (62)	0	0	0	0	0	0
	PS (103)	0	0	0	0	0	0
	PS (128)	0	0	0	0	0	0
	PS (166)	1	0	0	1	0	0
	PS (205)	0	0	0	0	1	1
	PS (218)	1	0	0	1	0	0
Total biased measurements		2	0	0	2	2	2
% bias measurements		**25%**	**0%**	**0%**	**8%**	**25%**	**25%**

4.7.5 Summary of the Self-Directedness Scale

Several items on the SD scale are surplus and should either be flagged as problematic items or modified to occupy under represented logit regions (see Section 4.4.5). Similar to the rest of the TCI's scales, the primary SD scale's respondent and item reliability values are relatively high. The SD scale functioned in a unidimensional manner, which means that the scale exclusively measures one construct. The unidimensionality of the scale supports both the construct and content validity of the entire scale. As mentioned earlier this evidence provides some support for the H6 hypothesis. The scale's, sub-scales (SD 1, SD 2, SD 3, SD 4 and SD 5) all proved to be unidimensional, and showed a high degree of construct validity and item reliability.

Table 207 below provides a summary of the results for the invariance analyses comparing the performance of the SD scale and its four sub-scales across the different ethnic and gender groups. The table shows the number of times each item functioned in a biased manner, such a biased occurrence is indicated with a 1, while a zero means that the item function in an invariant/unbiased way. The criteria for variant or biased functioning are based on standards set out by Bond and Fox (2001). These standards are extremely sensitive and were consequently revised.

According to the revised criteria six SD items functioned with a high level of ethnic bias; these items include SD 1 (24), SD 2 (9), SD 4 (74), SD 4 (107) and SD 5 (162) (see Table 207). To establish ethnic bias on a sub-scale or construct level, the sub-scale's items should function in a biased manner in more than 20% of item comparisons across groups. Neither the primary SD scale nor any of its sub-scales measured the construct in an ethnically biased manner (see Table 207). The scale also showed no significant degree of bias when measuring the construct across the Sotho and all the other ethnic groups (see Table 207).

To establish gender bias on an item level, an item's performance is evaluated within both the primary scale and sub-scale comparisons, if an item behaved in a biased manner in one or more instances the item is deemed biased. The following items showed a high degree of gender bias: SD 1 (4), SD 1 (58), SD 1 (121), SD 2 (9), SD 3 (106), SD 3 (171), SD 4 (32), SD 4 (74), SD 4 (107), SD 4 (179), SD 4 (214), SD 5 (135), SD 5 (184) and SD 5 (196). To establish gender bias on a sub-scale or construct level, the sub-scale's items should function in a biased manner in more than 20% of all item comparisons across gender groups. The primary SD scale (24%) as well as all five its sub-scales showed a high degree of gender bias SD 1 (38%), SD 2 (25%) SD 3 (40%), SD 4 (45%), and SD 5 (24%) (see Table 207).

Table 207: Occurrences of biased ethnic and gender measurements on the SD Scale

Sub scale (H3+H4)	Item (H1+H2)	Occurrences of ethnic bias				Occurrence of gender bias		
		Sotho-Nguni (H2)	Sotho-Tsonga (H2)	Sotho-Venda (H2)	Total (H2+H4)	Primary SD Scale Male-Female	Male-Female (H1 + H3)	Total (H5)
Responsibility vs. Blaming (SD 1)	SD 1 (4)	0	0	0	0	0	1	1
	SD 1 (24)	1	1	0	2	0	0	0
	SD 1 (58)	0	0	0	0	1	0	1
	SD 1 (86)	0	1	0	1	0	0	0
	SD 1 (121)	0	0	0	0	1	1	2
	SD 1 (151)	0	0	0	0	0	0	0
	SD 1 (169)	0	0	0	0	0	0	0
	SD 1 (198)	0	0	0	0	0	0	0
					13%			**38%**
Purposefulness vs. Lack of Goal Direction (SD 2)	SD 2 (9)	1	0	1	2	1	1	2
	SD 2 (30)	0	1	0	1	0	0	0
	SD 2 (59)	0	0	0	0	0	0	0
	SD 2 (105)	0	0	0	0	0	0	0
	SD 2 (126)	0	0	0	0	0	0	0
	SD 2 (159)	1	0	0	1	1	1	2
	SD 2 (177)	0	0	0	0	0	0	0
	SD 2 (223)	0	0	0	0	0	0	0
					13%			**25%**
Resourcefulness vs. Inertia (SD 3)	SD 3 (40)	1	0	0	1	0	0	0
	SD 3 (106)	0	0	0	0	1	0	1
	SD 3 (171)	0	0	0	0	1	1	2
	SD 3 (197)	0	1	0	1	0	0	0
	SD 3 (233)	0	0	0	0	0	0	0
					0%			**40%**
Self-acceptance vs. Self-Striving (SD 4)	SD 4 (32)	0	0	0	0	1	1	2
	SD 4 (60)	0	0	0	0	0	0	0
	SD 4 (74)	1	1	0	2	1	1	2
	SD 4 (85)	0	0	0	0	0	0	0
	SD 4 (94)	1	0	0	1	0	0	0
	SD 4 (107)	0	1	1	2	1	1	2
	SD 4 (136)	0	0	1	1	0	0	0
	SD 4 (150)	0	0	0	0	0	0	0
	SD 4 (179)	0	0	1	1	1	1	2
	SD 4 (214)	0	0	0	0	1	1	2
	SD 4 (229)	0	0	1	1	0	0	0
					18%			**45%**
Congruent Second Nature vs. Bad Habits (SD 5)	SD 5 (17)	0	0	0	0	0	0	0
	SD 5 (36)	0	0	0	0	0	0	0
	SD 5 (39)	0	1	0	1	0	0	0
	SD 5 (90)	0	0	0	0	0	0	0
	SD 5 (104)	0	0	0	0	0	0	0
	SD 5 (115)	0	0	0	0	0	0	0
	SD 5 (135)	0	0	1	1	1	0	1
	SD 5 (162)	0	1	1	2	0	0	0
	SD 5 (184)	0	0	1	1	0	1	1
	SD 5 (196)	0	0	0	0	1	1	2
	SD 5 (207)	0	0	0	0	0	0	0
	SD 5 (221)	0	0	0	0	0	0	0
					8%			**8%**
Total biased measurement		4	7	7	18	11	10	21
% bias measurements		**9%**	**16%**	**16%**	**14%**	**25%**	**23%**	**24%**

4.7.6 Summary of the Cooperativeness Scale

Several items of the Cooperativeness (C) scale are surplus and should either be flagged as problematic items or modified to occupy under represented logit regions (see Section 4.4.6). The C scale's respondent and item reliability values are relatively high. The C scale functioned in a unidimensional manner, which means that the scale exclusively measures one construct. The unidimensionality of the scale supports both the construct and content validity of the entire scale. This evidence provides evidence in support of the H6 hypothesis. The scale's, sub-scales (C 1, C 2, C 3, C 4 and C 5) all proved to be unidimensional, and showed a high degree of construct validity and item reliability.

Table 208 below provides a summary of the results of the invariance analyses comparing the performance of the C scale and its five sub-scales between the different ethnic and gender groups. According to the revised criteria six items showed a high degree of ethnic bias (see 4.7.1); these items include C 1 (16), C 2 (25), C 2 (137), C 3 (87), C 3 (216) and C 4 (199) (see Table 208).

None of C sub-scales functioned in an ethnically biased manner; however, the items of the primary C scale performed in a biased/variant manner in 26% of all item comparisons (20/72), which points out that the entire C construct functioned with a significant degree of ethnic bias. The scale showed a high degree of bias (41%), especially when measuring the construct across the Sotho and Nguni groups (see Table 208).

The following items showed a high degree of gender bias: C 1 (16), C 1 (234), C 2 (185), C 3 (64), C 4 (33), C 4 (57), C 5 (206), C 5 (235), C 5 (72), and C 5 (18) (see Table 208). The primary C scale (22%) as well as two of its sub-scales, C 1 (25%) and C 5 (44%), also showed a high degree of gender bias (see Table 208).

Table 208: Occurrences of biased ethnic and gender measurements on the Cooperativeness Scale

Sub scale (H3+H4)	Item (H1+H2)	Occurrences of ethnic bias				Occurrence of gender bias		
		Sotho-Nguni (H2)	Sotho-Tsonga (H2)	Sotho-Venda (H2)	**Total (H2 + H4)**	Primary C Scale Male-Female (H5)	Male-Female (H1+H3)	**Total (H5)**
Social Acceptance vs. Social Intolerance (C 1)	C 1 (5)	1	0	0	1	0	0	0
	C 1 (16)	1	1	0	2	1	1	2
	C 1 (48)	0	1	0	1	0	0	0
	C 1 (89)	1	0	0	1	0	0	0
	C 1 (122)	0	0	0	0	0	0	0
	C 1 (133)	1	0	0	1	0	0	0
	C 1 (172)	0	0	0	0	0	0	0
	C 1 (234)	1	0	0	1	1	1	2
					13%			**25%**
Empathy vs. Social Disinterest (C 2)	C 2 (25)	0	1	1	2	0	0	0
	C 2 (49)	0	1	0	1	0	0	0
	C 2 (73)	0	0	0	0	0	0	0
	C 2 (137)	1	1	0	2	0	0	0
	C 2 (161)	0	0	0	0	0	0	0
	C 2 (185)	1	0	0	1	1	1	2
	C 2 (227)	0	0	0	0	0	0	0
					29%			**14%**
Helpfulness vs. Unhelpfulness (C 3)	C 3 (47)	1	0	0	1	0	0	0
	C 3 (64)	1	0	0	1	1	1	2
	C 3 (87)	1	1	1	3	0	0	0
	C 3 (127)	0	0	0	0	0	0	0
	C 3 (153)	1	0	0	1	0	0	0
	C 3 (178)	1	0	0	1	0	0	0
	C 3 (216)	1	1	0	2	0	0	0
					29%			**14%**
Compassion vs. Revengefulness (C 4)	C 4 (7)	0	0	0	0	0	0	0
	C 4 (33)	1	0	0	1	1	1	2
	C 4 (57)	0	1	0	1	1	1	2
	C 4 (78)	0	0	0	0	0	0	0
	C 4 (98)	0	0	0	0	0	0	0
	C 4 (124)	0	0	0	0	0	0	0
	C 4 (146)	1	0	0	1	0	0	0
	C 4 (168)	0	0	0	0	0	0	0
	C 4 (199)	1	0	1	2	0	0	0
	C 4 (222)	0	0	1	1	0	0	0
					10%			**20%**
Integrated Conscience vs. Self-Serving (C5)	C 5 (18)	0	0	0	0	1	1	2
	C 5 (50)	0	0	0	0	0	0	0
	C 5 (72)	1	0	0	1	1	1	2
	C 5 (93)	0	0	1	1	0	0	0
	C 5 (138)	0	0	1	1	0	0	0
	C 5 (160)	0	0	1	1	0	0	0
	C 5 (186)	0	0	0	0	0	0	0
	C 5 (206)	0	0	0	0	1	0	1
	C 5 (235)	0	0	0	0	1	0	1
					0%			44%
Total biased measurements		17	8	7	32	10	8	18
% bias measurements		**41%**	**20%**	**17%**	**26%**	**24%**	**20%**	**22%**

4.7.7 Summary of the Self-Transcendence Scale

Several items of the ST scale are surplus and should either be flagged as problematic items or modified to occupy under represented logit regions (see Section 4.4.7). The ST scale's respondent and item reliability values are relatively high. The ST scale functioned in a unidimensional manner, which means that the scale exclusively measures one construct. The unidimensionality of the scale supports both the construct and content validity of the entire scale. This evidence provides evidence in support for the H6 hypothesis. The scale's, sub-scales (ST 1, ST 2, and ST 3) all proved to be unidimensional, and showed a high degree of construct validity and item reliability, which points out that these scales also have a high degree of construct validity.

Table 209 below provides a summary of the results of the invariance analyses comparing the performance of the ST scale and its four sub-scales between the different ethnic and gender groups. The table shows the number of times each item functioned in a biased manner. The criteria for variant or biased functioning are based on standards set out by Bond and Fox (2001). These standards are extremely sensitive and were revised (see Section 4.7.1).

As mentioned earlier an item is deemed biased, when the item behaves in a biased manner in two or more comparisons across ethnic groups. According to these criteria only three items (ST 2–200, ST 3–97, and ST 3-145) showed a high level of ethnic bias (see Table 209). To establish ethnic bias on a sub-scale or construct level, the sub-scale's items should function in a biased manner in more than 20% of item comparisons across groups. Neither the primary ST scale nor any of its sub-scales functioned in an ethnically biased manner (see Table 209).

To establish gender bias on an item level, an item's performance is evaluated in both the primary scale and sub-scale comparisons, if an item behaved in a biased manner in one or more instances the item is deemed biased. The following items showed a high degree of gender bias: ST 3 (175), ST 3 (88), ST 3 (97), ST 2 (163), ST 2 (200), ST 2 (232), ST 3 (6), ST 3 (38), ST 3 (56), ST 2 (31), ST 2 (51), ST 1 (195) and ST 1 (23) (see Table 209). The primary ST scale (21%) as well as two of its sub-scales, ST 2 (44%) and ST 3 (46%), showed a high degree of gender bias when assessing their respective constructs among the sample (see Table 209).

Table 209: Occurrences of biased ethnic and gender measurements on the Self-Transcendence Scale

Sub scale (H3+H4)	Item (H1+H2)	Occurrences of ethnic bias				Occurrence of gender bias		
		Sotho-Nguni (H2)	Sotho-Tsonga (H2)	Sotho-Venda (H2)	**Total (H2+H4)**	Primary C Scale Male-Female (H5)	Male-Female (H1+H3)	**Total (H5)**
Creative Self-Forgetfulness vs. Self-Consciousness (ST 1)	ST 1 (8)	1	0	0	1	0	0	0
	ST 1 (23)	0	0	0	0	1	0	1
	ST 1 (45)	1	0	0	1	0	0	0
	ST 1 (76)	0	0	0	0	0	0	0
	ST 1 (96)	0	0	0	0	0	0	0
	ST 1 (125)	0	0	0	0	0	0	0
	ST 1 (152)	0	0	0	0	0	0	0
	ST 1 (173)	0	0	0	0	1	0	1
	ST 1 (195)	0	0	0	0	0	0	0
	ST 1 (215)	0	0	0	0	0	0	0
	ST 1 (228)	1	0	0	1	0	0	0
					0%			**18%**
Transpersonal Identification vs. Personal Identification (ST 2)	ST 2 (15)	0	0	0	0	0	0	0
	ST 2 (31)	0	0	0	0	0	1	1
	ST 2 (51)	0	0	0	0	1	0	1
	ST 2 (84)	0	0	0	0	0	0	0
	ST 2 (95)	0	0	0	0	0	0	0
	ST 2 (132)	0	0	0	0	0	0	0
	ST 2 (163)	0	0	0	0	1	0	1
	ST 2 (200)	1	1	0	2	0	0	0
	ST 2 (232)	0	0	0	0	0	1	1
					11%			**44%**
Spiritual Acceptance vs. Rational Materialism (ST 3)	ST 3 (6)	0	0	1	1	0	1	1
	ST 3 (38)	0	1	0	1	0	1	1
	ST 3 (56)	1	0	0	1	0	1	1
	ST 3 (77)	0	0	1	1	0	0	0
	ST 3 (88)	0	0	0	0	1	1	2
	ST 3 (97)	1	1	0	2	1	0	1
	ST 3 (116)	0	0	0	0	0	0	0
	ST 3 (123)	0	1	0	1	0	0	0
	ST 3 (145)	0	1	1	2	0	0	0
	ST 3 (175)	0	1	0	1	0	1	1
	ST 3 (194)	0	0	0	0	0	0	0
	ST 3 (208)	0	0	0	0	0	0	0
	ST 3 (220)	0	0	1	1	0	0	0
					15%			**46%**
Total biased measurements		6	6	4	16	6	7	13
% bias measurements		**18%**	**18%**	**12%**	**16%**	**18%**	**21%**	**20%**

CHAPTER 5: DISCUSSION OF FINDINGS

5.1 OVERVIEW

The primary objective at the outset of this investigation was to explore the psychometric functioning of the TCI among a diverse South African sample. In order to achieve this objective, the researcher asked several questions that focussed on the psychometric performance of the TCI when administered to a sample of South African Police recruits. These questions were:

- Is the TCI a biased personality measure in a group of South African police trainees? (see Section 1.3); and
- Can the seven personality dimensions proposed by Cloninger's psychobiological model be reproduced in a South African context? (see Section 1.3).

The delineation of the sub-sections in this chapter is initially based on the foregoing questions, as it will ensure that the research objectives are achieved. In the first part of the chapter the degree, to which the TCI functions in a biased manner across ethnic and gender groups is explored. This is followed with an elaboration on whether or not the seven personality dimensions proposed by Cloninger's psychobiological are reproduced by the current sample.

Where possible the study's results and primary findings are contextualised within existing literature. The results chapter pointed that a.) the TCI possess a considerable degree of ethnic and gender bias; and b.) that the TCI's dimensions can to a certain degree be extrapolated to a South African context. Also considered are the implications of the aforementioned research findings, especially with regards to the following: the larger study in which this investigation is nested, the employment equity act, and the proposed universality of the psychobiological model. This chapter and in turn the mini-dissertation is concluded by making future recommendations, providing a summary of the limitations of the research project, and an overall conclusion.

5.2 MEASUREMENT PROPERTIES OF ITEMS AND SCALES ACROSS ETHNIC AND GENDER GROUPS

The study initially set out to determine the degree to which the TCI functions in an ethnic or gender biased manner in a diverse group of South African police trainees. In order to meet the aforementioned objective the study focussed on whether or not the measurement properties of items, sub-scales and primary scales differed significantly across different ethnic and gender groups.

5.2.1 Ethnic Bias among the TCI's Items, Sub-scales and Primary scales

5.2.1.1 Items

The presence of item bias was investigated through invariance analysis, which compared each items measurement properties across several ethnic groups. Each items performance was evaluated within three different comparison groups (Nguni vs. Sotho; Tsonga vs. Sotho; and Venda vs. Sotho) (see Section 4.5). To establish item bias, the results from all three invariance comparisons were evaluated. The evidence pointed out that a considerable number of items measurement properties where significantly different in at least one comparison; however, only items that performed in a biased manner in more than one comparison were classified as functioning with a significant degree of bias. The table below provides breakdown of the items, which functioned with a significant degree of ethnic bias.

Table 210: Items that showed a high degree of ethnic bias

Primary scale	Biased items
Novelty Seeking	NS 1 (99), NS 2 (203), NS 3 (174), and NS 3 (219)
Harm Avoidance	HA 1 (112) and HA 4 (147)
Reward Dependence	RD 1 (28), RD 1 (181), RD 1 (224), RD 3 (180), RD 3 (226) and RD 4 (156)
Persistence	-
Self-directedness	SD 1 (24), SD 2 (9), SD 4 (74), SD 4 (107) and SD 5 (162)
Cooperativeness	C 1 (16), C 2 (25), C 2 (137), C 3 (87), C 3 (216) and C 4 (199)
Self-transcendence	ST 2 (200), ST 3 (97), and ST 3 (145)

The items presented in the foregoing table should be flagged as problematic items when future versions of the TCI are compiled or when future results of the TCI are interpreted. It is noteworthy that none of the items comprising the Persistence scale showed significant levels of ethnic bias. These findings points out that there is little support for **Hypothesis 2:** There will be no evidence of item bias between different ethnic groups on items of the different sub-scales of the TCI. Of the 238 items included in the analysis, 11% of items (26 items) functioned with a significant degree of bias across ethnic groups (see Table 210); however when Bond and Fox's criteria is applied, the proportion of biased items increases considerably to 36% (86 items) (see Section 4.5 and 4.7).

5.2.1.2 Primary and sub-scale bias

To establish ethnic bias on a primary and sub-scale level, the scale's items should function in a biased manner in more than 20% of item comparisons; a more detailed layout of the results is presented in Section 4.7. Inspection of the performance of the TCI's primary and sub-scales across ethnic groups revealed significant differences in the functioning of several scales in the respective comparison groups. The findings listed below indicate, which of the TCI's primary and sub-scales were found to function with a significant degree of ethnic bias:

- The NS scale did not show a significant degree of ethnic bias, as enough of its items performed invariantly across groups; however on a sub-scale level the NS 3 sub-scale functioned with a significant degree of ethnic bias.
- Similar to NS scale, the results for the primary HA scale points out that it does not function in an ethnically biased manner as a whole; however, the scale illustrated an elevated degree of bias when measuring the construct across the Sotho and Tsonga groups. None of the HA sub-scales functioned with a high level of ethnic bias.
- The items of the primary RD scale performed in a biased manner in 28% of all comparisons, which implicates a significant degree of ethnic bias; the scale also showed a high degree of bias in each comparison group (i.e. Sotho vs. Nguni, Sotho vs. Tsonga, and Sotho vs. Venda). This bias filters down to a sub-scale level, where two of the three RD sub-scales (RD 1 and RD 3) rendered significant levels of ethnic bias.
- Although none of the items of the persistence scale performed in a significantly biased manner (performing in a biased manner at least twice); the items still show enough singular incidences of bias to argue that scale as whole functioned in a biased manner.
- Neither the primary SD scale nor any of its sub-scales measured the construct in an ethnically biased manner.
- The items of the C scale performed in a biased manner in 26% of comparisons, which points out that the scale possesses a significant degree of ethnic bias. The scale showed a high degree of bias (41%), especially when measuring the construct across the Sotho and Nguni ethnic groups. Although all the cooperativeness sub-scales showed some degree of bias, none of the sub-scales bias incidence exceeded 20%.
- Similar to the SD scale, neither the primary ST scale nor any of its three sub-scales functioned in an ethnically biased manner.

These results indicate that participants belonging to different ethnic groups are unlikely to obtain the comparable scores on several primary (RD, P, and C) and sub-scales (NS 3, RD 1 and RD 3). More simply stated; Sotho and Tsonga respondents at the same level on the RD 1 construct are not going to obtain the same total score on the sub-scale (or any of the biased scales for that matter), due to the fact that the scale has a different effect on the respondents score depending on their ethnicity. However when Bond and Fox's (2001) criteria is applied to the data (see Section 4.5) almost all the sub-scale of the TCI, show a significant level of bias, in at least one of the comparison groups. These findings show little support for **Hypothesis 4**: There will be no evidence of construct bias between different ethnic groups on the different sub-scales scale of the TCI. It is important to note that it is assumed in this study that each scale is an accurate and valid reflection of its underlying construct. If this is not the case, the results discussed in this section only points to the fact that the sub-scale is biased, and that the underlying construct might still be unbiased across the comparison groups.

This finding has considerable implications for the interpretation of mean score differences rendered by the TCI, especially those based on a sub-scale level. This bias could be minimised by modifying items and re-analyzing the assessment measure.

5.2.2 Gender Bias among the TCI's Items, Sub-scales and Primary scales

5.2.2.1 <u>Item</u>

Similar to the evaluation of ethnic bias, the degree of gender bias of each of the TCI's items was investigated through invariance analysis. The results of the invariance analysis conducted on item performance across gender groups were consolidated by evaluating, whether the item showed bias when its functioning was compared across genders on both a primary and sub-scale level. Unlike the criteria for ethnic bias where an item had to function in bias manner in more than one occasion, the criteria for gender bias required only one occurrence of biased measurement. The results for gender comparisons on each scale are discussed in more detail in Section 4.6 and 4.7. The table below provides breakdown of biased items.

Table 211: Items that showed a high degree of gender bias

Primary scale	Biased items
Novelty Seeking	NS 1 (52), NS 1 (211), NS 3 (19), NS 4 (34), NS 4 (79), NS 4 (91), and NS 4 (204)
Harm Avoidance	HA 3 (54), HA 4 (22), HA 4 (63), HA 4 (147), HA 4 (92), HA 4 (113), HA 4 (202) and HA 4 (236)
Reward Dependence	RD 1 (3), RD 1 (28), RD 1 (181), RD 3 (68), RD 3 (117) and RD 3 (226)
Persistence	PS (11) and PS (205)
Self-directedness	SD1 (4), SD 1 (58), SD 1 (121), SD 2 (9), SD 3 (106), SD 3 (171), SD 4 (32), SD 4 (74), SD 4 (107), SD 4 (179), SD 4 (214), SD 5 (135), SD 5 (184) and SD 5 (196)
Cooperativeness	C 1 (16), C 1 (234), C 2 (185), C 3 (64), C 4 (33), C 4 (57), C 5 (206), C 5 (235), C 5 (72), and C 5 (18)
Self-transcendence	ST 3 (175), ST 3 (88), ST 3 (97), ST 2 (163), ST 2 (200), ST 2 (232), ST 3 (6), ST 3 (38), ST 3 (56), ST 2 (31), ST 2 (51), ST 1 (195) and ST 1 (23)

The items listed in the table above should be flagged as problematic items when future versions of the TCI are compiled or when future results of the TCI are interpreted. It is strongly recommended that these items should be investigated to explore the source of bias contributing to the differences in measurement properties between groups.

It is concerning that almost double the number of items, than for the ethnic analysis, rendered significant levels of gender bias. Of the 238 items included in the analysis, 22% (55 items) showed significant levels of bias across gender groups. When Bond and Fox's (2001) criteria is applied the same number of items were found to be biased. These findings points out that there is little support for **Hypothesis 1:** There will be no evidence of item bias between male and female groups on items of the different sub-scales of the TCI.

5.2.2.1 Primary and sub-scale bias

Inspection of the performance of the TCI's primary and sub-scales across gender groups revealed significant differences in the functioning of several scales in the respective comparison groups. To establish gender bias on a primary and sub-scale level, the sub-scale's items should function in a biased manner in more than 20% of item comparisons across groups; a more detailed description of these results is presented in Section 4.7. The findings listed below indicate which of the TCI's primary and sub-scales functioned with a significant degree of gender bias:

- The primary NS scale's items performed in a biased manner in 21% of comparisons, which points out that the scale measures the construct with a significant degree of gender bias. Only the NS 4 sub-scale showed a significant degree of gender bias.

- The results for the HA scales point out that the primary scale as well as the HA 4 sub-scale possesses a significant degree of gender bias.
- The Reward Dependence scale performed in a biased manner across male and female groups; in addition two of its sub-scales (RD 1 and RD 3) also showed a high degree of gender bias when measuring their respective constructs. It is noteworthy that these two sub-scales also functioned with a high degree of ethnic bias.
- The persistence scale also showed a high degree of gender bias.
- The SD scale as well as all five its sub-scales showed a high degree of gender bias.
- The Cooperativeness scale as well as two of its sub-scales (C 1 and C 5) showed a high degree of gender bias.
- The ST scale as well as two of its three sub-scales (ST 2 and ST 3) rendered a high degree of gender bias.

The techniques used in the present study suggest all the TCI's primary scales and several sub-scales (NS 4, HA 4, RD 1, RD 3, SD 1, SD 2, SD 3, SD 4, SD 5, C 1, C 5, ST 2 and ST 3) assessed their respective construct differently across males and females. These findings disconfirm **Hypotheses 3** and **5,** which state that there will be no evidence of construct bias between male and female groups on the respective primary and sub-scales of the TCI. This prohibits the direct comparison of scores on the TCI across these groups, although it is recommended that this study be repeated with samples other than police recruits.

It is again reiterated that the study assumes that each scale is an accurate and valid reflection of its underlying construct. If this is not the case, the results discussed in this section only points to the fact that the scale is biased, and that the underlying construct might still be unbiased across the comparison groups.

5.3 GENERAL PSYCHOMETRIC PROPERTIES

In general the items of the TCI appeared to show good fit to the Rasch model at both the primary and sub-scale level, and therefore fulfilled the basic requirements for measurement. More specifically all the primary and sub-scales rendered fit values that indicated that each scale measures a single construct. This offers considerable support for the **H 6 hypothesis**, which states that Temperament as measured by the TCI will produce four unidimensional factors, while character will produce three unidimensional factors among the entire sample of police recruits[5].

It is concerning that the current study's findings point out that most of the TCI's primary and sub-scales function with low person reliability. This is in contrast to several findings, which established that the TCI possesses satisfactory Cronbach alpha coefficients (e.g. Arkar et al., 2005; Cloninger et al., 1993; Miettunen et al., 2004; Miettunen et al., 2008). The relatively low reliability value rendered by the PS scale is attributed to the fact that it has relatively few items compared to the other primary scales; however, the primary NS scale's also produced low reliability statistics. It is argued that this tendency also explains to a certain degree the low reliability values rendered my most of the TCI's sub-scales, which also have small numbers of items.

Arkar et al. (2005) found acceptable Cronbach alpha values for most of the TCI's scales and sub-scales, apart from the sub-scales of the cooperativeness (C) scale. The C2, C3 and C5 sub-scales all rendered alpha values lower than .39. The findings of the current investigation ties in with the low reliability found for the cooperativeness sub-scales; and add that the C1 and C4 scales also have low person reliability.

It is important to note that the majority of findings regarding the psychometric properties of the TCI are supported by statistics derived from analyses based on CTT. The calculations used to produce these statistics rely on interval or ratio level data. Due to the dichotomous nature of the TCI's items it can only produce nominal or ordinal level data. This complicates the comparison between previous findings and the current study's to a certain degree.

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[5] It should again be noted that the operational definition of a factor in this case, is a scale which measures a construct in a unidimensional fashion. In other words any scale or sub-scale, which items statistics support the unidimensionality of the scale - constitutes a single factor.

5.4 IMPLICATIONS AND CONTRIBUTION OF FINDINGS

The current dissertation forms part of a greater research project undertaken collaboratively by Umea University in Sweden and the University of Pretoria, of which the primary aim is to explore and compare the high prevalence of psychological disturbances experienced by law enforcement officers in South Africa to those in Sweden (du Preez et al., 2009). The current study's findings points out that the TCI probably renders a biased reflection of several of the TCI's primary and sub-facet level constructs within the current sample. These findings have stern implications for the larger research project, as it might decrease the validity of findings derived from comparing scores across groups within the current sample, and to a lesser degree if the performance of the current sample is compared to that of the Swedish sample. Consequently the larger project should seriously consider the possible effect of ethnic and gender bias on findings based on the TCI. The implications of the aforementioned findings are discussed in greater detail below.

The theory underlying the TCI proposes that the temperament and character domains are invariant across cultural or ethnic groups (Cloninger et al., 1994). Several investigations with the TCI illustrate that the measure can successfully be translated into foreign languages, while still retaining the same factor structure and adequate reliability and validity estimates. If it is assumed that language is a valid indicator of one's ethnicity and/or culture, then these findings provide at least some support for the generalizability of the psychobiological model. (Arkar et al., 2005; Guitierrez et al., 2001; Kose et al., 2009; Sung et al., 2002). The current investigation found some evidence in support of the universality TCI's dimensions within the current sample, as each primary and sub-scale functioned in a unidimensional manner when assessing their respective constructs; however, it is concerning that a high degree of ethnic bias was found within this predominantly African sample.

It can be argued that these findings show that personality manifests and function differently in individualistic versus collectivist society's, especially if one considers the fact that the TCI seem to have a high degree of equivalence when its functioning is compared across European samples (Cloninger et al., 1993). These contrary findings are in line with several other authors (e.g. Gana & Trouillet., 2003; Herbst et al., 2000; Miettunen et al., 2008; and Pelissolo & Lepine, 2000) who also found evidence that detracts from the universal application of the TCI. The findings of the study also aligns with Biesheuvel and other researchers contention that assessment measures developed on certain population groups, which are then applied to other population groups will not necessarily reflect a true measure of the intended construct like personality (Biesheuvel, 1943; Shuttleworth-Jordan, 1996; and Van de Vijver & Leung, 1997).

Irrelevant of the fact whether the domains of the psycho-biological model are universal or not, the domains might actually not function or manifest in the same manner across European and African samples, which means that a different measure should be used in such samples. If the contrary is assumed to be true, that these personality domains are universal and manifest in the same manner across cultures, then the implication of the current studies finding is that the measure should be dramatically revised to modify or replace items to decrease the degree of bias to a negligible level.

With regards to the TCI's performance across gender groups several investigations show that the four factor temperament model does not vary considerably across gender groups (; Stallings et al., 1994). Cloninger also established that the three character domains are invariant across American males and females (Cloninger et al., 1993). The results of the current study point out the contrary, as a very high degree of gender bias was found on a sub-and primary scale level. If it is assumed that these scales accurately capture their respective constructs, then the evidence of bias points out a probability that constructs vary between genders.

In addition several studies show that males and females tend to rate higher on different domains of the TCI (e.g. Arkar et al., 2005; Cloninger et al., 1993; Miettunen et al., 2007). In general research show that gender differences are greater in Western than non-Western cultures (Costa et al., 2001; McCrae & Terracciano, 2005). Costa et al. (2001) argue that this trend may represent differences in personality traits arising from individualistic versus collectivist cultural influences. Western societies are typically individualistic while non-Western or African societies are collectivist (Costa et al., 2001). The aforementioned differences in personality traits among individualistic and collectivistic cultures, may offer one explanation for the high level of gender bias found during the current investigation. In addition the TCI was primarily developed on data derived from European sample's, which might explain why a mostly African sample rendered a high degree gender of bias across most of the TCI's scales and sub-scales.

It is argued in this investigation that a lack of psychometric research across especially black African ethnic groups necessarily implies that gender differences in performance on assessment measures across these groups have also been neglected to the same the degree. In other words, although gender differences in performance on assessment measures have been compared between Caucasian males and females, and standardised accordingly, the same quantity and quality of investigations have not been undertaken in samples representing black African ethnicities. For the TCI almost no research has been done in South Africa that focusses entirely on the psychometric properties of the TCI, this obviously implies that very little research has been done with the TCI where personality composition of South Africans explored, not even mentioning comparisons on the composition of personality across males and females from black African ethnic groups. Consequently the current study's findings regarding gender bias then adds tremendously to the dearth of research in this area.

Considering the current study's findings regarding gender bias, it is reiterated that future findings on gender differences on the domains measured by the TCI should be interpreted with caution, especially among African males and females, as biased measurement can inflate differences. Hyde (2005) cautions that over-inflated claims about the differences between males and female saturate the mass media, resulting in the development of misinformed gendered stereotypes. These stereotypes can have detrimental effects on relationships, parenting and the advancement of women in the workplace.

According to Poortinga and Van der Flier (1988) bias may yield important information about cross-cultural differences and can also be seen as a phenomenon that requires explanation. To better understand the determents of human behavior, it is necessary to investigate the manifestation of psychological constructs both within and across groups. Cloninger argues that neurotransmitters are functionally organised within the human brain to take responsibility to activate, maintain, inhibit, and persist behavioural responses to specific stimuli (Cloninger, 1987; Cloninger et al., 1994). It is argued that if the TCI's scales accurately capture their respective constructs, and if Cloninger's assumption is true that these constructs depend on neurological function, bias may then to a large extent indicate fundamental neuro-functional differences. In other words the identified neurotransmitters for constructs do not shape personality among African individuals in the same way as they do in European samples, the same can be argued for different gender groups.

Finally it should be mentioned that due to its relatively late introduction into the South African context, the TCI was also not evaluated by TCRSA and Professional Board of Psychology which means that the assessment measure has a relatively long way to go before it can be acknowledged as a legitimate psychological test in the South African context. According to the researcher's knowledge there is virtually no literature illustrating support for the cross-cultural appropriateness of the TCI in a South African context. The current investigation points out that several of the TCI's primary and sub-scales function differently across different ethnic and gender groups on several measurement levels. The implication of this finding is that the information derived from the TCI cannot legally be used to make clinical or selection decisions based partially on the personality profile of individuals.

5.5 RECOMMENDATIONS FOR FUTURE RESEARCH

This section list and discusses recommendations that are to be considered in future research endeavors. Several contributions, which could not be highlighted in the previous section is also mentioned together with accompanying recommendations. The recommendations are as follows:

1. This study showed that the TCI measures personality with a considerable degree of ethnic bias; however, more pronounced levels of bias were found when measuring constructs across gender groups. The impact of non-uniform bias on the interpretation of mean scores across groups needs to be investigated, to ensure that scores are not artefacts of responding to the instrument, but good indicators of an individual's true standing on the latent trait.
2. The primary aim of this investigation was not to provide a full investigation into the validity and reliability of the TCI. However, a launch pad for future research was provided and it is suggested that studies with similar objectives that includes a more diverse sample be conducted so that the instrument can be adapted and further tested for South African use. This is pertinent as most personality measures used in South Africa do not comply with the standards set out by current legislation; the responsibility to rectify this situation lies primarily with the psychometric research community.
3. It is important for the field of Psychology to understand what makes individuals similar and what makes them different in order to be able to predict behaviour (Berry et al., 2002). Therefore the most important recommendation resulting from the present study is that, researchers are encouraged to find ways to not only determine the impact of bias, but also the underlying reasons for the high level of bias rendered by the TCI.
4. It is also important that future research should explore, whether it is only the nature of scales and items, or also the theoretical constructs represented by the TCI, which are functioning differently across individuals from different ethnic or gender groups. Such investigations will contribute immensely to understanding, whether or not the psychobiological model can be applied across all of humanity.

5. The study shows the utility of concepts and methodology developed in the field of cross-cultural research, and indicates that these techniques can also enhance the ability to establish whether personality assessment measures can be applied justly across different genders, or any groups for that matter. The ability of these concepts to compare different groupings should be incorporated when similar studies are undertaken.
6. The utility of the methods based on IRT, in investigating bias across groups was clearly demonstrated, especially in analysing dichotomous data. However, the current study only relied on fit statistics to indicate whether the scales of the TCI measure their underlying constructs in a unidimensional manner. In future more sophisticated techniques (e.g. Principal Component Analysis of residuals) should be used to explore or confirm the seven primary factors, as well as the sub-facet structure of each primary construct; these studies should preferably be conducted on a South African sample.
7. The current study only lists and briefly describes the constructs associated with the different primary and sub-scales of the TCI; and failed to comprehensively unpack the construct structure rendered by the current sample. A detailed description of the nature of the TCI's respective constructs in a South African sample is recommended, as it will contribute immensely to the body of knowledge underpinning the TCI.
8. The current investigation also does not offer enough evidence to validate the TCI as a personality measure that can be used in a fair and just manner across-cultures and gender groups in South Africa. It is recommended that additional research be conducted on this measure before a.) its adherence to the standards set out by current legislation can be confirmed; and b.) its potential utility in a South African starts can be disregarded. In the case of the latter it would mean that the psychological community will lose valuable indicators of psychological functioning; as well as the vast body of research available on the TCI which add to the understanding of psychological functioning, especially from a biological point of view.

5.6 LIMITATIONS OR WEAKNESSES OF THE STUDY

Although all reasonable efforts have been made to ensure a reliable and valid investigation of the psychometric properties of Cloninger's TCI; the study is still subject to several limitations:

1. The convenient nature of the sample limits the generalizability of the investigation's findings. The sample only provides data from African population groups, which adds

to the value for this particular group, but detracts from the generalizability of the research findings to other South African population groups. In other words the sample is not characteristic of the general population or of the average working population. Only differences between African male and female respondents are analysed, which also leaves several opportunities to further investigate bias within other groups or between different racial groupings. It would also be interesting to see whether the patterns found in the present study would replicate to other African samples or contexts.

2. The majority of both the primary and sub-scales rendered low person separation reliability statistics, which detracts from the power of the Rasch model to detect item misfit (Bond & Fox, 2001; Smith, 2000; Smith et al., 2002; Smith et al., 1998). In other words it becomes increasingly difficult to detect item ‘noise’ in the midst of other ‘noise’ primarily generated by person measures with low reliability. This data trend detracts from the confidence with which the current study’s findings can be interpreted. This should be kept in mind when this study’s findings are referred to in future investigations.
3. The current sample is also limiting in that there are too few respondents in each ethnic group to validly compare the functioning of the primary scales across the different ethnic groups, as the ration between each primary scale’s items and number of persons in the Nguni, Tsonga and Venda groups were too small for valid comparison on the primary scales. Future samples should ensure that enough data is collected from each intended comparison group.
4. Ethnicity was indicated by the racial group and the language the respondent spoke. This definition of ethnicity has a very narrow range. Future research should strive for a broader more sophisticated definition.
5. Although participants were informed of the voluntary nature of this assessment, a certain percentage could still have felt that they are obliged to complete the assessment. This obligatory sentiment may have its root in the authoritarian culture within the SAP. This might introduce a certain degree of method bias between those willing and unwilling to participate in the assessment; for instance those who felt forced could respond in a dishonest manner, which will have confounding effect on their assessment.
6. There was also no attempt made to investigate the reasons underlying bias, which would have helped to explain the findings and create avenues for future directions in item modification.

7. Finally the limitation in assuming a critical realist position with regards to the methods used to empirically verify personality is that the knowledge derived of personality from various samples will always be partial to some degree. This means that the conclusions from any project investigating personality under the guidance of critical realism will be limited to the degree to which they can comprehensively describe the tendencies that underlies human personality.

5.7 CONCLUSION

The primary aim of this investigation was to determine whether the TCI can in the future be established as a valid and reliable personality assessment measure in a South African context. In order to achieve the primary goal of this project additional secondary objectives were set. Firstly the personality structure of the TCI in a South African sample was explored and compared to investigations conducted in other cultures. Secondly the TCI's measurement properties were analysed on an item, sub-scale and primary scale level, to determine the degree to which the TCI is an ethnically and gender biased measure.

The TCI is based on a genotypic model of personality, which assumes a universal structure of personality across all humans irrespective of their ethnicity or gender. Parker et al. (2003) states that it is essential to explore the factor structure of the TCI in diverse socio-cultural populations, especially non-western samples. It is argued that such investigations will test Cloninger's proposition of a universal personality structure and will either diminish or increase the possibility that the measure is confounded by western ethnicity. It should be noted that the existing psychometric properties for the TCI were established by utilizing samples with predominantly European and Eastern origins.

Literature points out that currently there is a small number of personality measures utilised in South Africa, which have the potential to validly and justly measure personality in line with the stipulations of the employment equity act. The results derived from this investigation show that numerous items and sub-scales possessed some degree of ethnic and gender bias, it is noteworthy that all the primary scales functioned with a high degree of gender bias. The study also concluded that each of the primary TCI scales measured a single factor; and that most of the primary and sub scales functioned with low person reliability, and a high degree of construct and content validity.

This evidence suggests that the measure will likely not produce a valid reflection of personality as required by legislation. Psychologists in South Africa are bound by duty and law to ensure that the assessment tools they use, such as the TCI are not biased, and the paucity of literature in this field clearly indicates that not enough is being done to investigate this. In other words the fact that the TCI was shown to possess a significant level of ethnic and gender bias provides a launch pad and motivation for future studies to investigate the sources of this bias.

While there have been studies that investigated construct and item bias in personality questionnaires, (e.g. Meiring et al., 2005; Taylor, 2008), it is nearly impossible to find studies investigating bias across black South African males and females. Furthermore the study of bias has usually been limited to research using CTT methods, where the results of any analysis are invariably bound to the characteristics of the sample. This study used techniques derived from IRT, in particular the Rasch model and invariance analysis. This study shows that methods other than those based on CTT are useful in investigating the psychometric properties of assessments, especially when those measures render dichotomous data.

The contribution of this research to the body of psychological knowledge in South Africa primarily lies in fact that there is little published research regarding the psychometric performance of the TCI's item, sub-scale, and primary scale across groups in South Africa, especially gender groups. The current investigation to certain degree produces useful information in this regard, that can in future aid the interpretation of the TCI in a South African context.

With the support of future research projects that have a similar aim, but include a larger sample size, the current research question can be explored in more depth. This may not only provide the South African Police Services with the necessary information to support the recruitment of police officers, but also allow the psychometric community to use this measure for general selection or clinical decisions. It is only through the understanding of the nature of psychological assessments such as the TCI and all their associated challenges that psychologists can provide quality measurement tools for a country in such desperate need of them.

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Appendixes

Appendix A: Invariance Analysis Sheets: Ethnic comparisons

Ethnic Comparisons for the NS 1 sub-scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	otho measur	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-0,65	-0,22	-0,22	0,11	0,21	-0,6720654	-0,1979346	-0,1979346	-0,6720654	NS1(1)	-0,43	-0,43		0,2370654	-1,8138455		0,2370654	-1,8138455		-0,6720654	-0,1979346	-0,1979346	-0,6720654
2	0	0,14	0,14	0,1	0,2	-0,1536068	0,2936068	0,2936068	-0,1536068	NS1(29)	-0,14	-0,14		0,2236068	-0,626099		0,2236068	-0,626099		-0,1536068	0,2936068	0,2936068	-0,1536068
3	2,26	2,27	2,27	0,11	0,22	2,0190325	2,5109675	2,5109675	2,0190325	NS1(52)	-0,01	-0,01		0,2459675	-0,0406558		0,2459675	-0,0406558		2,0190325	2,5109675	2,5109675	2,0190325
4	-0,95	-1,31	-1,31	0,12	0,27	-1,4254657	-0,8345343	-0,8345343	-1,4254657	NS1(70)	0,36	0,36		0,2954657	1,2184154		0,2954657	1,2184154		-1,4254657	-0,8345343	-0,8345343	-1,4254657
5	2,5	1,82	1,82	0,12	0,2	1,9267619	2,3932381	2,3932381	1,9267619	NS1(99)	0,68	0,68	*	0,2332381	2,9154759	*	0,2332381	2,9154759	*	1,9267619	2,3932381	2,3932381	1,9267619
6	2,14	2,47	2,47	0,11	0,23	2,050049	2,559951	2,559951	2,050049	NS1(114)	-0,33	-0,33		0,254951	-1,2943665		0,254951	-1,2943665		2,050049	2,559951	2,559951	2,050049
7	-0,73	-0,59	-0,59	0,11	0,22	-0,9059675	-0,4140325	-0,4140325	-0,9059675	NS1(144)	-0,14	-0,14		0,2459675	-0,5691809		0,2459675	-0,5691809		-0,9059675	-0,4140325	-0,4140325	-0,9059675
8	-0,06	0,22	0,22	0,1	0,19	-0,1347091	0,2947091	0,2947091	-0,1347091	NS1(167)	-0,28	-0,28		0,2147091	-1,30409		0,2147091	-1,30409		-0,1347091	0,2947091	0,2947091	-0,1347091
9	-2,08	-1,64	-1,64	0,17	0,3	-2,2048188	-1,5151812	-1,5151812	-2,2048188	NS1(191)	-0,44	-0,44		0,3448188	-1,2760325		0,3448188	-1,2760325		-2,2048188	-1,5151812	-1,5151812	-2,2048188
10	-0,83	-0,97	-0,97	0,11	0,25	-1,17313	-0,62687	-0,62687	-1,17313	NS1(211)	0,14	0,14		0,27313	0,5125764		0,27313	0,5125764		-1,17313	-0,62687	-0,62687	-1,17313
11	-1,61	-2,2	-2,2	0,14	0,37	-2,3006008	-1,5093992	-1,5093992	-2,3006008	NS1(238)	0,59	0,59	*	0,3956008	1,4914024		0,3956008	1,4914024		-2,3006008	-1,5093992	-1,5093992	-2,3006008
	-0,0009091	**-0,0009091**	**2,017E-17**																				
corr	**0,9690961**	**0,9391473**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	otho measur	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-0,65	-0,19	-0,1881818	0,11	0,17	-0,6215755	-0,2166063	-0,2166063	-0,6215755	NS1(1)	-0,4618182	-0,46		0,2024846	-2,2807574	*	0,2024846	-2,2717781	*	-0,6224846	-0,2175154	-0,2175154	-0,6224846
2	0	0,31	0,3118182	0,1	0,16	-0,0327705	0,3445887	0,3445887	-0,0327705	NS1(29)	-0,3118182	-0,31		0,1886796	-1,6526331		0,1886796	-1,6429967		-0,0336796	0,3436796	0,3436796	-0,0336796
3	2,26	2,59	2,5918182	0,11	0,2	2,1976548	2,6541633	2,6541633	2,1976548	NS1(52)	-0,3318182	-0,33		0,2282542	-1,4537218		0,2282542	-1,4457562		2,1967458	2,6532542	2,6532542	2,1967458
4	-0,95	-1,28	-1,2781818	0,12	0,22	-1,3646902	-0,8634916	-0,8634916	-1,3646902	NS1(70)	0,3281818	0,33		0,2505993	1,309588		0,2505993	1,3168434		-1,3655993	-0,8644007	-0,8644007	-1,3655993
5	2,5	2	2,0018182	0,12	0,18	2,034576	2,4672422	2,4672422	2,034576	NS1(99)	0,4981818	0,5		0,2163331	2,3028463	*	0,2163331	2,3112508	*	2,0336669	2,4663331	2,4663331	2,0336669
6	2,14	2	2,0018182	0,11	0,18	1,8599589	2,2818593	2,2818593	1,8599589	NS1(114)	0,1381818	0,14		0,2109502	0,6550446		0,2109502	0,6636636		1,8590498	2,2809502	2,2809502	1,8590498
7	-0,73	-0,96	-0,9581818	0,11	0,2	-1,0723452	-0,6158367	-0,6158367	-1,0723452	NS1(144)	0,2281818	0,23		0,2282542	0,9996827		0,2282542	1,0076483		-1,0732542	-0,6167458	-0,6167458	-1,0732542
8	-0,06	-0,05	-0,0481818	0,1	0,17	-0,2513217	0,1431399	0,1431399	-0,2513217	NS1(167)	-0,0118182	-0,01		0,1972308	-0,0599206		0,1972308	-0,050702		-0,2522308	0,1422308	0,1422308	-0,2522308
9	**-2,08**	**-2,35**	-2,3481818	0,17	0,33	-2,5853051	-1,8428767	-1,8428767	-2,5853051	NS1(191)	0,2681818	0,27		0,3712142	0,7224449		0,3712142	0,7273428		-2,5862142	-1,8437858	-1,8437858	-2,5862142
10	-0,83	-0,68	-0,6781818	0,11	0,19	-0,9736359	-0,5345459	-0,5345459	-0,9736359	NS1(211)	-0,1518182	-0,15		0,219545	-0,6915129		0,219545	-0,6832313		-0,974545	-0,535455	-0,535455	-0,974545
11	-1,61	-1,38	-1,3781818	0,14	0,23	-1,7633491	-1,2248327	-1,2248327	-1,7633491	NS1(238)	-0,2318182	-0,23		0,2692582	-0,8609511		0,2692582	-0,8541986		-1,7642582	-1,2257418	-1,2257418	-1,7642582
	-0,0009091	**0,0009091**	**-0,0018182**																				
corr	**0,9803496**	**0,9610854**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	otho measur	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-0,65	-0,57	-0,5690909	0,11	0,18	-0,8204957	-0,3985952	-0,3985952	-0,8204957	NS1(1)	-0,0809091	-0,08		0,2109502	-0,3835459		0,2109502	-0,3792364		-0,8209502	-0,3990498	-0,3990498	-0,8209502
2	**0**	**-0,35**	-0,3490909	0,1	0,18	-0,3804581	0,0313671	0,0313671	-0,3804581	NS1(29)	0,3490909	0,35		0,2059126	1,6953353		0,2059126	1,6997503		-0,3809126	0,0309126	0,0309126	-0,3809126
3	2,26	2,25	2,2509091	0,11	0,18	2,0445043	2,4664048	2,4664048	2,0445043	NS1(52)	0,0090909	0,01		0,2109502	0,043095		0,2109502	0,0474045		2,0440498	2,4659502	2,4659502	2,0440498
4	-0,95	-0,54	-0,5390909	0,12	0,18	-0,9608785	-0,5282124	-0,5282124	-0,9608785	NS1(70)	-0,4109091	-0,41		0,2163331	-1,8994279		0,2163331	-1,8952257		-0,9613331	-0,5286669	-0,5286669	-0,9613331
5	2,5	2,31	2,3109091	0,12	0,18	2,1891215	2,6217876	2,6217876	2,1891215	NS1(99)	0,1890909	0,19		0,2163331	0,874073		0,2163331	0,8782753		2,1886669	2,6213331	2,6213331	2,1886669
6	2,14	1,83	1,8309091	0,11	0,17	1,78297	2,1879391	2,1879391	1,78297	NS1(114)	0,3090909	0,31		0,2024846	1,5264912		0,2024846	1,5309809		1,7825154	2,1874846	2,1874846	1,7825154
7	-0,73	-1,14	-1,1390909	0,11	0,21	-1,1716108	-0,6974801	-0,6974801	-1,1716108	NS1(144)	0,4090909	0,41		0,2370654	1,7256458		0,2370654	1,7294806		-1,1720654	-0,6979346	-0,6979346	-1,1720654
8	-0,06	0,17	0,1709091	0,1	0,16	-0,1332251	0,2441342	0,2441342	-0,1332251	NS1(167)	-0,2309091	-0,23		0,1886796	-1,2238157		0,1886796	-1,2189976		-0,1336796	0,2436796	0,2436796	-0,1336796
9	-2,08	-1,99	-1,9890909	0,17	0,27	-2,3536066	-1,7154843	-1,7154843	-2,3536066	NS1(191)	-0,0909091	-0,09		0,3190611	-0,2849269		0,3190611	-0,2820776		-2,3540611	-1,7159389	-1,7159389	-2,3540611
10	-0,83	-0,54	-0,5390909	0,11	0,18	-0,8954957	-0,4735952	-0,4735952	-0,8954957	NS1(211)	-0,2909091	-0,29		0,2109502	-1,3790413		0,2109502	-1,3747318		-0,8959502	-0,4740498	-0,4740498	-0,8959502
11	-1,61	-1,43	-1,4290909	0,14	0,23	-1,7888037	-1,2502872	-1,2502872	-1,7888037	NS1(238)	-0,1809091	-0,18		0,2692582	-0,6718795		0,2692582	-0,6685032		-1,7892582	-1,2507418	-1,2507418	-1,7892582
	-0,0009091	**0**	**-0,0009091**																				
corr	**0,9860654**	**0,972325**		**R 2**																			

Ethnic Comparisons for the NS 2 sub-scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-1,22	-1,53	-1,063	0,1	0,2	-1,3651068	-0,9178932	-0,9178932	-1,3651068	NS2(13)	-0,157	0,31		0,2236068	-0,7021253		0,2236068	1,3863621		-1,5986068	-1,1513932	-1,1513932	-1,598606798
2	-1,4	-0,49	-0,023	0,1	0,21	-0,9440941	-0,4789059	-0,4789059	-0,9440941	NS2(35)	-1,377	-0,91	*	0,2325941	-5,9201854	*	0,2325941	-3,9123956	*	-1,1775941	-0,7124059	-0,7124059	-1,177594067
3	-0,05	1,13	1,597	0,11	0,31	0,4445623	1,1024377	1,1024377	0,4445623	NS2(61)	-1,647	-1,18	*	0,3289377	-5,0070274	*	0,3289377	-3,5873056	*	0,2110623	0,8689377	0,8689377	0,211062316
4	2,8	4,67	5,137	0,32	1,42	2,5128902	5,4241098	5,4241098	2,5128902	NS2(82)	-2,337	-1,87	*	1,4556098	-1,6055126		1,4556098	-1,2846849		2,2793902	5,1906098	5,1906098	2,279390162
5	-1,32	-1,64	-1,173	0,1	0,2	-1,4701068	-1,0228932	-1,0228932	-1,4701068	NS2(108)	-0,147	0,32		0,2236068	-0,657404		0,2236068	1,4310835		-1,7036068	-1,2563932	-1,2563932	-1,703606798
6	-0,52	-0,4	0,067	0,1	0,21	-0,4590941	0,0060941	0,0060941	-0,4590941	NS2(130)	-0,587	-0,12		0,2325941	-2,5237101	*	0,2325941	-0,5159203		-0,6925941	-0,2274059	-0,2274059	-0,692594067
7	1,68	1,58	2,047	0,2	0,36	1,4516748	2,2753252	2,2753252	1,4516748	NS2(148)	-0,367	0,1		0,4118252	-0,8911548		0,4118252	0,2428215		1,2181748	2,0418252	2,0418252	1,218174794
8	-2,72	-2,41	-1,943	0,11	0,21	-2,5685654	-2,0944346	-2,0944346	-2,5685654	NS2(187)	-0,777	-0,31		0,2370654	-3,2775767	*	0,2370654	-1,3076561		-2,8020654	-2,3279346	-2,3279346	-2,802065392
9	0,52	0,95	1,417	0,13	0,29	0,650695	1,286305	1,286305	0,650695	NS2(203)	-0,897	-0,43		0,317805	-2,8224857	*	0,317805	-1,3530311		0,417195	1,052805	1,052805	0,417195028
10	2,23	2,81	3,277	0,25	0,6	2,1035	3,4035	3,4035	2,1035	NS2(237)	-1,047	-0,58	*	0,65	-1,6107692		0,65	-0,8923077		1,87	3,17	3,17	1,87
	0	**0,467**	**-0,467**																				
corr	**0,959396158**	**0,920440988**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-1,22	-1,17	-1,171	0,1	0,17	-1,3927308	-0,9982692	-0,9982692	-1,3927308	NS2(13)	-0,049	-0,05		0,1972308	-0,2484399		0,1972308	-0,2535101		-1,3922308	-0,9977692	-0,9977692	-1,392230829
2	-1,4	-1,14	-1,141	0,1	0,17	-1,4677308	-1,0732692	-1,0732692	-1,4677308	NS2(35)	-0,259	-0,26		0,1972308	-1,3131821		0,1972308	-1,3182523		-1,4672308	-1,0727692	-1,0727692	-1,467230829
3	-0,05	0,26	0,259	0,11	0,21	-0,1325654	0,3415654	0,3415654	-0,1325654	NS2(61)	-0,309	-0,31		0,2370654	-1,3034378		0,2370654	-1,3076561		-0,1320654	0,3420654	0,3420654	-0,132065392
4	2,8	2,47	2,469	0,32	0,47	2,0659052	3,2030948	3,2030948	2,0659052	NS2(82)	0,331	0,33		0,5685948	0,5821369		0,5685948	0,5803782		2,0664052	3,2035948	3,2035948	2,066405241
5	-1,32	-1,47	-1,471	0,1	0,16	-1,5841796	-1,2068204	-1,2068204	-1,5841796	NS2(108)	0,151	0,15		0,1886796	0,8002984		0,1886796	0,7949984		-1,5836796	-1,2063204	-1,2063204	-1,583679623
6	-0,52	-0,34	-0,341	0,1	0,18	-0,6364126	-0,2245874	-0,2245874	-0,6364126	NS2(130)	-0,179	-0,18		0,2059126	-0,8693008		0,2059126	-0,8741573		-0,6359126	-0,2240874	-0,2240874	-0,635912603
7	1,68	0,94	0,939	0,2	0,26	0,9814756	1,6375244	1,6375244	0,9814756	NS2(148)	0,741	0,74	*	0,3280244	2,2589784	*	0,3280244	2,2559298	*	0,9819756	1,6380244	1,6380244	0,981975611
8	-2,72	-2,85	-2,851	0,11	0,19	-3,005045	-2,565955	-2,565955	-3,005045	NS2(187)	0,131	0,13		0,219545	0,5966886		0,219545	0,5921338		-3,004545	-2,565455	-2,565455	-3,004544984
9	**0,52**	**0,82**	0,819	0,13	0,24	0,3965531	0,9424469	0,9424469	0,3965531	NS2(203)	-0,299	-0,3		0,2729469	-1,0954512		0,2729469	-1,099115		0,3970531	0,9429469	0,9429469	0,397053119
10	2,23	2,47	2,469	0,25	0,47	1,8171467	2,8818533	2,8818533	1,8171467	NS2(237)	-0,239	-0,24		0,5323533	-0,44895		0,5323533	-0,4508285		1,8176467	2,8823533	2,8823533	1,817646734
	0	**-0,001**	**0,001**																				
corr	**0,98183499**	**0,963999948**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-1,22	-0,87	-0,7272088	0,1	0,16	-1,162284	-0,7849248	-0,7849248	-1,162284	NS2(13)	-0,4927912	-0,35		0,1886796	-2,6117883	*	0,1886796	-1,8549963		-1,2336796	-0,8563204	-0,8563204	-1,233679623
2	**-1,4**	**-1,55**	-1,4072088	0,1	0,16	-1,592284	-1,2149248	-1,2149248	-1,592284	NS2(35)	0,0072088	0,15		0,1886796	0,0382064		0,1886796	0,7949984		-1,6636796	-1,2863204	-1,2863204	-1,663679623
3	-0,05	-0,16	-0,0172088	0,11	0,18	-0,2445546	0,1773459	0,1773459	-0,2445546	NS2(61)	-0,0327912	0,11		0,2109502	-0,1554454		0,2109502	0,52145		-0,3159502	0,1059502	0,1059502	-0,315950231
4	2,8	2	2,1427912	0,32	0,37	1,9822126	2,9605786	2,9605786	1,9822126	NS2(82)	0,6572088	0,8	*	0,489183	1,3434824		0,489183	1,6353798		1,910817	2,889183	2,889183	1,910817008
5	-1,32	-1,35	-1,2072088	0,1	0,16	-1,452284	-1,0749248	-1,0749248	-1,452284	NS2(108)	-0,1127912	0,03		0,1886796	-0,5977924		0,1886796	0,1589997		-1,5236796	-1,1463204	-1,1463204	-1,523679623
6	-0,52	-0,42	-0,2772088	0,1	0,17	-0,5958352	-0,2013736	-0,2013736	-0,5958352	NS2(130)	-0,2427912	-0,1		0,1972308	-1,2310004		0,1972308	-0,5070201		-0,6672308	-0,2727692	-0,2727692	-0,667230829
7	1,68	1,75	1,8927912	0,2	0,34	1,391934	2,1808573	2,1808573	1,391934	NS2(148)	-0,2127912	-0,07		0,3944617	-0,5394472		0,3944617	-0,177457		1,3205383	2,1094617	2,1094617	1,320538342
8	-2,72	-2,53	-2,3872088	0,11	0,17	-2,7560889	-2,3511198	-2,3511198	-2,7560889	NS2(187)	-0,3327912	-0,19		0,2024846	-1,6435388		0,2024846	-0,9383431		-2,8274846	-2,4225154	-2,4225154	-2,827484567
9	0,52	1	1,1427912	0,13	0,25	0,5496156	1,1131757	1,1131757	0,5496156	NS2(203)	-0,6227912	-0,48		0,2817801	-2,2102034	*	0,2817801	-1,7034563		0,4782199	1,0417801	1,0417801	0,478219944
10	2,23	2,14	2,2827912	0,25	0,39	1,7931462	2,719645	2,719645	1,7931462	NS2(237)	-0,0527912	0,09		0,4632494	-0,1139586		0,4632494	0,1942798		1,7217506	2,6482494	2,6482494	1,721750607
	0,497958748	**0,640749987**	**-0,1427912**																				
corr	**0,992401539**	**0,984860814**		**R 2**																			

Ethnic Comparisons for the NS 3 sub-scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	0,54	-0,13	-0,1288889	0,12	0,23	-0,0538669	0,464978	0,464978	-0,0538669	NS3(19)	0,6688889	0,67	*	0,2594224	2,5783772	*	0,2594224	2,5826602	*	-0,0544224	0,4644224	0,4644224	-0,0544224
2	1,73	1,64	1,6411111	0,17	0,37	1,2783701	2,092741	2,092741	1,2783701	NS3(41)	0,0888889	0,09		0,4071855	0,2183007		0,4071855	0,2210295		1,2778145	2,0921855	2,0921855	1,2778145
3	-2,18	-2	-1,9988889	0,1	0,2	-2,3130512	-1,8658376	-1,8658376	-2,3130512	NS3(66)	-0,1811111	-0,18		0,2236068	-0,8099535		0,2236068	-0,8049845		-2,3136068	-1,8663932	-1,8663932	-2,3136068
4	1,18	1,08	1,0811111	0,15	0,31	0,786172	1,4749391	1,4749391	0,786172	NS3(109)	0,0988889	0,1		0,3443835	0,2871476		0,3443835	0,290374		0,7856165	1,4743835	1,4743835	0,7856165
5	-0,01	0,2	0,2011111	0,11	0,24	-0,168452	0,3595631	0,3595631	-0,168452	NS3(139)	-0,2111111	-0,21		0,2640076	-0,7996404		0,2640076	-0,7954317		-0,1690076	0,3590076	0,3590076	-0,1690076
6	1,41	0,9	0,9011111	0,16	0,29	0,8243457	1,4867655	1,4867655	0,8243457	NS3(155)	0,5088889	0,51	*	0,3312099	1,5364543		0,3312099	1,539809		0,8237901	1,4862099	1,4862099	0,8237901
7	-2,79	-1,23	-1,2288889	0,11	0,2	-2,2376987	-1,7811902	-1,7811902	-2,2376987	NS3(174)	-1,5611111	-1,56	*	0,2282542	-6,839352	*	0,2282542	-6,8344841	*	-2,2382542	-1,7817458	-1,7817458	-2,2382542
8	0,64	0,66	0,6611111	0,13	0,27	0,3508891	0,950222	0,950222	0,3508891	NS3(192)	-0,0211111	-0,02		0,2996665	-0,0704487		0,2996665	-0,0667409		0,3503335	0,9496665	0,9496665	0,3503335
9	-0,52	-1,11	-1,1088889	0,1	0,2	-1,0380512	-0,5908376	-0,5908376	-1,0380512	NS3(219)	0,5888889	0,59	*	0,2236068	2,6335912	*	0,2236068	2,6385602	*	-1,0386068	-0,5913932	-0,5913932	-1,0386068
	0	**0,001111111**	**-0,0011111**																				
corr	**0,916530814**	**0,840028734**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	0,54	0,18	0,18	0,12	0,2	0,1267619	0,5932381	0,5932381	0,1267619	NS3(19)	0,36	0,36		0,2332381	1,5434873		0,2332381	1,5434873		0,1267619	0,5932381	0,5932381	0,1267619
2	1,73	1,76	1,76	0,17	0,32	1,3826466	2,1073534	2,1073534	1,3826466	NS3(41)	-0,03	-0,03		0,3623534	-0,0827921		0,3623534	-0,0827921		1,3826466	2,1073534	2,1073534	1,3826466
3	-2,18	-2,34	-2,34	0,1	0,18	-2,4659126	-2,0540874	-2,0540874	-2,4659126	NS3(66)	0,16	0,16		0,2059126	0,7770287		0,2059126	0,7770287		-2,4659126	-2,0540874	-2,0540874	-2,4659126
4	1,18	0,92	0,92	0,15	0,25	0,7584524	1,3415476	1,3415476	0,7584524	NS3(109)	0,26	0,26		0,2915476	0,8917926		0,2915476	0,8917926		0,7584524	1,3415476	1,3415476	0,7584524
5	-0,01	0,06	0,06	0,11	0,2	-0,2032542	0,2532542	0,2532542	-0,2032542	NS3(139)	-0,07	-0,07		0,2282542	-0,3066756		0,2282542	-0,3066756		-0,2032542	0,2532542	0,2532542	-0,2032542
6	1,41	1,86	1,86	0,16	0,33	1,2682576	2,0017424	2,0017424	1,2682576	NS3(155)	-0,45	-0,45		0,3667424	-1,2270192		0,3667424	-1,2270192		1,2682576	2,0017424	2,0017424	1,2682576
7	-2,79	-1,93	-1,93	0,11	0,17	-2,5624846	-2,1575154	-2,1575154	-2,5624846	NS3(174)	-0,86	-0,86	*	0,2024846	-4,2472373	*	0,2024846	-4,2472373	*	-2,5624846	-2,1575154	-2,1575154	-2,5624846
8	0,64	0,8	0,8	0,13	0,24	0,4470531	0,9929469	0,9929469	0,4470531	NS3(192)	-0,16	-0,16		0,2729469	-0,5861946		0,2729469	-0,5861946		0,4470531	0,9929469	0,9929469	0,4470531
9	**-0,52**	**-1,31**	-1,31	0,1	0,17	-1,1122308	-0,7177692	-0,7177692	-1,1122308	NS3(219)	0,79	0,79	*	0,1972308	4,005459	*	0,1972308	4,005459	*	-1,1122308	-0,7177692	-0,7177692	-1,1122308
	0	**0**	**0**																				
corr	**0,953423642**	**0,909016642**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	0,54	0,31	0,3088889	0,12	0,2	0,1912064	0,6576825	0,6576825	0,1912064	NS3(19)	0,2311111	0,23		0,2332381	0,9908807		0,2332381	0,9861169		0,1917619	0,6582381	0,6582381	0,1917619
2	**1,73**	**1,97**	1,9688889	0,17	0,3	1,5046257	2,1942632	2,1942632	1,5046257	NS3(41)	-0,2388889	-0,24		0,3448188	-0,6927954		0,3448188	-0,6960177		1,5051812	2,1948188	2,1948188	1,5051812
3	-2,18	-2,03	-2,0311111	0,1	0,17	-2,3027864	-1,9083247	-1,9083247	-2,3027864	NS3(66)	-0,1488889	-0,15		0,1972308	-0,7548966		0,1972308	-0,7605302		-2,3022308	-1,9077692	-1,9077692	-2,3022308
4	1,18	1,31	1,3088889	0,15	0,25	0,9528968	1,535992	1,535992	0,9528968	NS3(109)	-0,1288889	-0,13		0,2915476	-0,4420852		0,2915476	-0,4458963		0,9534524	1,5365476	1,5365476	0,9534524
5	-0,01	-0,52	-0,5211111	0,11	0,17	-0,4680401	-0,063071	-0,063071	-0,4680401	NS3(139)	0,5111111	0,51	*	0,2024846	2,5241979	*	0,2024846	2,5187105	*	-0,4674846	-0,0625154	-0,0625154	-0,4674846
6	1,41	1,64	1,6388889	0,16	0,27	1,2105973	1,8382915	1,8382915	1,2105973	NS3(155)	-0,2288889	-0,23		0,3138471	-0,7293006		0,3138471	-0,7328409		1,2111529	1,8388471	1,8388471	1,2111529
7	-2,79	-2,21	-2,2111111	0,11	0,17	-2,7030401	-2,298071	-2,298071	-2,7030401	NS3(174)	-0,5788889	-0,58	*	0,2024846	-2,8589284	*	0,2024846	-2,8644158	*	-2,7024846	-2,2975154	-2,2975154	-2,7024846
8	0,64	0,27	0,2688889	0,13	0,19	0,2242272	0,6846617	0,6846617	0,2242272	NS3(192)	0,3711111	0,37		0,2302173	1,6120037		0,2302173	1,6071773		0,2247827	0,6852173	0,6852173	0,2247827
9	-0,52	-0,75	-0,7511111	0,1	0,17	-0,8327864	-0,4383247	-0,4383247	-0,8327864	NS3(219)	0,2311111	0,23		0,1972308	1,1717798		0,1972308	1,1661463		-0,8322308	-0,4377692	-0,4377692	-0,8322308
	0	**-0,001111111**	**0,0011111**																				
corr	**0,974934711**	**0,95049769**		**R 2**																			

Ethnic Comparisons for the NS 4 sub-scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	0,56	0,89	0,891	0,11	0,25	0,45237	0,99863	0,99863	0,45237	NS4(34)	-0,331	-0,33		0,273130006	-1,2118771		0,27313	-1,2082158		0,45187	0,99813	0,99813	0,45187
2	1,39	1,24	1,241	0,14	0,28	1,0024505	1,6285495	1,6285495	1,0024505	NS4(53)	0,149	0,15		0,313049517	0,475963		0,3130495	0,4791574		1,0019505	1,6280495	1,6280495	1,0019505
3	-0,11	0,27	0,271	0,1	0,21	-0,1520941	0,3130941	0,3130941	-0,1520941	NS4(79)	-0,381	-0,38		0,232594067	-1,6380469		0,2325941	-1,6337476		-0,1525941	0,3125941	0,3125941	-0,1525941
4	0,28	0,56	0,561	0,1	0,23	0,1697013	0,6712987	0,6712987	0,1697013	NS4(91)	-0,281	-0,28		0,250798724	-1,1204204		0,2507987	-1,1164331		0,1692013	0,6707987	0,6707987	0,1692013
5	-1,76	-1,8	-1,799	0,1	0,2	-2,0031068	-1,5558932	-1,5558932	-2,0031068	NS4(110)	0,039	0,04		0,223606798	0,1744133		0,2236068	0,1788854		-2,0036068	-1,5563932	-1,5563932	-2,0036068
6	1,15	1,58	1,581	0,13	0,31	1,0293453	1,7016547	1,7016547	1,0293453	NS4(141)	-0,431	-0,43		0,336154726	-1,2821477		0,3361547	-1,2791729		1,0288453	1,7011547	1,7011547	1,0288453
7	-0,11	-0,6	-0,599	0,1	0,19	-0,5692091	-0,1397909	-0,1397909	-0,5692091	NS4(165)	0,489	0,49		0,214709106	2,2775001	*	0,2147091	2,2821575	*	-0,5697091	-0,1402909	-0,1402909	-0,5697091
8	1,12	1,31	1,311	0,13	0,28	0,906793	1,524207	1,524207	0,906793	NS4(183)	-0,191	-0,19		0,308706981	-0,6187097		0,308707	-0,6154704		0,906293	1,523707	1,523707	0,906293
9	-1,7	-2,61	-2,609	0,1	0,23	-2,4052987	-1,9037013	-1,9037013	-2,4052987	NS4(204)	0,909	0,91	*	0,250798724	3,6244204	*	0,2507987	3,6284076	*	-2,4057987	-1,9042013	-1,9042013	-2,4057987
10	-0,84	-0,85	-0,849	0,09	0,19	-1,054738	-0,634262	-0,634262	-1,054738	NS4(212)	0,009	0,01		0,21023796	0,0428086		0,210238	0,0475651		-1,055238	-0,634762	-0,634762	-1,055238
	-0,002	-0,001	-0,001																				
corr	0,96766245	0,9363706		R 2																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	0,56	0,86	0,863	0,11	0,21	0,4744346	0,9485654	0,9485654	0,4744346	NS4(34)	-0,303	-0,3		0,237065392	-1,2781284		0,2370654	-1,2654736		0,4729346	0,9470654	0,9470654	0,4729346
2	1,39	1,73	1,733	0,14	0,27	1,2573619	1,8656381	1,8656381	1,2573619	NS4(53)	-0,343	-0,34		0,304138127	-1,1277771		0,3041381	-1,1179131		1,2558619	1,8641381	1,8641381	1,2558619
3	-0,11	-0,06	-0,057	0,1	0,17	-0,2807308	0,1137308	0,1137308	-0,2807308	NS4(79)	-0,053	-0,05		0,197230829	-0,2687207		0,1972308	-0,2535101		-0,2822308	0,1122308	0,1122308	-0,2822308
4	0,28	0,3	0,303	0,1	0,18	0,0855874	0,4974126	0,4974126	0,0855874	NS4(91)	-0,023	-0,02		0,205912603	-0,1116979		0,2059126	-0,0971286		0,0840874	0,4959126	0,4959126	0,0840874
5	-1,76	-2,32	-2,317	0,1	0,19	-2,2532091	-1,8237909	-1,8237909	-2,2532091	NS4(110)	0,557	0,56	*	0,214709106	2,5942076	*	0,2147091	2,60818	*	-2,2547091	-1,8252909	-1,8252909	-2,2547091
6	1,15	1,19	1,193	0,13	0,23	0,9073031	1,4356969	1,4356969	0,9073031	NS4(141)	-0,043	-0,04		0,264196896	-0,1627574		0,2641969	-0,1514022		0,9058031	1,4341969	1,4341969	0,9058031
7	-0,11	0,15	0,153	0,1	0,18	-0,1844126	0,2274126	0,2274126	-0,1844126	NS4(165)	-0,263	-0,26		0,205912603	-1,2772409		0,2059126	-1,2626716		-0,1859126	0,2259126	0,2259126	-0,1859126
8	1,12	1,35	1,353	0,13	0,24	0,9635531	1,5094469	1,5094469	0,9635531	NS4(183)	-0,233	-0,23		0,272946881	-0,853646		0,2729469	-0,8426548		0,9620531	1,5079469	1,5079469	0,9620531
9	-1,7	-2,09	-2,087	0,1	0,18	-2,0994126	-1,6875874	-1,6875874	-2,0994126	NS4(204)	0,387	0,39		0,205912603	1,8794381		0,2059126	1,8940074		-2,1009126	-1,6890874	-1,6890874	-2,1009126
10	-0,84	-1,1	-1,097	0,09	0,16	-1,1520756	-0,7849244	-0,7849244	-1,1520756	NS4(212)	0,257	0,26		0,183575598	1,3999682		0,1835756	1,4163102		-1,1535756	-0,7864244	-0,7864244	-1,1535756
	-0,002	0,001	-0,003																				
corr	0,994518906	0,9890679		R 2																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	0,56	0,5	0,501	0,11	0,18	0,3195498	0,7414502	0,7414502	0,3195498	NS4(34)	0,059	0,06		0,210950231	0,2796868		0,2109502	0,2844273		0,3190498	0,7409502	0,7409502	0,3190498
2	1,39	0,94	0,941	0,14	0,2	0,9213689	1,4096311	1,4096311	0,9213689	NS4(53)	0,449	0,45		0,244131112	1,8391757		0,2441311	1,8432718		0,9208689	1,4091311	1,4091311	0,9208689
3	-0,11	0,37	0,371	0,1	0,18	-0,0754126	0,3364126	0,3364126	-0,0754126	NS4(79)	-0,481	-0,48		0,205912603	-2,3359425	*	0,2059126	-2,3310861	*	-0,0759126	0,3359126	0,3359126	-0,0759126
4	0,28	0,03	0,031	0,1	0,16	-0,0331796	0,3441796	0,3441796	-0,0331796	NS4(91)	0,249	0,25		0,188679623	1,3196974		0,1886796	1,3249974		-0,0336796	0,3436796	0,3436796	-0,0336796
5	-1,76	-1,68	-1,679	0,1	0,16	-1,9081796	-1,5308204	-1,5308204	-1,9081796	NS4(110)	-0,081	-0,08		0,188679623	-0,4292991		0,1886796	-0,4239992		-1,9086796	-1,5313204	-1,5313204	-1,9086796
6	1,15	1,59	1,591	0,13	0,25	1,0887199	1,6522801	1,6522801	1,0887199	NS4(141)	-0,441	-0,44		0,281780056	-1,5650504		0,2817801	-1,5615016		1,0882199	1,6517801	1,6517801	1,0882199
7	-0,11	-0,15	-0,149	0,1	0,16	-0,3181796	0,0591796	0,0591796	-0,3181796	NS4(165)	0,039	0,04		0,188679623	0,2066996		0,1886796	0,2119996		-0,3186796	0,0586796	0,0586796	-0,3186796
8	1,12	0,85	0,851	0,13	0,2	0,7469628	1,2240372	1,2240372	0,7469628	NS4(183)	0,269	0,27		0,238537209	1,1277067		0,2385372	1,1318989		0,7464628	1,2235372	1,2235372	0,7464628
9	-1,7	-1,53	-1,529	0,1	0,16	-1,8031796	-1,4258204	-1,4258204	-1,8031796	NS4(204)	-0,171	-0,17		0,188679623	-0,9062982		0,1886796	-0,9009982		-1,8036796	-1,4263204	-1,4263204	-1,8036796
10	-0,84	-0,93	-0,929	0,09	0,15	-1,0594286	-0,7095714	-0,7095714	-1,0594286	NS4(212)	0,089	0,09		0,174928557	0,5087791		0,1749286	0,5144958		-1,0599286	-0,7100714	-0,7100714	-1,0599286
	-0,002	-0,001	-0,001																				
corr	0,964548159	0,9303532		R 2																			

Ethnic Comparisons for the HA 1 sub-scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	1,96	1,93	1,9290909	0,19	0,43	1,4744391	2,4146518	2,4146518	1,4744391	HA1(2)	0,0309091	0,03		0,4701064	0,0657491		0,4701064	0,0638153		1,4748936	2,4151064	2,4151064	1,4748936
z	-0,59	-0,65	-0,6509091	0,1	0,2	-0,8440613	-0,3968477	-0,3968477	-0,8440613	HA1(20)	0,0609091	0,06		0,2236068	0,2723937		0,2236068	0,2683282		-0,8436068	-0,3963932	-0,3963932	-0,8436068
3	2,78	2,36	2,3590909	0,27	0,51	1,9924839	3,146607	3,146607	1,9924839	HA1(42)	0,4209091	0,42		0,5770615	0,7294007		0,5770615	0,7278253		1,9929385	3,1470615	3,1470615	1,9929385
4	1,46	1,47	1,4690909	0,16	0,36	1,0705911	1,8584998	1,8584998	1,0705911	HA1(65)	-0,0090909	-0,01		0,3939543	-0,023076		0,3939543	-0,0253837		1,0710457	1,8589543	1,8589543	1,0710457
5	-1,1	-1,33	-1,3309091	0,1	0,2	-1,4390613	-0,9918477	-0,9918477	-1,4390613	HA1(81)	0,2309091	0,23		0,2236068	1,0326568		0,2236068	1,0285913		-1,4386068	-0,9913932	-0,9913932	-1,4386068
6	-0,44	-0,35	-0,3509091	0,1	0,21	-0,6280486	-0,1628605	-0,1628605	-0,6280486	HA1(112)	-0,0890909	-0,09		0,2325941	-0,3830317		0,2325941	-0,3869402		-0,6275941	-0,1624059	-0,1624059	-0,6275941
7	-1,22	-1,64	-1,6409091	0,1	0,2	-1,6540613	-1,2068477	-1,2068477	-1,6540613	HA1(119)	0,4209091	0,42		0,2236068	1,8823627		0,2236068	1,8782971		-1,6536068	-1,2063932	-1,2063932	-1,6536068
8	0,17	0,79	0,7890909	0,11	0,28	0,1787133	0,7803776	0,7803776	0,1787133	HA1(149)	-0,6190909	-0,62	*	0,3008322	-2,0579278	*	0,3008322	-2,0609497	*	0,1791678	0,7808322	0,7808322	0,1791678
9	-1,48	-1,64	-1,6409091	0,1	0,2	-1,7840613	-1,3368477	-1,3368477	-1,7840613	HA1(164)	0,1609091	0,16		0,2236068	0,7196073		0,2236068	0,7155418		-1,7836068	-1,3363932	-1,3363932	-1,7836068
10	0,51	0,51	0,5090909	0,12	0,26	0,223189	0,7959019	0,7959019	0,223189	HA1(188)	0,0009091	0		0,2863564	0,0031747		0,2863564	0		0,2236436	0,7963564	0,7963564	0,2236436
11	-2,04	-1,45	-1,4509091	0,1	0,2	-1,9690613	-1,5218477	-1,5218477	-1,9690613	HA1(225)	-0,5890909	-0,59	*	0,2236068	-2,6344946	*	0,2236068	-2,6385602	*	-1,9686068	-1,5213932	-1,5213932	-1,9686068
	0,000909091	**0**	**0,0009091**																				
corr	**0,974754981**	**0,950147273**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	1,96	2	2	0,19	0,37	1,5640673	2,3959327	2,3959327	1,5640673	HA1(2)	-0,04	-0,04		0,4159327	-0,0961694		0,4159327	-0,0961694		1,5640673	2,3959327	2,3959327	1,5640673
2	-0,59	-0,64	-0,64	0,1	0,17	-0,8122308	-0,4177692	-0,4177692	-0,8122308	HA1(20)	0,05	0,05		0,1972308	0,2535101		0,1972308	0,2535101		-0,8122308	-0,4177692	-0,4177692	-0,8122308
3	2,78	2,31	2,31	0,27	0,42	2,0457005	3,0442995	3,0442995	2,0457005	HA1(42)	0,47	0,47		0,4992995	0,9413188		0,4992995	0,9413188		2,0457005	3,0442995	3,0442995	2,0457005
4	1,46	1,28	1,28	0,16	0,28	1,0475097	1,6924903	1,6924903	1,0475097	HA1(65)	0,18	0,18		0,3224903	0,5581563		0,3224903	0,5581563		1,0475097	1,6924903	1,6924903	1,0475097
5	-1,1	-0,93	-0,93	0,1	0,17	-1,2122308	-0,8177692	-0,8177692	-1,2122308	HA1(81)	-0,17	-0,17		0,1972308	-0,8619342		0,1972308	-0,8619342		-1,2122308	-0,8177692	-0,8177692	-1,2122308
6	-0,44	-0,96	-0,96	0,1	0,17	-0,8972308	-0,5027692	-0,5027692	-0,8972308	HA1(112)	0,52	0,52	*	0,1972308	2,6365047	*	0,1972308	2,6365047	*	-0,8972308	-0,5027692	-0,5027692	-0,8972308
7	-1,22	-1,65	-1,65	0,1	0,17	-1,6322308	-1,2377692	-1,2377692	-1,6322308	HA1(119)	0,43	0,43		0,1972308	2,1801865	*	0,1972308	2,1801865	*	-1,6322308	-1,2377692	-1,2377692	-1,6322308
8	0,17	0,87	0,87	0,11	0,24	0,2559924	0,7840076	0,7840076	0,2559924	HA1(149)	-0,7	-0,7	*	0,2640076	-2,6514391	*	0,2640076	-2,6514391	*	0,2559924	0,7840076	0,7840076	0,2559924
9	**-1,48**	**-1,43**	-1,43	0,1	0,17	-1,6522308	-1,2577692	-1,2577692	-1,6522308	HA1(164)	-0,05	-0,05		0,1972308	-0,2535101		0,1972308	-0,2535101		-1,6522308	-1,2577692	-1,2577692	-1,6522308
10	0,51	0,87	0,87	0,12	0,24	0,4216718	0,9583282	0,9583282	0,4216718	HA1(188)	-0,36	-0,36		0,2683282	-1,3416408		0,2683282	-1,3416408		0,4216718	0,9583282	0,9583282	0,4216718
11	-2,04	-1,71	-1,71	0,1	0,17	-2,0722308	-1,6777692	-1,6777692	-2,0722308	HA1(225)	-0,33	-0,33		0,1972308	-1,6731664		0,1972308	-1,6731664		-2,0722308	-1,6777692	-1,6777692	-2,0722308
	0,000909091	**0,000909091**	**-8,077E-17**																				
corr	**0,968291985**	**0,937589368**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	1,96	1,43	1,4309091	0,19	0,28	1,3570761	2,033833	2,033833	1,3570761	HA1(2)	0,5290909	0,53	*	0,3383785	1,5636068		0,3383785	1,5662934		1,3566215	2,0333785	2,0333785	1,3566215
2	**-0,59**	**-0,72**	-0,7190909	0,1	0,16	-0,8432251	-0,4658658	-0,4658658	-0,8432251	HA1(20)	0,1290909	0,13		0,1886796	0,6841804		0,1886796	0,6889986		-0,8436796	-0,4663204	-0,4663204	-0,8436796
3	2,78	2,65	2,6509091	0,27	0,46	2,1820691	3,24884	3,24884	2,1820691	HA1(42)	0,1290909	0,13		0,5333854	0,2420218		0,5333854	0,2437262		2,1816146	3,2483854	3,2483854	2,1816146
4	1,46	2,14	2,1409091	0,16	0,37	1,3973417	2,2035674	2,2035674	1,3973417	HA1(65)	-0,6809091	-0,68	*	0,4031129	-1,6891276		0,4031129	-1,6868724		1,3968871	2,2031129	2,2031129	1,3968871
5	-1,1	-1,15	-1,1490909	0,1	0,16	-1,3132251	-0,9358658	-0,9358658	-1,3132251	HA1(81)	0,0490909	0,05		0,1886796	0,2601813		0,1886796	0,2649995		-1,3136796	-0,9363204	-0,9363204	-1,3136796
6	-0,44	-0,85	-0,8490909	0,1	0,16	-0,8332251	-0,4558658	-0,4558658	-0,8332251	HA1(112)	0,4090909	0,41		0,1886796	2,1681775	*	0,1886796	2,1729957	*	-0,8336796	-0,4563204	-0,4563204	-0,8336796
7	-1,22	-1	-0,9990909	0,1	0,16	-1,2982251	-0,9208658	-0,9208658	-1,2982251	HA1(119)	-0,2209091	-0,22		0,1886796	-1,1708158		0,1886796	-1,1659977		-1,2986796	-0,9213204	-0,9213204	-1,2986796
8	0,17	0,36	0,3609091	0,11	0,2	0,0372003	0,4937088	0,4937088	0,0372003	HA1(149)	-0,1909091	-0,19		0,2282542	-0,8363879		0,2282542	-0,8324051		0,0367458	0,4932542	0,4932542	0,0367458
9	-1,48	-1,49	-1,4890909	0,1	0,16	-1,6732251	-1,2958658	-1,2958658	-1,6732251	HA1(164)	0,0090909	0,01		0,1886796	0,0481817		0,1886796	0,0529999		-1,6736796	-1,2963204	-1,2963204	-1,6736796
10	0,51	0,44	0,4409091	0,12	0,2	0,2422165	0,7086926	0,7086926	0,2422165	HA1(188)	0,0690909	0,07		0,2332381	0,2962248		0,2332381	0,3001225		0,2417619	0,7082381	0,7082381	0,2417619
11	-2,04	-1,79	-1,7890909	0,1	0,16	-2,1032251	-1,7258658	-1,7258658	-2,1032251	HA1(225)	-0,2509091	-0,25		0,1886796	-1,3298155		0,1886796	-1,3249974		-2,1036796	-1,7263204	-1,7263204	-2,1036796
	0,000909091	**0,001818182**	**-0,0009091**																				
corr	**0,976459322**	**0,953472808**		**R 2**																			

Ethnic Comparisons for the HA 2 sub-scale

Sotho	vs	Nguni								0,5										
								new												
Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
-0,322857143	0,1	0,2	-0,5400354	-0,0928218	-0,0928218	-0,5400354	HA2(12)	0,0128571	0,01		0,2236068	0,0574989		0,2236068	0,0447214		-0,5386068	-0,0913932	-0,0913932	-0,5386068
-0,282857143	0,1	0,2	-0,5550354	-0,1078218	-0,1078218	-0,5550354	HA2(26)	-0,0971429	-0,1		0,2236068	-0,4344361		0,2236068	-0,4472136		-0,5536068	-0,1063932	-0,1063932	-0,5536068
0,417142857	0,1	0,21	0,2509774	0,7161655	0,7161655	0,2509774	HA2(67)	0,1328571	0,13		0,2325941	0,5711975		0,2325941	0,5589137		0,2524059	0,7175941	0,7175941	0,2524059
-0,082857143	0,1	0,2	-0,1350354	0,3121782	0,3121782	-0,1350354	HA2(129)	0,3428571	0,34		0,2236068	1,5333038		0,2236068	1,5205262		-0,1336068	0,3136068	0,3136068	-0,1336068
0,007142857	0,1	0,2	-0,2500354	0,1971782	0,1971782	-0,2500354	HA2(154)	-0,0671429	-0,07		0,2236068	-0,300272		0,2236068	-0,3130495		-0,2486068	0,1986068	0,1986068	-0,2486068
-0,602857143	0,1	0,2	-0,7550354	-0,3078218	-0,3078218	-0,7550354	HA2(189)	0,1428571	0,14		0,2236068	0,6388766		0,2236068	0,626099		-0,7536068	-0,3063932	-0,3063932	-0,7536068
0,827142857	0,1	0,22	0,3719105	0,8552323	0,8552323	0,3719105	HA2(217)	-0,4271429	-0,43		0,2416609	-1,7675297		0,2416609	-1,7793527		0,3733391	0,8566609	0,8566609	0,3733391
0,002857143																				
	R 2																			

Sotho	vs	Tsonga																		
Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
0,16	0,1	0,17	-0,2722308	0,1222308	0,1222308	-0,2722308	HA2(12)	-0,47	-0,47		0,1972308	-2,3829946	*	0,1972308	-2,3829946	*	-0,2722308	0,1222308	0,1222308	-0,2722308
-0,74	0,1	0,17	-0,7572308	-0,3627692	-0,3627692	-0,7572308	HA2(26)	0,36	0,36		0,1972308	1,8252725		0,1972308	1,8252725		-0,7572308	-0,3627692	-0,3627692	-0,7572308
0,62	0,1	0,17	0,3877692	0,7822308	0,7822308	0,3877692	HA2(67)	-0,07	-0,07		0,1972308	-0,3549141		0,1972308	-0,3549141		0,3877692	0,7822308	0,7822308	0,3877692
0,13	0,1	0,17	-0,0022308	0,3922308	0,3922308	-0,0022308	HA2(129)	0,13	0,13		0,1972308	0,6591262		0,1972308	0,6591262		-0,0022308	0,3922308	0,3922308	-0,0022308
-0,54	0,1	0,17	-0,4972308	-0,1027692	-0,1027692	-0,4972308	HA2(154)	0,48	0,48		0,1972308	2,4336966	*	0,1972308	2,4336966	*	-0,4972308	-0,1027692	-0,1027692	-0,4972308
-0,43	0,1	0,17	-0,6422308	-0,2477692	-0,2477692	-0,6422308	HA2(189)	-0,03	-0,03		0,1972308	-0,152106		0,1972308	-0,152106		-0,6422308	-0,2477692	-0,2477692	-0,6422308
0,8	0,1	0,18	0,3940874	0,8059126	0,8059126	0,3940874	HA2(217)	-0,4	-0,4		0,2059126	-1,9425717		0,2059126	-1,9425717		0,3940874	0,8059126	0,8059126	0,3940874
0																				
	R 2																			

Sotho	vs	Venda																		
Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
-0,488571429	0,1	0,17	-0,5965165	-0,2020549	-0,2020549	-0,5965165	HA2(12)	0,1785714	0,18		0,1972308	0,9053931		0,1972308	0,9126362		-0,5972308	-0,2027692	-0,2027692	-0,5972308
-0,458571429	0,1	0,17	-0,6165165	-0,2220549	-0,2220549	-0,6165165	HA2(26)	0,0785714	0,08		0,1972308	0,398373		0,1972308	0,4056161		-0,6172308	-0,2227692	-0,2227692	-0,6172308
0,721428571	0,1	0,17	0,4384835	0,8329451	0,8329451	0,4384835	HA2(67)	-0,1714286	-0,17		0,1972308	-0,8691774		0,1972308	-0,8619342		0,4377692	0,8322308	0,8322308	0,4377692
0,371428571	0,1	0,17	0,1184835	0,5129451	0,5129451	0,1184835	HA2(129)	-0,1114286	-0,11		0,1972308	-0,5649653		0,1972308	-0,5577221		0,1177692	0,5122308	0,5122308	0,1177692
-0,288571429	0,1	0,17	-0,3715165	0,0229451	0,0229451	-0,3715165	HA2(154)	0,2285714	0,23		0,1972308	1,1589031		0,1972308	1,1661463		-0,3722308	0,0222308	0,0222308	-0,3722308
-0,238571429	0,1	0,17	-0,5465165	-0,1520549	-0,1520549	-0,5465165	HA2(189)	-0,2214286	-0,22		0,1972308	-1,1226874		0,1972308	-1,1154443		-0,5472308	-0,1527692	-0,1527692	-0,5472308
0,401428571	0,1	0,17	0,2034835	0,5979451	0,5979451	0,2034835	HA2(217)	-0,0014286	0		0,1972308	-0,0072431		0,1972308	0		0,2027692	0,5972308	0,5972308	0,2027692
-0,001428571																				
	R 2																			

Ethnic Comparisons for the HA 3 sub-scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-0,06	-0,41	-0,41125	0,12	0,24	-0,5039532	0,0327032	0,0327032	-0,5039532	HA3(27)	0,35125	0,35		0,2683282	1,3090315		0,2683282	1,304373		-0,5033282	0,0333282	0,0333282	-0,5033282
2	-0,21	0,65	0,64875	0,12	0,31	-0,1130404	0,5517904	0,5517904	-0,1130404	HA3(54)	-0,85875	-0,86	*	0,3324154	-2,583364	*	0,3324154	-2,5871244	*	-0,1124154	0,5524154	0,5524154	-0,1124154
3	-1,68	-1,86	-1,86125	0,12	0,22	-2,0212243	-1,5200257	-1,5200257	-2,0212243	HA3(80)	0,18125	0,18		0,2505993	0,7232662		0,2505993	0,7182782		-2,0205993	-1,5194007	-1,5194007	-2,0205993
4	1,56	0,75	0,74875	0,18	0,31	0,795906	1,512844	1,512844	0,795906	HA3(100)	0,81125	0,81	*	0,358469	2,2630969	*	0,358469	2,2596098	*	0,796531	1,513469	1,513469	0,796531
5	1,62	1,5	1,49875	0,18	0,41	1,1116027	2,0071473	2,0071473	1,1116027	HA3(142)	0,12125	0,12		0,4477723	0,270785		0,4477723	0,2679934		1,1122277	2,0077723	2,0077723	1,1122277
6	-0,34	-0,17	-0,17125	0,12	0,25	-0,5329335	0,0216835	0,0216835	-0,5329335	HA3(157)	-0,16875	-0,17		0,2773085	-0,6085281		0,2773085	-0,6130357		-0,5323085	0,0223085	0,0223085	-0,5323085
7	-0,84	-0,41	-0,41125	0,12	0,24	-0,8939532	-0,3572968	-0,3572968	-0,8939532	HA3(209)	-0,42875	-0,43		0,2683282	-1,5978569		0,2683282	-1,6025154		-0,8933282	-0,3566718	-0,3566718	-0,8933282
8	-0,04	-0,05	-0,05125	0,12	0,26	-0,3319814	0,2407314	0,2407314	-0,3319814	HA3(231)	0,01125	0,01		0,2863564	0,0392867		0,2863564	0,0349215		-0,3313564	0,2413564	0,2413564	-0,3313564
	0,00125	**-1,56125E-17**	**0,00125**																				
corr	**0,892609714**	**0,796752102**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-0,06	-0,75	-0,74875	0,12	0,19	-0,6290971	-0,1796529	-0,1796529	-0,6290971	HA3(27)	0,68875	0,69	*	0,2247221	3,0648973	*	0,2247221	3,0704597	*	-0,6297221	-0,1802779	-0,1802779	-0,6297221
2	-0,21	0,09	0,09125	0,12	0,21	-0,3012427	0,1824927	0,1824927	-0,3012427	HA3(54)	-0,30125	-0,3		0,2418677	-1,2455155		0,2418677	-1,2403473		-0,3018677	0,1818677	0,1818677	-0,3018677
3	-1,68	-2,04	-2,03875	0,12	0,19	-2,0840971	-1,6346529	-1,6346529	-2,0840971	HA3(80)	0,35875	0,36		0,2247221	1,5964165		0,2247221	1,601979		-2,0847221	-1,6352779	-1,6352779	-2,0847221
4	1,56	1,91	1,91125	0,18	0,36	1,3331328	2,1381172	2,1381172	1,3331328	HA3(100)	-0,35125	-0,35		0,4024922	-0,8726876		0,4024922	-0,869582		1,3325078	2,1374922	2,1374922	1,3325078
5	1,62	2,05	2,05125	0,18	0,38	1,4151491	2,2561009	2,2561009	1,4151491	HA3(142)	-0,43125	-0,43		0,4204759	-1,0256235		0,4204759	-1,0226507		1,4145241	2,2554759	2,2554759	1,4145241
6	-0,34	-0,09	-0,08875	0,12	0,21	-0,4562427	0,0274927	0,0274927	-0,4562427	HA3(157)	-0,25125	-0,25		0,2418677	-1,0387909		0,2418677	-1,0336228		-0,4568677	0,0268677	0,0268677	-0,4568677
7	-0,84	-1,24	-1,23875	0,12	0,18	-1,2557081	-0,8230419	-0,8230419	-1,2557081	HA3(209)	0,39875	0,4		0,2163331	1,8432225		0,2163331	1,8490007		-1,2563331	-0,8236669	-0,8236669	-1,2563331
8	-0,04	0,09	0,09125	0,12	0,21	-0,2162427	0,2674927	0,2674927	-0,2162427	HA3(231)	-0,13125	-0,13		0,2418677	-0,542652		0,2418677	-0,5374838		-0,2168677	0,2668677	0,2668677	-0,2168677
	0,00125	**0,0025**	**-0,00125**																				
corr	**0,973035811**	**0,94679869**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-0,06	0,31	0,30875	0,12	0,22	-0,1262243	0,3749743	0,3749743	-0,1262243	HA3(27)	-0,36875	-0,37		0,2505993	-1,4714727		0,2505993	-1,4764607		-0,1255993	0,3755993	0,3755993	-0,1255993
2	**-0,21**	**-0,11**	-0,11125	0,12	0,21	-0,4024927	0,0812427	0,0812427	-0,4024927	HA3(54)	-0,09875	-0,1		0,2418677	-0,408281		0,2418677	-0,4134491		-0,4018677	0,0818677	0,0818677	-0,4018677
3	-1,68	-2,17	-2,17125	0,12	0,2	-2,1588631	-1,6923869	-1,6923869	-2,1588631	HA3(80)	0,49125	0,49		0,2332381	2,106217	*	0,2332381	2,1008577	*	-2,1582381	-1,6917619	-1,6917619	-2,1582381
4	1,56	1,13	1,12875	0,18	0,27	1,0198754	1,6688746	1,6688746	1,0198754	HA3(100)	0,43125	0,43		0,3244996	1,3289692		0,3244996	1,3251171		1,0205004	1,6694996	1,6694996	1,0205004
5	1,62	1,28	1,27875	0,18	0,28	1,1165087	1,7822413	1,7822413	1,1165087	HA3(142)	0,34125	0,34		0,3328663	1,0251863		0,3328663	1,021431		1,1171337	1,7828663	1,7828663	1,1171337
6	-0,34	-0,16	-0,16125	0,12	0,21	-0,4924927	-0,0087573	-0,0087573	-0,4924927	HA3(157)	-0,17875	-0,18		0,2418677	-0,7390403		0,2418677	-0,7442084		-0,4918677	-0,0081323	-0,0081323	-0,4918677
7	-0,84	-0,8	-0,80125	0,12	0,2	-1,0538631	-0,5873869	-0,5873869	-1,0538631	HA3(209)	-0,03875	-0,04		0,2332381	-0,1661393		0,2332381	-0,1714986		-1,0532381	-0,5867619	-0,5867619	-1,0532381
8	-0,04	0,52	0,51875	0,12	0,23	-0,0200474	0,4987974	0,4987974	-0,0200474	HA3(231)	-0,55875	-0,56	*	0,2594224	-2,153823	*	0,2594224	-2,1586414	*	-0,0194224	0,4994224	0,4994224	-0,0194224
	0,00125	**0**	**0,00125**																				
corr	**0,940588626**	**0,884706964**		**R 2**																			

Ethnic Comparisons for the HA 4 sub-scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	1,45	1,62	1,6222222	0,14	0,32	1,1868261	1,8853961	1,8853961	1,1868261	HA4(22)	-0,1722222	-0,17		0,349285	-0,4930708		0,349285	-0,4867086		1,185715	1,884285	1,884285	1,185715
2	0,81	0,71	0,7122222	0,12	0,24	0,492783	1,0294393	1,0294393	0,492783	HA4(43)	0,0977778	0,1		0,2683282	0,3643963		0,2683282	0,372678		0,4916718	1,0283282	1,0283282	0,4916718
3	0,84	1,26	1,2622222	0,12	0,28	0,7464802	1,355742	1,355742	0,7464802	HA4(63)	-0,4222222	-0,42		0,3046309	-1,3860123		0,3046309	-1,3787175		0,7453691	1,3546309	1,3546309	0,7453691
4	-1,02	-1	-0,9977778	0,1	0,19	-1,223598	-0,7941798	-0,7941798	-1,223598	HA4(92)	-0,0222222	-0,02		0,2147091	-0,1034992		0,2147091	-0,0931493		-1,2247091	-0,7952909	-0,7952909	-1,2247091
5	0,52	0,96	0,9622222	0,11	0,26	0,4587992	1,023423	1,023423	0,4587992	HA4(113)	-0,4422222	-0,44		0,2823119	-1,5664315		0,2823119	-1,55856		0,4576881	1,0223119	1,0223119	0,4576881
6	-0,63	-1,15	-1,1477778	0,1	0,19	-1,103598	-0,6741798	-0,6741798	-1,103598	HA4(147)	0,5177778	0,52	*	0,2147091	2,4115315	*	0,2147091	2,4218815	*	-1,1047091	-0,6752909	-0,6752909	-1,1047091
7	1,06	0,77	0,7722222	0,13	0,25	0,6343311	1,1978912	1,1978912	0,6343311	HA4(182)	0,2877778	0,29		0,2817801	1,0212851		0,2817801	1,0291715		0,6332199	1,1967801	1,1967801	0,6332199
8	-0,09	0	0,0022222	0,1	0,21	-0,276483	0,1887052	0,1887052	-0,276483	HA4(202)	-0,0922222	-0,09		0,2325941	-0,3964943		0,2325941	-0,3869402		-0,2775941	0,1875941	0,1875941	-0,2775941
9	-2,96	-3,17	-3,1677778	0,12	0,26	-3,3502453	-2,7775325	-2,7775325	-3,3502453	HA4(236)	0,2077778	0,21		0,2863564	0,7255915		0,2863564	0,7333518		-3,3513564	-2,7786436	-2,7786436	-3,3513564
	-0,002222222	**0**	**-0,0022222**																				
corr	**0,981193387**	**0,962740462**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	1,45	1,88	1,8833333	0,14	0,29	1,3446418	1,9886915	1,9886915	1,3446418	HA4(22)	-0,4333333	-0,43		0,3220248	-1,3456519		0,3220248	-1,3353007		1,3429752	1,9870248	1,9870248	1,3429752
2	0,81	0,52	0,5233333	0,12	0,2	0,4334286	0,8999047	0,8999047	0,4334286	HA4(43)	0,2866667	0,29		0,2332381	1,2290732		0,2332381	1,2433647		0,4317619	0,8982381	0,8982381	0,4317619
3	0,84	1,05	1,0533333	0,12	0,22	0,6960674	1,1972659	1,1972659	0,6960674	HA4(63)	-0,2133333	-0,21		0,2505993	-0,8512927		0,2505993	-0,8379912		0,6944007	1,1955993	1,1955993	0,6944007
4	-1,02	-1,15	-1,1466667	0,1	0,16	-1,272013	-0,8946537	-0,8946537	-1,272013	HA4(92)	0,1266667	0,13		0,1886796	0,671332		0,1886796	0,6889986		-1,2736796	-0,8963204	-0,8963204	-1,2736796
5	0,52	1,05	1,0533333	0,11	0,22	0,5406992	1,0326341	1,0326341	0,5406992	HA4(113)	-0,5333333	-0,53	*	0,2459675	-2,1683083	*	0,2459675	-2,1547564	*	0,5390325	1,0309675	1,0309675	0,5390325
6	-0,63	-1,28	-1,2766667	0,1	0,16	-1,142013	-0,7646537	-0,7646537	-1,142013	HA4(147)	0,6466667	0,65	*	0,1886796	3,4273265	*	0,1886796	3,4449931	*	-1,1436796	-0,7663204	-0,7663204	-1,1436796
7	1,06	1,32	1,3233333	0,13	0,24	0,9187198	1,4646135	1,4646135	0,9187198	HA4(182)	-0,2633333	-0,26		0,2729469	-0,9647787		0,2729469	-0,9525663		0,9170531	1,4629469	1,4629469	0,9170531
8	-0,09	-0,15	-0,1466667	0,1	0,17	-0,3155642	0,0788975	0,0788975	-0,3155642	HA4(202)	0,0566667	0,06		0,1972308	0,2873114		0,1972308	0,3042121		-0,3172308	0,0772308	0,0772308	-0,3172308
9	**-2,96**	**-3,23**	-3,2266667	0,12	0,22	-3,3439326	-2,8427341	-2,8427341	-3,3439326	HA4(236)	0,2666667	0,27		0,2505993	1,0641158		0,2505993	1,0774173		-3,3455993	-2,8444007	-2,8444007	-3,3455993
	-0,002222222	**0,001111111**	**-0,0033333**																				
corr	**0,981530172**	**0,963401478**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	1,45	1,71	1,7111111	0,14	0,25	1,2940246	1,8670865	1,8670865	1,2940246	HA4(22)	-0,2611111	-0,26		0,286531	-0,9112841		0,286531	-0,9074063		1,293469	1,866531	1,866531	1,293469
2	**0,81**	**0,72**	0,7211111	0,12	0,19	0,5408335	0,9902776	0,9902776	0,5408335	HA4(43)	0,0888889	0,09		0,2247221	0,3955504		0,2247221	0,4004947		0,5402779	0,9897221	0,9897221	0,5402779
3	0,84	0,72	0,7211111	0,12	0,19	0,5558335	1,0052776	1,0052776	0,5558335	HA4(63)	0,1188889	0,12		0,2247221	0,5290486		0,2247221	0,533993		0,5552779	1,0047221	1,0047221	0,5552779
4	-1,02	-0,86	-0,8588889	0,1	0,16	-1,1281241	-0,7507648	-0,7507648	-1,1281241	HA4(92)	-0,1611111	-0,16		0,1886796	-0,8538872		0,1886796	-0,8479983		-1,1286796	-0,7513204	-0,7513204	-1,1286796
5	0,52	0,58	0,5811111	0,11	0,19	0,3310106	0,7701005	0,7701005	0,3310106	HA4(113)	-0,0611111	-0,06		0,219545	-0,2783535		0,219545	-0,2732925		0,330455	0,769545	0,769545	0,330455
6	-0,63	-1,09	-1,0888889	0,1	0,16	-1,0481241	-0,6707648	-0,6707648	-1,0481241	HA4(147)	0,4588889	0,46		0,1886796	2,4321062	*	0,1886796	2,4379951	*	-1,0486796	-0,6713204	-0,6713204	-1,0486796
7	1,06	1,18	1,1811111	0,13	0,21	0,8735738	1,3675373	1,3675373	0,8735738	HA4(182)	-0,1211111	-0,12		0,2469818	-0,4903646		0,2469818	-0,4858658		0,8730182	1,3669818	1,3669818	0,8730182
8	-0,09	-0,16	-0,1588889	0,1	0,17	-0,3216753	0,0727864	0,0727864	-0,3216753	HA4(202)	0,0688889	0,07		0,1972308	0,3492805		0,1972308	0,3549141		-0,3222308	0,0722308	0,0722308	-0,3222308
9	-2,96	-2,81	-2,8088889	0,12	0,2	-3,1176825	-2,6512064	-2,6512064	-3,1176825	HA4(236)	-0,1511111	-0,15		0,2332381	-0,6478835		0,2332381	-0,6431197		-3,1182381	-2,6517619	-2,6517619	-3,1182381
	-0,002222222	**-0,001111111**	**-0,0011111**																				
corr	**0,987940781**	**0,976026987**		**R 2**																			

Ethnic Comparisons for the RD 1 sub-scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	0,14	0,16	0,16	0,1	0,21	-0,0825941	0,3825941	0,3825941	-0,0825941	RD1(3)	-0,02	-0,02		0,2325941	-0,0859867		0,2325941	-0,0859867		-0,0825941	0,3825941	0,3825941	-0,0825941
2	0,48	-0,16	-0,16	0,1	0,22	-0,0816609	0,4016609	0,4016609	-0,0816609	RD1(28)	0,64	0,64	*	0,2416609	2,6483388	*	0,2416609	2,6483388	*	-0,0816609	0,4016609	0,4016609	-0,0816609
3	1,76	2,15	2,15	0,1	0,2	1,7313932	2,1786068	2,1786068	1,7313932	RD1(55)	-0,39	-0,39		0,2236068	-1,744133		0,2236068	-1,744133		1,7313932	2,1786068	2,1786068	1,7313932
4	-1,52	-2,22	-2,22	0,15	0,46	-2,3538388	-1,3861612	-1,3861612	-2,3538388	RD1(83)	0,7	0,7	*	0,4838388	1,4467628		0,4838388	1,4467628		-2,3538388	-1,3861612	-1,3861612	-2,3538388
5	-0,72	-0,62	-0,62	0,12	0,25	-0,9473085	-0,3926915	-0,3926915	-0,9473085	RD1(102)	-0,1	-0,1		0,2773085	-0,3606092		0,2773085	-0,3606092		-0,9473085	-0,3926915	-0,3926915	-0,9473085
6	-0,07	0,29	0,29	0,1	0,2	-0,1136068	0,3336068	0,3336068	-0,1136068	RD1(120)	-0,36	-0,36		0,2236068	-1,6099689		0,2236068	-1,6099689		-0,1136068	0,3336068	0,3336068	-0,1136068
7	0,27	0,03	0,03	0,1	0,21	-0,0825941	0,3825941	0,3825941	-0,0825941	RD1(158)	0,24	0,24		0,2325941	1,0318406		0,2325941	1,0318406		-0,0825941	0,3825941	0,3825941	-0,0825941
8	1,95	2,63	2,63	0,1	0,22	2,0483391	2,5316609	2,5316609	2,0483391	RD1(181)	-0,68	-0,68	*	0,2416609	-2,81386	*	0,2416609	-2,81386	*	2,0483391	2,5316609	2,5316609	2,0483391
9	-1,56	-1,71	-1,71	0,15	0,37	-2,0342493	-1,2357507	-1,2357507	-2,0342493	RD1(210)	0,15	0,15		0,3992493	0,3757051		0,3992493	0,3757051		-2,0342493	-1,2357507	-1,2357507	-2,0342493
10	-0,73	-0,55	-0,55	0,12	0,25	-0,9173085	-0,3626915	-0,3626915	-0,9173085	RD1(224)	-0,18	-0,18		0,2773085	-0,6490966		0,2773085	-0,6490966		-0,9173085	-0,3626915	-0,3626915	-0,9173085
	0	0	0																				
corr	0,969824384	0,940559336		R 2																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	0,14	0,14	0,139	0,1	0,17	-0,0577308	0,3367308	0,3367308	-0,0577308	RD1(3)	1E-03	0		0,1972308	0,0050702		0,1972308	0		-0,0572308	0,3372308	0,3372308	-0,0572308
2	0,48	0,05	0,049	0,1	0,17	0,0672692	0,4617308	0,4617308	0,0672692	RD1(28)	0,431	0,43		0,1972308	2,1852567	*	0,1972308	2,1801865	*	0,0677692	0,4622308	0,4622308	0,0677692
3	1,76	1,84	1,839	0,1	0,17	1,6022692	1,9967308	1,9967308	1,6022692	RD1(55)	-0,079	-0,08		0,1972308	-0,4005459		0,1972308	-0,4056161		1,6027692	1,9972308	1,9972308	1,6027692
4	-1,52	-2,14	-2,141	0,15	0,33	-2,1929914	-1,4680086	-1,4680086	-2,1929914	RD1(83)	0,621	0,62	*	0,3624914	1,7131442		0,3624914	1,7103855		-2,1924914	-1,4675086	-1,4675086	-2,1924914
5	-0,72	-0,4	-0,401	0,12	0,19	-0,7852221	-0,3357779	-0,3357779	-0,7852221	RD1(102)	-0,319	-0,32		0,2247221	-1,4195314		0,2247221	-1,4239813		-0,7847221	-0,3352779	-0,3352779	-0,7847221
6	-0,07	-0,23	-0,231	0,1	0,18	-0,3564126	0,0554126	0,0554126	-0,3564126	RD1(120)	0,161	0,16		0,2059126	0,7818851		0,2059126	0,7770287		-0,3559126	0,0559126	0,0559126	-0,3559126
7	0,27	0,28	0,279	0,1	0,17	0,0772692	0,4717308	0,4717308	0,0772692	RD1(158)	-0,009	-0,01		0,1972308	-0,0456318		0,1972308	-0,050702		0,0777692	0,4722308	0,4722308	0,0777692
8	1,95	2,22	2,219	0,1	0,18	1,8785874	2,2904126	2,2904126	1,8785874	RD1(181)	-0,269	-0,27		0,2059126	-1,3063795		0,2059126	-1,3112359		1,8790874	2,2909126	2,2909126	1,8790874
9	**-1,56**	**-1,85**	-1,851	0,15	0,3	-2,0409102	-1,3700898	-1,3700898	-2,0409102	RD1(210)	0,291	0,29		0,3354102	0,8675944		0,3354102	0,864613		-2,0404102	-1,3695898	-1,3695898	-2,0404102
10	-0,73	0,08	0,079	0,12	0,17	-0,5335865	-0,1174135	-0,1174135	-0,5335865	RD1(224)	-0,809	-0,81	*	0,2080865	-3,8878059	*	0,2080865	-3,8926116	*	-0,5330865	-0,1169135	-0,1169135	-0,5330865
	0	-0,001	0,001																				
corr	0,955974206	0,913886683		R 2																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	0,14	-0,15	-0,15	0,1	0,17	-0,2022308	0,1922308	0,1922308	-0,2022308	RD1(3)	0,29	0,29		0,1972308	1,4703584		0,1972308	1,4703584		-0,2022308	0,1922308	0,1922308	-0,2022308
2	**0,48**	**0,41**	0,41	0,1	0,16	0,2563204	0,6336796	0,6336796	0,2563204	RD1(28)	0,07	0,07		0,1886796	0,3709993		0,1886796	0,3709993		0,2563204	0,6336796	0,6336796	0,2563204
3	1,76	1,87	1,87	0,1	0,17	1,6177692	2,0122308	2,0122308	1,6177692	RD1(55)	-0,11	-0,11		0,1972308	-0,5577221		0,1972308	-0,5577221		1,6177692	2,0122308	2,0122308	1,6177692
4	-1,52	-1,99	-1,99	0,15	0,29	-2,0814966	-1,4285034	-1,4285034	-2,0814966	RD1(83)	0,47	0,47		0,3264966	1,4395251		0,3264966	1,4395251		-2,0814966	-1,4285034	-1,4285034	-2,0814966
5	-0,72	-0,98	-0,98	0,12	0,2	-1,0832381	-0,6167619	-0,6167619	-1,0832381	RD1(102)	0,26	0,26		0,2332381	1,1147408		0,2332381	1,1147408		-1,0832381	-0,6167619	-0,6167619	-1,0832381
6	-0,07	-0,5	-0,5	0,1	0,18	-0,4909126	-0,0790874	-0,0790874	-0,4909126	RD1(120)	0,43	0,43		0,2059126	2,0882646	*	0,2059126	2,0882646	*	-0,4909126	-0,0790874	-0,0790874	-0,4909126
7	0,27	0,36	0,36	0,1	0,16	0,1263204	0,5036796	0,5036796	0,1263204	RD1(158)	-0,09	-0,09		0,1886796	-0,476999		0,1886796	-0,476999		0,1263204	0,5036796	0,5036796	0,1263204
8	1,95	2,59	2,59	0,1	0,19	2,0552909	2,4847091	2,4847091	2,0552909	RD1(181)	-0,64	-0,64	*	0,2147091	-2,9807772	*	0,2147091	-2,9807772	*	2,0552909	2,4847091	2,4847091	2,0552909
9	-1,56	-1,57	-1,57	0,15	0,25	-1,8565476	-1,2734524	-1,2734524	-1,8565476	RD1(210)	0,01	0,01		0,2915476	0,0342997		0,2915476	0,0342997		-1,8565476	-1,2734524	-1,2734524	-1,8565476
10	-0,73	-0,04	-0,04	0,12	0,17	-0,5930865	-0,1769135	-0,1769135	-0,5930865	RD1(224)	-0,69	-0,69	*	0,2080865	-3,3159284	*	0,2080865	-3,3159284	*	-0,5930865	-0,1769135	-0,1769135	-0,5930865
	0	-1,8735E-17	1,8735E-17																				
corr	0,966121811	0,933391353		R 2																			

Ethnic Comparisons for the RD 3 sub-scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-2	-1,34	-1,34	0,17	0,3	-2,0148188	-1,3251812	-1,3251812	-2,0148188	RD3(21)	-0,66	-0,66	*	0,34481879	-1,9140488		0,34481879	-1,9140488		-2,0148188	-1,3251812	-1,3251812	-2,0148188
2	0,66	0,88	0,88	0,1	0,2	0,5463932	0,9936068	0,9936068	0,5463932	RD3(44)	-0,22	-0,22		0,2236068	-0,9838699		0,2236068	-0,9838699		0,5463932	0,9936068	0,9936068	0,5463932
3	-0,9	-1,64	-1,64	0,13	0,33	-1,624683	-0,915317	-0,915317	-1,624683	RD3(68)	0,74	0,74	*	0,35468296	2,08637034	*	0,35468296	2,08637034	*	-1,624683	-0,915317	-0,915317	-1,624683
4	-0,44	-0,36	-0,36	0,12	0,24	-0,6683282	-0,1316718	-0,1316718	-0,6683282	RD3(117)	-0,08	-0,08		0,26832816	-0,2981424		0,26832816	-0,2981424		-0,6683282	-0,1316718	-0,1316718	-0,6683282
5	0,28	0,72	0,72	0,1	0,21	0,26740593	0,73259407	0,73259407	0,26740593	RD3(143)	-0,44	-0,44		0,23259407	-1,8917078		0,23259407	-1,8917078		0,26740593	0,73259407	0,73259407	0,26740593
6	2,37	1,09	1,09	0,11	0,2	1,50174576	1,95825424	1,95825424	1,50174576	RD3(180)	1,28	1,28	*	0,22825424	5,60778182	*	0,22825424	5,60778182	*	1,50174576	1,95825424	1,95825424	1,50174576
7	0,95	0,55	0,55	0,1	0,21	0,51740593	0,98259407	0,98259407	0,51740593	RD3(201)	0,4	0,4		0,23259407	1,71973432		0,23259407	1,71973432		0,51740593	0,98259407	0,98259407	0,51740593
8	-0,92	0,1	0,1	0,13	0,22	-0,6655386	-0,1544614	-0,1544614	-0,6655386	RD3(226)	-1,02	-1,02	*	0,25553865	-3,9915684	*	0,25553865	-3,9915684	*	-0,6655386	-0,1544614	-0,1544614	-0,6655386
	0	**1,73472E-17**	**-1,73472E-17**																				
corr	**0,830197438**	**0,689227785**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-2	-2,64	-2,64	0,17	0,41	-2,7638468	-1,8761532	-1,8761532	-2,7638468	RD3(21)	0,64	0,64	*	0,44384682	1,44193891		0,44384682	1,44193891		-2,7638468	-1,8761532	-1,8761532	-2,7638468
2	0,66	0,96	0,96	0,1	0,17	0,61276917	1,00723083	1,00723083	0,61276917	RD3(44)	-0,3	-0,3		0,19723083	-1,5210604		0,19723083	-1,5210604		0,61276917	1,00723083	1,00723083	0,61276917
3	-0,9	-1,06	-1,06	0,13	0,23	-1,2441969	-0,7158031	-0,7158031	-1,2441969	RD3(68)	0,16	0,16		0,2641969	0,60560893		0,2641969	0,60560893		-1,2441969	-0,7158031	-0,7158031	-1,2441969
4	-0,44	-0,08	-0,08	0,12	0,19	-0,4847221	-0,0352779	-0,0352779	-0,4847221	RD3(117)	-0,36	-0,36		0,22472205	-1,601979		0,22472205	-1,601979		-0,4847221	-0,0352779	-0,0352779	-0,4847221
5	0,28	0,25	0,25	0,1	0,18	0,0590874	0,4709126	0,4709126	0,0590874	RD3(143)	0,03	0,03		0,2059126	0,14569288		0,2059126	0,14569288		0,0590874	0,4709126	0,4709126	0,0590874
6	2,37	1,8	1,8	0,11	0,17	1,88251543	2,28748457	2,28748457	1,88251543	RD3(180)	0,57	0,57	*	0,20248457	2,81502935	*	0,20248457	2,81502935	*	1,88251543	2,28748457	2,28748457	1,88251543
7	0,95	1,34	1,34	0,1	0,17	0,94776917	1,34223083	1,34223083	0,94776917	RD3(201)	-0,39	-0,39		0,19723083	-1,9773785	*	0,19723083	-1,9773785	*	0,94776917	1,34223083	1,34223083	0,94776917
8	-0,92	-0,57	-0,57	0,13	0,21	-0,9919818	-0,4980182	-0,4980182	-0,9919818	RD3(226)	-0,35	-0,35		0,24698178	-1,4171086		0,24698178	-1,4171086		-0,9919818	-0,4980182	-0,4980182	-0,9919818
	0	**0**	**0**																				
corr	**0,955628345**	**0,913225533**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-2	-1,51	-1,51	0,17	0,24	-2,0491088	-1,4608912	-1,4608912	-2,0491088	RD3(21)	-0,49	-0,49		0,29410882	-1,66605		0,29410882	-1,66605		-2,0491088	-1,4608912	-1,4608912	-2,0491088
2	**0,66**	**0,03**	0,03	0,1	0,18	0,1390874	0,5509126	0,5509126	0,1390874	RD3(44)	0,63	0,63	*	0,2059126	3,05955047	*	0,2059126	3,05955047	*	0,1390874	0,5509126	0,5509126	0,1390874
3	-0,9	-0,74	-0,74	0,13	0,2	-1,0585372	-0,5814628	-0,5814628	-1,0585372	RD3(68)	-0,16	-0,16		0,23853721	-0,6707549		0,23853721	-0,6707549		-1,0585372	-0,5814628	-0,5814628	-1,0585372
4	-0,44	-0,66	-0,66	0,12	0,2	-0,7832381	-0,3167619	-0,3167619	-0,7832381	RD3(117)	0,22	0,22		0,23323808	0,94324222		0,23323808	0,94324222		-0,7832381	-0,3167619	-0,3167619	-0,7832381
5	0,28	0,39	0,39	0,1	0,17	0,13776917	0,53223083	0,53223083	0,13776917	RD3(143)	-0,11	-0,11		0,19723083	-0,5577221		0,19723083	-0,5577221		0,13776917	0,53223083	0,53223083	0,13776917
6	2,37	1,98	1,98	0,11	0,18	1,96404977	2,38595023	2,38595023	1,96404977	RD3(180)	0,39	0,39		0,21095023	1,84877731		0,21095023	1,84877731		1,96404977	2,38595023	2,38595023	1,96404977
7	0,95	0,94	0,94	0,1	0,17	0,74776917	1,14223083	1,14223083	0,74776917	RD3(201)	0,01	0,01		0,19723083	0,05070201		0,19723083	0,05070201		0,74776917	1,14223083	1,14223083	0,74776917
8	-0,92	-0,43	-0,43	0,13	0,19	-0,9052173	-0,4447827	-0,4447827	-0,9052173	RD3(226)	-0,49	-0,49		0,23021729	-2,128424	*	0,23021729	-2,128424	*	-0,9052173	-0,4447827	-0,4447827	-0,9052173
	0	**0**	**0**																				
corr	**0,969294006**	**0,93953087**		**R 2**																			

Ethnic Comparisons for the RD 4 sub-scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-0,02	-0,02	-0,02	0,1	0,2	-0,2436068	0,2036068	0,2036068	-0,2436068	RD4(14)	0	0		0,2236068	7,7579E-17		0,2236068	0		-0,2436068	0,2036068	0,2036068	-0,2436068
2	0,55	0,91	0,91	0,1	0,21	0,49740593	0,96259407	0,96259407	0,49740593	RD4(46)	-0,36	-0,36		0,23259407	-1,5477609		0,23259407	-1,5477609		0,49740593	0,96259407	0,96259407	0,49740593
3	-2,14	-1,82	-1,82	0,13	0,26	-2,2706888	-1,6893112	-1,6893112	-2,2706888	RD4(71)	-0,32	-0,32		0,29068884	-1,1008335		0,29068884	-1,1008335		-2,2706888	-1,6893112	-1,6893112	-2,2706888
4	0,31	0,14	0,14	0,1	0,2	0,0013932	0,4486068	0,4486068	0,0013932	RD4(131)	0,17	0,17		0,2236068	0,76026311		0,2236068	0,76026311		0,0013932	0,4486068	0,4486068	0,0013932
5	0,64	0,18	0,18	0,1	0,2	0,1863932	0,6336068	0,6336068	0,1863932	RD4(156)	0,46	0,46		0,2236068	2,05718254	*	0,2236068	2,05718254	*	0,1863932	0,6336068	0,6336068	0,1863932
6	0,65	0,6	0,6	0,1	0,21	0,39240593	0,85759407	0,85759407	0,39240593	RD4(193)	0,05	0,05		0,23259407	0,21496679		0,23259407	0,21496679		0,39240593	0,85759407	0,85759407	0,39240593
	-0,001666667	**-0,001666667**	**1,86483E-17**																				
corr	**0,961272427**	**0,924044679**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-0,02	0,9	0,901666667	0,1	0,18	0,23492073	0,64674594	0,64674594	0,23492073	RD4(14)	-0,9216667	-0,92	*	0,2059126	-4,476009	*	0,2059126	-4,467915	*	0,2340874	0,6459126	0,6459126	0,2340874
2	0,55	0,41	0,411666667	0,1	0,17	0,2836025	0,67806416	0,67806416	0,2836025	RD4(46)	0,13833333	0,14		0,19723083	0,70137784		0,19723083	0,70982818		0,28276917	0,67723083	0,67723083	0,28276917
3	-2,14	0,35	0,351666667	0,13	0,17	-1,108176	-0,6801573	-0,6801573	-1,108176	RD4(71)	-2,4916667	-2,49	*	0,21400935	-11,642794	*	0,21400935	-11,635006	*	-1,1090093	-0,6809907	-0,6809907	-1,1090093
4	0,31	-0,02	-0,01833333	0,1	0,17	-0,0513975	0,34306416	0,34306416	-0,0513975	RD4(131)	0,32833333	0,33		0,19723083	1,66471608		0,19723083	1,67316642		-0,0522308	0,34223083	0,34223083	-0,0522308
5	0,64	-0,05	-0,04833333	0,1	0,17	0,0986025	0,49306416	0,49306416	0,0986025	RD4(156)	0,68833333	0,69	*	0,19723083	3,48998854	*	0,19723083	3,49843887	*	0,09776917	0,49223083	0,49223083	0,09776917
6	0,65	-1,59	-1,58833333	0,1	0,2	-0,6927735	-0,2455599	-0,2455599	-0,6927735	RD4(193)	2,23833333	2,24	*	0,2236068	10,010131	*	0,2236068	10,0175845	*	-0,6936068	-0,2463932	-0,2463932	-0,6936068
	-0,001666667	**0**	**-0,00166667**																				
corr	**-0,351176629**	**0,123325025**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-0,02	0,04	0,041666667	0,1	0,17	-0,1863975	0,20806416	0,20806416	-0,1863975	RD4(14)	-0,0616667	-0,06		0,19723083	-0,3126624		0,19723083	-0,3042121		-0,1872308	0,20723083	0,20723083	-0,1872308
2	**0,55**	**0,95**	0,951666667	0,1	0,17	0,5536025	0,94806416	0,94806416	0,5536025	RD4(46)	-0,4016667	-0,4		0,19723083	-2,0365308	*	0,19723083	-2,0280805	*	0,55276917	0,94723083	0,94723083	0,55276917
3	-2,14	-2,56	-2,55833333	0,13	0,24	-2,6221135	-2,0762198	-2,0762198	-2,6221135	RD4(71)	0,41833333	0,42		0,27294688	1,53265475		0,27294688	1,53876094		-2,6229469	-2,0770531	-2,0770531	-2,6229469
4	0,31	-0,06	-0,05833333	0,1	0,17	-0,0713975	0,32306416	0,32306416	-0,0713975	RD4(131)	0,36833333	0,37		0,19723083	1,86752413		0,19723083	1,87597447		-0,0722308	0,32223083	0,32223083	-0,0722308
5	0,64	0,89	0,891666667	0,1	0,17	0,5686025	0,96306416	0,96306416	0,5686025	RD4(156)	-0,2516667	-0,25		0,19723083	-1,2760007		0,19723083	-1,2675503		0,56776917	0,96223083	0,96223083	0,56776917
6	0,65	0,74	0,741666667	0,1	0,17	0,4986025	0,89306416	0,89306416	0,4986025	RD4(193)	-0,0916667	-0,09		0,19723083	-0,4647684		0,19723083	-0,4563181		0,49776917	0,89223083	0,89223083	0,49776917
	-0,001666667	**0**	**-0,00166667**																				
corr	**0,983343889**	**0,966965205**		**R 2**																			

Ethnic Comparisons for the PS scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	1,06	1,17	1,17	0,1	0,21	0,88240593	1,34759407	1,34759407	0,88240593	PS(11)	-0,11	-0,11		0,23259407	-0,4729269		0,23259407	-0,4729269		0,88240593	1,34759407	1,34759407	0,88240593
2	-0,43	-0,92	-0,92	0,12	0,3	-0,9981099	-0,3518901	-0,3518901	-0,9981099	PS(37)	0,49	0,49		0,32310989	1,51651193		0,32310989	1,51651193		-0,9981099	-0,3518901	-0,3518901	-0,9981099
3	-0,44	-0,92	-0,92	0,12	0,3	-1,0031099	-0,3568901	-0,3568901	-1,0031099	PS(62)	0,48	0,48		0,32310989	1,48556271		0,32310989	1,48556271		-1,0031099	-0,3568901	-0,3568901	-1,0031099
4	-2,11	-2,8	-2,8	0,19	0,6	-3,0843648	-1,8256352	-1,8256352	-3,0843648	PS(103)	0,69	0,69	*	0,62936476	1,09634356		0,62936476	1,09634356		-3,0843648	-1,8256352	-1,8256352	-3,0843648
5	2,32	2,45	2,45	0,11	0,21	2,14793461	2,62206539	2,62206539	2,14793461	PS(128)	-0,13	-0,13		0,23706539	-0,5483719		0,23706539	-0,5483719		2,14793461	2,62206539	2,62206539	2,14793461
6	-1,15	-0,25	-0,25	0,14	0,25	-0,986531	-0,413469	-0,413469	-0,986531	PS(166)	-0,9	-0,9	*	0,28653098	-3,1410217	*	0,28653098	-3,1410217	*	-0,986531	-0,413469	-0,413469	-0,986531
7	1,22	1,17	1,17	0,1	0,21	0,96240593	1,42759407	1,42759407	0,96240593	PS(205)	0,05	0,05		0,23259407	0,21496679		0,23259407	0,21496679		0,96240593	1,42759407	1,42759407	0,96240593
8	-0,47	0,1	0,1	0,12	0,23	-0,4444224	0,07442244	0,07442244	-0,4444224	PS(218)	-0,57	-0,57	*	0,25942244	-2,1971885	*	0,25942244	-2,1971885	*	-0,4444224	0,07442244	0,07442244	-0,4444224
	0	4,51028E-17	-4,51028E-17																				
corr	0,942400392	0,8881185		R 2																			
Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	1,06	0,68	0,68	0,1	0,17	0,67276917	1,06723083	1,06723083	0,67276917	PS(11)	0,38	0,38		0,19723083	1,92667648		0,19723083	1,92667648		0,67276917	1,06723083	1,06723083	0,67276917
2	-0,43	-0,93	-0,93	0,12	0,23	-0,9394224	-0,4205776	-0,4205776	-0,9394224	PS(37)	0,5	0,5		0,25942244	1,92735836		0,25942244	1,92735836		-0,9394224	-0,4205776	-0,4205776	-0,9394224
3	-0,44	-0,46	-0,46	0,12	0,2	-0,6832381	-0,2167619	-0,2167619	-0,6832381	PS(62)	0,02	0,02		0,23323808	0,08574929		0,23323808	0,08574929		-0,6832381	-0,2167619	-0,2167619	-0,6832381
4	-2,11	-1,76	-1,76	0,19	0,3	-2,2901056	-1,5798944	-1,5798944	-2,2901056	PS(103)	-0,35	-0,35		0,35510562	-0,9856223		0,35510562	-0,9856223		-2,2901056	-1,5798944	-1,5798944	-2,2901056
5	2,32	2,17	2,17	0,11	0,18	2,03404977	2,45595023	2,45595023	2,03404977	PS(128)	0,15	0,15		0,21095023	0,71106819		0,21095023	0,71106819		2,03404977	2,45595023	2,45595023	2,03404977
6	-1,15	-0,68	-0,68	0,14	0,22	-1,1757681	-0,6542319	-0,6542319	-1,1757681	PS(166)	-0,47	-0,47		0,2607681	-1,8023677		0,2607681	-1,8023677		-1,1757681	-0,6542319	-0,6542319	-1,1757681
7	1,22	1,21	1,21	0,1	0,17	1,01776917	1,41223083	1,41223083	1,01776917	PS(205)	0,01	0,01		0,19723083	0,05070201		0,19723083	0,05070201		1,01776917	1,41223083	1,41223083	1,01776917
8	-0,47	-0,23	-0,23	0,12	0,19	-0,5747221	-0,1252779	-0,1252779	-0,5747221	PS(218)	-0,24	-0,24		0,22472205	-1,067986		0,22472205	-1,067986		-0,5747221	-0,1252779	-0,1252779	-0,5747221
	0	0	0																				
corr	0,975012372	0,950649126		R 2																			
Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	1,06	0,88	0,88125	0,1	0,16	0,78194538	1,15930462	1,15930462	0,78194538	PS(11)	0,17875	0,18		0,18867962	0,94737311		0,18867962	0,95399809		0,78132038	1,15867962	1,15867962	0,78132038
2	**-0,43**	**-0,81**	-0,80875	0,12	0,2	-0,8526131	-0,3861369	-0,3861369	-0,8526131	PS(37)	0,37875	0,38		0,23323808	1,62387723		0,23323808	1,62923656		-0,8532381	-0,3867619	-0,3867619	-0,8532381
3	-0,44	0	0,00125	0,12	0,17	-0,4274615	-0,0112885	-0,0112885	-0,4274615	PS(62)	-0,44125	-0,44		0,20808652	-2,1205122	*	0,20808652	-2,1145051	*	-0,4280865	-0,0119135	-0,0119135	-0,4280865
4	-2,11	-1,72	-1,71875	0,19	0,27	-2,2445265	-1,5842235	-1,5842235	-2,2445265	PS(103)	-0,39125	-0,39		0,33015148	-1,1850621		0,33015148	-1,1812759		-2,2451515	-1,5848485	-1,5848485	-2,2451515
5	2,32	1,75	1,75125	0,11	0,17	1,83314043	2,23810957	2,23810957	1,83314043	PS(128)	0,56875	0,57	*	0,20248457	2,80885604	*	0,20248457	2,81502935	*	1,83251543	2,23748457	2,23748457	1,83251543
6	-1,15	-1,29	-1,28875	0,14	0,23	-1,4886332	-0,9501168	-0,9501168	-1,4886332	PS(166)	0,13875	0,14		0,26925824	0,51530456		0,26925824	0,51994695		-1,4892582	-0,9507418	-0,9507418	-1,4892582
7	1,22	1,59	1,59125	0,1	0,16	1,21694538	1,59430462	1,59430462	1,21694538	PS(205)	-0,37125	-0,37		0,18867962	-1,9676211	*	0,18867962	-1,9609961	*	1,21632038	1,59367962	1,59367962	1,21632038
8	-0,47	-0,39	-0,38875	0,12	0,19	-0,6540971	-0,2046529	-0,2046529	-0,6540971	PS(218)	-0,08125	-0,08		0,22472205	-0,3615578		0,22472205	-0,3559953		-0,6547221	-0,2052779	-0,2052779	-0,6547221
	0	0,00125	-0,00125																				
corr	0,966068171	0,933287711		R 2																			

Ethnic Comparisons for the SD 1 scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	0	-0,19	-0,18875	0,11	0,22	-0,3403425	0,1515925	0,1515925	-0,3403425	SD1(4)	0,18875	0,19		0,2459675	0,7673779		0,2459675	0,7724598		-0,3409675	0,1509675	0,1509675	-0,3409675
2	2,73	3,78	3,78125	0,12	0,31	2,9232096	3,5880404	3,5880404	2,9232096	SD1(24)	-1,05125	-1,05	*	0,3324154	-3,1624588	*	0,3324154	-3,1586984	*	2,9225846	3,5874154	3,5874154	2,9225846
3	0,08	-0,09	-0,08875	0,11	0,22	-0,2503425	0,2415925	0,2415925	-0,2503425	SD1(58)	0,16875	0,17		0,2459675	0,6860663		0,2459675	0,6911483		-0,2509675	0,2409675	0,2409675	-0,2509675
4	-1,12	-1,35	-1,34875	0,14	0,3	-1,5654339	-0,9033161	-0,9033161	-1,5654339	SD1(86)	0,22875	0,23		0,3310589	0,6909646		0,3310589	0,6947404		-1,5660589	-0,9039411	-0,9039411	-1,5660589
5	0,84	0,62	0,62125	0,1	0,2	0,5070182	0,9542318	0,9542318	0,5070182	SD1(121)	0,21875	0,22		0,2236068	0,9782797		0,2236068	0,9838699		0,5063932	0,9536068	0,9536068	0,5063932
6	-2,47	-2,35	-2,34875	0,22	0,43	-2,8923864	-1,9263636	-1,9263636	-2,8923864	SD1(151)	-0,12125	-0,12		0,4830114	-0,2510293		0,4830114	-0,2484413		-2,8930114	-1,9269886	-1,9269886	-2,8930114
7	0,61	0,7	0,70125	0,1	0,2	0,4320182	0,8792318	0,8792318	0,4320182	SD1(169)	-0,09125	-0,09		0,2236068	-0,4080824		0,2236068	-0,4024922		0,4313932	0,8786068	0,8786068	0,4313932
8	-0,67	-1,11	-1,10875	0,12	0,28	-1,1940059	-0,5847441	-0,5847441	-1,1940059	SD1(198)	0,43875	0,44		0,3046309	1,4402674		0,3046309	1,4443708		-1,1946309	-0,5853691	-0,5853691	-1,1946309
	0	0,00125	-0,00125																				
corr	0,980000728	0,9604014		R 2																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	0	0,26	0,26125	0,11	0,18	-0,0803252	0,3415752	0,3415752	-0,0803252	SD1(4)	-0,26125	-0,26		0,2109502	-1,2384438		0,2109502	-1,2325182		-0,0809502	0,3409502	0,3409502	-0,0809502
2	2,73	3,45	3,45125	0,12	0,23	2,8312026	3,3500474	3,3500474	2,8312026	SD1(24)	-0,72125	-0,72	*	0,2594224	-2,7802144	*	0,2594224	-2,775396	*	2,8305776	3,3494224	3,3494224	2,8305776
3	0,08	-0,33	-0,32875	0,11	0,2	-0,3526292	0,1038792	0,1038792	-0,3526292	SD1(58)	0,40875	0,41		0,2282542	1,7907663		0,2282542	1,7962426		-0,3532542	0,1032542	0,1032542	-0,3532542
4	-1,12	-1,81	-1,80875	0,14	0,3	-1,7954339	-1,1333161	-1,1333161	-1,7954339	SD1(86)	0,68875	0,69	*	0,3310589	2,0804455	*	0,3310589	2,0842212	*	-1,7960589	-1,1339411	-1,1339411	-1,7960589
5	0,84	0,93	0,93125	0,1	0,18	0,6797124	1,0915376	1,0915376	0,6797124	SD1(121)	-0,09125	-0,09		0,2059126	-0,4431492		0,2059126	-0,4370786		0,6790874	1,0909126	1,0909126	0,6790874
6	-2,47	-2,1	-2,09875	0,22	0,33	-2,6809856	-1,8877644	-1,8877644	-2,6809856	SD1(151)	-0,37125	-0,37		0,3966106	-0,9360566		0,3966106	-0,9329049		-2,6816106	-1,8883894	-1,8883894	-2,6816106
7	0,61	0,52	0,52125	0,1	0,18	0,3597124	0,7715376	0,7715376	0,3597124	SD1(169)	0,08875	0,09		0,2059126	0,4310081		0,2059126	0,4370786		0,3590874	0,7709126	0,7709126	0,3590874
8	-0,67	-0,91	-0,90875	0,12	0,23	-1,0487974	-0,5299526	-0,5299526	-1,0487974	SD1(198)	0,23875	0,24		0,2594224	0,9203136		0,2594224	0,925132		-1,0494224	-0,5305776	-0,5305776	-1,0494224
	0	0,00125	-0,00125																				
corr	0,971932209	0,9446522		R 2																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	0	0,23	0,23125	0,11	0,17	-0,0868596	0,3181096	0,3181096	-0,0868596	SD1(4)	-0,23125	-0,23		0,2024846	-1,1420623		0,2024846	-1,135889		-0,0874846	0,3174846	0,3174846	-0,0874846
2	**2,73**	**2,95**	2,95125	0,12	0,2	2,6073869	3,0738631	3,0738631	2,6073869	SD1(24)	-0,22125	-0,22		0,2332381	-0,9486015		0,2332381	-0,9432422		2,6067619	3,0732381	3,0732381	2,6067619
3	0,08	0,23	0,23125	0,11	0,17	-0,0468596	0,3581096	0,3581096	-0,0468596	SD1(58)	-0,15125	-0,15		0,2024846	-0,7469705		0,2024846	-0,7407972		-0,0474846	0,3574846	0,3574846	-0,0474846
4	-1,12	-1,42	-1,41875	0,14	0,25	-1,555906	-0,982844	-0,982844	-1,555906	SD1(86)	0,29875	0,3		0,286531	1,0426447		0,286531	1,0470072		-1,556531	-0,983469	-0,983469	-1,556531
5	0,84	0,57	0,57125	0,1	0,17	0,5083942	0,9028558	0,9028558	0,5083942	SD1(121)	0,26875	0,27		0,1972308	1,3626166		0,1972308	1,3689543		0,5077692	0,9022308	0,9022308	0,5077692
6	-2,47	-2,24	-2,23875	0,22	0,34	-2,7593441	-1,9494059	-1,9494059	-2,7593441	SD1(151)	-0,23125	-0,23		0,4049691	-0,5710312		0,4049691	-0,5679445		-2,7599691	-1,9500309	-1,9500309	-2,7599691
7	0,61	0,49	0,49125	0,1	0,17	0,3533942	0,7478558	0,7478558	0,3533942	SD1(169)	0,11875	0,12		0,1972308	0,6020864		0,1972308	0,6084242		0,3527692	0,7472308	0,7472308	0,3527692
8	-0,67	-0,8	-0,79875	0,12	0,21	-0,9762427	-0,4925073	-0,4925073	-0,9762427	SD1(198)	0,12875	0,13		0,2418677	0,5323157		0,2418677	0,5374838		-0,9768677	-0,4931323	-0,4931323	-0,9768677
	0	0,00125	-0,00125																				
corr	0,989112956	0,9783444		R 2																			

Ethnic Comparisons for the SD 2 scale

Sotho	vs	Nguni																					
													0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	2,63	2,06	2,0625	0,11	0,21	2,10918461	2,58331539	2,58331539	2,10918461	SD2(9)	0,5675	0,57	*	0,23706539	2,39385427	*	0,23706539	2,40439988	*	2,10793461	2,58206539	2,58206539	2,10793461
2	0,98	1,28	1,2825	0,12	0,23	0,87182756	1,39067244	1,39067244	0,87182756	SD2(30)	-0,3025	-0,3		0,25942244	-1,1660518		0,25942244	-1,156415		0,87057756	1,38942244	1,38942244	0,87057756
3	-3,19	-2,7	-2,6975	0,58	1,01	-4,1084388	-1,7790612	-1,7790612	-4,1084388	SD2(59)	-0,4925	-0,49		1,1646888	-0,4228597		1,1646888	-0,4207132		-4,1096888	-1,7803112	-1,7803112	-4,1096888
4	1,58	1,69	1,6925	0,11	0,22	1,39028252	1,88221748	1,88221748	1,39028252	SD2(105)	-0,1125	-0,11		0,24596748	-0,4573775		0,24596748	-0,4472136		1,38903252	1,88096748	1,88096748	1,38903252
5	-0,36	-0,34	-0,3375	0,18	0,36	-0,7512422	0,05374224	0,05374224	-0,7512422	SD2(126)	-0,0225	-0,02		0,40249224	-0,0559017		0,40249224	-0,0496904		-0,7524922	0,05249224	0,05249224	-0,7524922
6	1,27	1,97	1,9725	0,12	0,22	1,37065072	1,87184928	1,87184928	1,37065072	SD2(159)	-0,7025	-0,7	*	0,25059928	-2,8032802	*	0,25059928	-2,7933041	*	1,36940072	1,87059928	1,87059928	1,36940072
7	-0,6	-1,25	-1,2475	0,19	0,52	-1,4773744	-0,3701256	-0,3701256	-1,4773744	SD2(177)	0,6475	0,65	*	0,55362442	1,16956546		0,55362442	1,17408115		-1,4786244	-0,3713756	-0,3713756	-1,4786244
8	-2,32	-2,7	-2,6975	0,39	1,01	-3,5914319	-1,4260681	-1,4260681	-3,5914319	SD2(223)	0,3775	0,38		1,08268186	0,34867122		1,08268186	0,3509803		-3,5926819	-1,4273181	-1,4273181	-3,5926819
	-0,00125	**0,00125**	**-0,0025**																				
corr	**0,969807595**	**0,940526771**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	2,63	2,36	2,36	0,11	0,19	2,27545502	2,71454498	2,71454498	2,27545502	SD2(9)	0,27	0,27		0,21954498	1,2298163		0,21954498	1,2298163		2,27545502	2,71454498	2,71454498	2,27545502
2	0,98	0,23	0,23	0,12	0,25	0,32769151	0,88230849	0,88230849	0,32769151	SD2(30)	0,75	0,75	*	0,27730849	2,70456917	*	0,27730849	2,70456917	*	0,32769151	0,88230849	0,88230849	0,32769151
3	-3,19	-2,1	-2,1	0,58	0,59	-3,4723452	-1,8176548	-1,8176548	-3,4723452	SD2(59)	-1,09	-1,09	*	0,82734515	-1,3174671		0,82734515	-1,3174671		-3,4723452	-1,8176548	-1,8176548	-3,4723452
4	1,58	1,33	1,33	0,11	0,2	1,22674576	1,68325424	1,68325424	1,22674576	SD2(105)	0,25	0,25		0,22825424	1,09526989		0,22825424	1,09526989		1,22674576	1,68325424	1,68325424	1,22674576
5	-0,36	-0,55	-0,55	0,18	0,32	-0,8221512	-0,0878488	-0,0878488	-0,8221512	SD2(126)	0,19	0,19		0,3671512	0,51749798		0,3671512	0,51749798		-0,8221512	-0,0878488	-0,0878488	-0,8221512
6	1,27	1,45	1,45	0,12	0,2	1,12676192	1,59323808	1,59323808	1,12676192	SD2(159)	-0,18	-0,18		0,23323808	-0,7717436		0,23323808	-0,7717436		1,12676192	1,59323808	1,59323808	1,12676192
7	-0,6	-1,18	-1,18	0,19	0,4	-1,3328318	-0,4471682	-0,4471682	-1,3328318	SD2(177)	0,58	0,58	*	0,4428318	1,30975238		0,4428318	1,30975238		-1,3328318	-0,4471682	-0,4471682	-1,3328318
8	-2,32	-1,55	-1,55	0,39	0,47	-2,5457373	-1,3242627	-1,3242627	-2,5457373	SD2(223)	-0,77	-0,77	*	0,61073726	-1,2607713		0,61073726	-1,2607713		-2,5457373	-1,3242627	-1,3242627	-2,5457373
	-0,00125	**-0,00125**	**5,55112E-17**																				
corr	**0,960446218**	**0,922456938**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	2,63	1,87	1,87	0,11	0,17	2,04751543	2,45248457	2,45248457	2,04751543	SD2(9)	0,76	0,76	*	0,20248457	3,75337247	*	0,20248457	3,75337247	*	2,04751543	2,45248457	2,45248457	2,04751543
2	**0,98**	**0,71**	0,71	0,12	0,2	0,61176192	1,07823808	1,07823808	0,61176192	SD2(30)	0,27	0,27		0,23323808	1,15761545		0,23323808	1,15761545		0,61176192	1,07823808	1,07823808	0,61176192
3	-3,19	-1,78	-1,78	0,58	0,46	-3,2252702	-1,7447298	-1,7447298	-3,2252702	SD2(59)	-1,41	-1,41	*	0,74027022	-1,9047099		0,74027022	-1,9047099		-3,2252702	-1,7447298	-1,7447298	-3,2252702
4	1,58	1,61	1,61	0,11	0,17	1,39251543	1,79748457	1,79748457	1,39251543	SD2(105)	-0,03	-0,03		0,20248457	-0,1481594		0,20248457	-0,1481594		1,39251543	1,79748457	1,79748457	1,39251543
5	-0,36	-0,55	-0,55	0,18	0,28	-0,7878663	-0,1221337	-0,1221337	-0,7878663	SD2(126)	0,19	0,19		0,33286634	0,57079968		0,33286634	0,57079968		-0,7878663	-0,1221337	-0,1221337	-0,7878663
6	1,27	1,42	1,42	0,12	0,18	1,12866692	1,56133308	1,56133308	1,12866692	SD2(159)	-0,15	-0,15		0,21633308	-0,6933752		0,21633308	-0,6933752		1,12866692	1,56133308	1,56133308	1,12866692
7	-0,6	-1,27	-1,27	0,19	0,37	-1,3509327	-0,5190673	-0,5190673	-1,3509327	SD2(177)	0,67	0,67	*	0,41593269	1,61083757		0,41593269	1,61083757		-1,3509327	-0,5190673	-0,5190673	-1,3509327
8	-2,32	-2,02	-2,02	0,39	0,51	-2,812028	-1,527972	-1,527972	-2,812028	SD2(223)	-0,3	-0,3		0,64202804	-0,4672693		0,64202804	-0,4672693		-2,812028	-1,527972	-1,527972	-2,812028
	-0,00125	**-0,00125**	**0**																				
corr	**0,953566647**	**0,90928935**		**R 2**																			

Ethnic Comparisons for the SD 3 scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-0,08	0,72	0,72	0,14	0,24	0,0421511	0,5978489	0,5978489	0,0421511	SD3(40)	-0,8	-0,8	*	0,2778489	-2,879263	*	0,2778489	-2,879263	*	0,0421511	0,5978489	0,5978489	0,0421511
2	-0,77	-1,59	-1,59	0,17	0,41	-1,6238468	-0,7361532	-0,7361532	-1,6238468	SD3(106)	0,82	0,82	*	0,4438468	1,8474842		0,4438468	1,8474842		-1,6238468	-0,7361532	-0,7361532	-1,6238468
3	0,72	1,05	1,05	0,13	0,23	0,6208031	1,1491969	1,1491969	0,6208031	SD3(171)	-0,33	-0,33		0,2641969	-1,2490684		0,2641969	-1,2490684		0,6208031	1,1491969	1,1491969	0,6208031
4	1,95	1,59	1,59	0,13	0,23	1,5058031	2,0341969	2,0341969	1,5058031	SD3(197)	0,36	0,36		0,2641969	1,3626201		0,2641969	1,3626201		1,5058031	2,0341969	2,0341969	1,5058031
5	-1,82	-1,77	-1,77	0,24	0,44	-2,2961986	-1,2938014	-1,2938014	-2,2961986	SD3(233)	-0,05	-0,05		0,5011986	-0,0997609		0,5011986	-0,0997609		-2,2961986	-1,2938014	-1,2938014	-2,2961986
	0	**0**	**0**																				
corr	**0,917416568**	**0,8416532**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-0,08	0,25	0,252	0,14	0,22	-0,1747681	0,3467681	0,3467681	-0,1747681	SD3(40)	-0,332	-0,33		0,2607681	-1,2731619		0,2607681	-1,2654922		-0,1757681	0,3457681	0,3457681	-0,1757681
2	-0,77	-1,02	-1,018	0,17	0,3	-1,2388188	-0,5491812	-0,5491812	-1,2388188	SD3(106)	0,248	0,25		0,3448188	0,7192183		0,3448188	0,7250185		-1,2398188	-0,5501812	-0,5501812	-1,2398188
3	0,72	0,84	0,842	0,13	0,21	0,5340182	1,0279818	1,0279818	0,5340182	SD3(171)	-0,122	-0,12		0,2469818	-0,4939636		0,2469818	-0,4858658		0,5330182	1,0269818	1,0269818	0,5330182
4	1,95	1,26	1,262	0,13	0,21	1,3590182	1,8529818	1,8529818	1,3590182	SD3(197)	0,688	0,69	*	0,2469818	2,7856306	*	0,2469818	2,7937283	*	1,3580182	1,8519818	1,8519818	1,3580182
5	-1,82	-1,32	-1,318	0,24	0,33	-1,9770441	-1,1609559	-1,1609559	-1,9770441	SD3(233)	-0,502	-0,5		0,4080441	-1,2302591		0,4080441	-1,2253577		-1,9780441	-1,1619559	-1,1619559	-1,9780441
	0	**0,002**	**-0,002**																				
corr	**0,957798867**	**0,9173787**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-0,08	0,15	0,152	0,14	0,23	-0,2332582	0,3052582	0,3052582	-0,2332582	SD3(40)	-0,232	-0,23		0,2692582	-0,8616264		0,2692582	-0,8541986		-0,2342582	0,3042582	0,3042582	-0,2342582
2	**-0,77**	**-0,66**	-0,658	0,17	0,27	-1,0330611	-0,3949389	-0,3949389	-1,0330611	SD3(106)	-0,112	-0,11		0,3190611	-0,3510299		0,3190611	-0,3447615		-1,0340611	-0,3959389	-0,3959389	-1,0340611
3	0,72	0,35	0,352	0,13	0,22	0,2804614	0,7915386	0,7915386	0,2804614	SD3(171)	0,368	0,37		0,2555386	1,4400953		0,2555386	1,4479219		0,2794614	0,7905386	0,7905386	0,2794614
4	1,95	1,69	1,692	0,13	0,21	1,5740182	2,0679818	2,0679818	1,5740182	SD3(197)	0,258	0,26		0,2469818	1,0446115		0,2469818	1,0527092		1,5730182	2,0669818	2,0669818	1,5730182
5	-1,82	-1,52	-1,518	0,24	0,35	-2,0933819	-1,2446181	-1,2446181	-2,0933819	SD3(233)	-0,302	-0,3		0,4243819	-0,7116232		0,4243819	-0,7069104		-2,0943819	-1,2456181	-1,2456181	-2,0943819
	0	**0,002**	**-0,002**																				
corr	**0,990059649**	**0,9802181**		**R 2**																			

Ethnic Comparisons for the SD 4 scale

Sotho	vs.	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-0,73	-0,5	-0,4990909	0,1	0,21	-0,8471395	-0,3819514	-0,3819514	-0,8471395	SD4(32)	-0,230909091	-0,23		0,2325941	-0,9927557		0,2325941	-0,9888472		-0,8475941	-0,3824059	-0,3824059	-0,8475941
2	1,01	1,31	1,3109091	0,1	0,22	0,9187936	1,4021155	1,4021155	0,9187936	SD4(60)	-0,300909091	-0,3		0,2416609	-1,2451707		0,2416609	-1,2414088		0,9183391	1,4016609	1,4016609	0,9183391
3	0,3	-0,21	-0,2090909	0,1	0,2	-0,1781523	0,2690613	0,2690613	-0,1781523	SD4(74)	0,509090909	0,51	*	0,2236068	2,2767238	*	0,2236068	2,2807893	*	-0,1786068	0,2686068	0,2686068	-0,1786068
4	0,39	0,49	0,4909091	0,1	0,21	0,2078605	0,6730486	0,6730486	0,2078605	SD4(85)	-0,100909091	-0,1		0,2325941	-0,4338421		0,2325941	-0,4299336		0,2074059	0,6725941	0,6725941	0,2074059
5	-0,86	-0,25	-0,2490909	0,1	0,2	-0,7781523	-0,3309387	-0,3309387	-0,7781523	SD4(94)	-0,610909091	-0,61	*	0,2236068	-2,7320685	*	0,2236068	-2,7280029	*	-0,7786068	-0,3313932	-0,3313932	-0,7786068
6	-1,32	-1,74	-1,7390909	0,11	0,24	-1,793553	-1,2655379	-1,2655379	-1,793553	SD4(107)	0,419090909	0,42		0,2640076	1,58742		0,2640076	1,5908634		-1,7940076	-1,2659924	-1,2659924	-1,7940076
7	-0,67	-0,46	-0,4590909	0,1	0,21	-0,7971395	-0,3319514	-0,3319514	-0,7971395	SD4(136)	-0,210909091	-0,21		0,2325941	-0,906769		0,2325941	-0,9028605		-0,7975941	-0,3324059	-0,3324059	-0,7975941
8	0,41	0,28	0,2809091	0,1	0,2	0,1218477	0,5690613	0,5690613	0,1218477	SD4(150)	0,129090909	0,13		0,2236068	0,5773121		0,2236068	0,5813777		0,1213932	0,5686068	0,5686068	0,1213932
9	2,61	2,06	2,0609091	0,15	0,26	2,0352879	2,6356212	2,6356212	2,0352879	SD4(179)	0,549090909	0,55	*	0,3001666	1,829287		0,3001666	1,8323157		2,0348334	2,6351666	2,6351666	2,0348334
10	-0,47	-0,46	-0,4590909	0,1	0,21	-0,6971395	-0,2319514	-0,2319514	-0,6971395	SD4(214)	-0,010909091	-0,01		0,2325941	-0,0469018		0,2325941	-0,0429934		-0,6975941	-0,2324059	-0,2324059	-0,6975941
11	-0,66	-0,5	-0,4990909	0,1	0,21	-0,8121395	-0,3469514	-0,3469514	-0,8121395	SD4(229)	-0,160909091	-0,16		0,2325941	-0,6918022		0,2325941	-0,6878937		-0,8125941	-0,3474059	-0,3474059	-0,8125941
	0,000909091	**0,001818182**	**-0,0009091**																				
corr	**0,944266827**	**0,891639841**		**R 2**																			

Sotho	vs.	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-0,73	-0,65	-0,6509091	0,1	0,17	-0,8876854	-0,4932237	-0,4932237	-0,8876854	SD4(32)	-0,079090909	-0,08		0,1972308	-0,4010068		0,1972308	-0,4056161		-0,8872308	-0,4927692	-0,4927692	-0,8872308
2	1,01	0,96	0,9590909	0,1	0,18	0,7786329	1,1904581	1,1904581	0,7786329	SD4(60)	0,050909091	0,05		0,2059126	0,2472364		0,2059126	0,2428215		0,7790874	1,1909126	1,1909126	0,7790874
3	0,3	-0,42	-0,4209091	0,1	0,17	-0,2576854	0,1367763	0,1367763	-0,2576854	SD4(74)	0,720909091	0,72	*	0,1972308	3,6551542	*	0,1972308	3,6505449	*	-0,2572308	0,1372308	0,1372308	-0,2572308
4	0,39	0,62	0,6190909	0,1	0,17	0,3073146	0,7017763	0,7017763	0,3073146	SD4(85)	-0,229090909	-0,23		0,1972308	-1,161537		0,1972308	-1,1661463		0,3077692	0,7022308	0,7022308	0,3077692
5	-0,86	-0,51	-0,5109091	0,1	0,17	-0,8826854	-0,4882237	-0,4882237	-0,8826854	SD4(94)	-0,349090909	-0,35		0,1972308	-1,7699612		0,1972308	-1,7745704		-0,8822308	-0,4877692	-0,4877692	-0,8822308
6	-1,32	-2,16	-2,1609091	0,11	0,22	-1,986422	-1,4944871	-1,4944871	-1,986422	SD4(107)	0,840909091	0,84	*	0,2459675	3,4187816	*	0,2459675	3,4150856	*	-1,9859675	-1,4940325	-1,4940325	-1,9859675
7	-0,67	-0,31	-0,3109091	0,1	0,17	-0,6876854	-0,2932237	-0,2932237	-0,6876854	SD4(136)	-0,359090909	-0,36		0,1972308	-1,8206632		0,1972308	-1,8252725		-0,6872308	-0,2927692	-0,2927692	-0,6872308
8	0,41	0,42	0,4190909	0,1	0,17	0,2173146	0,6117763	0,6117763	0,2173146	SD4(150)	-0,009090909	-0,01		0,1972308	-0,0460927		0,1972308	-0,050702		0,2177692	0,6122308	0,6122308	0,2177692
9	**2,61**	**2,67**	2,6690909	0,15	0,26	2,3393788	2,9397121	2,9397121	2,3393788	SD4(179)	-0,059090909	-0,06		0,3001666	-0,1968604		0,3001666	-0,199889		2,3398334	2,9401666	2,9401666	2,3398334
10	-0,47	-0,2	-0,2009091	0,1	0,17	-0,5326854	-0,1382237	-0,1382237	-0,5326854	SD4(214)	-0,269090909	-0,27		0,1972308	-1,3643451		0,1972308	-1,3689543		-0,5322308	-0,1377692	-0,1377692	-0,5322308
11	-0,66	-0,42	-0,4209091	0,1	0,17	-0,7376854	-0,3432237	-0,3432237	-0,7376854	SD4(229)	-0,239090909	-0,24		0,1972308	-1,212239		0,1972308	-1,2168483		-0,7372308	-0,3427692	-0,3427692	-0,7372308
	0,000909091	**0**	**0,0009091**																				
corr	**0,940484448**	**0,884510997**		**R 2**																			

Sotho	vs.	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-0,73	-0,66	-0,6590909	0,1	0,17	-0,8917763	-0,4973146	-0,4973146	-0,8917763	SD4(32)	-0,070909091	-0,07		0,1972308	-0,3595234		0,1972308	-0,3549141		-0,8922308	-0,4977692	-0,4977692	-0,8922308
2	**1,01**	**1,09**	1,0909091	0,1	0,17	0,8532237	1,2476854	1,2476854	0,8532237	SD4(60)	-0,080909091	-0,08		0,1972308	-0,4102254		0,1972308	-0,4056161		0,8527692	1,2472308	1,2472308	0,8527692
3	0,3	0,35	0,3509091	0,1	0,17	0,1282237	0,5226854	0,5226854	0,1282237	SD4(74)	-0,050909091	-0,05		0,1972308	-0,2581193		0,1972308	-0,2535101		0,1277692	0,5222308	0,5222308	0,1277692
4	0,39	0,38	0,3809091	0,1	0,17	0,1882237	0,5826854	0,5826854	0,1882237	SD4(85)	0,009090909	0,01		0,1972308	0,0460927		0,1972308	0,050702		0,1877692	0,5822308	0,5822308	0,1877692
5	-0,86	-0,88	-0,8790909	0,1	0,18	-1,0754581	-0,6636329	-0,6636329	-1,0754581	SD4(94)	0,019090909	0,02		0,2059126	0,0927137		0,2059126	0,0971286		-1,0759126	-0,6640874	-0,6640874	-1,0759126
6	-1,32	-0,66	-0,6590909	0,11	0,17	-1,19203	-0,7870609	-0,7870609	-1,19203	SD4(107)	-0,660909091	-0,66	*	0,2024846	-3,2639973	*	0,2024846	-3,2595077	*	-1,1924846	-0,7875154	-0,7875154	-1,1924846
7	-0,67	-0,11	-0,1090909	0,1	0,17	-0,5867763	-0,1923146	-0,1923146	-0,5867763	SD4(136)	-0,560909091	-0,56	*	0,1972308	-2,843922	*	0,1972308	-2,8393127	*	-0,5872308	-0,1927692	-0,1927692	-0,5872308
8	0,41	0,19	0,1909091	0,1	0,17	0,1032237	0,4976854	0,4976854	0,1032237	SD4(150)	0,219090909	0,22		0,1972308	1,110835		0,1972308	1,1154443		0,1027692	0,4972308	0,4972308	0,1027692
9	2,61	1,97	1,9709091	0,15	0,19	2,0483802	2,5325289	2,5325289	2,0483802	SD4(179)	0,639090909	0,64	*	0,2420744	2,6400602	*	0,2420744	2,6438156	*	2,0479256	2,5320744	2,5320744	2,0479256
10	-0,47	-0,57	-0,5690909	0,1	0,17	-0,7167763	-0,3223146	-0,3223146	-0,7167763	SD4(214)	0,099090909	0,1		0,1972308	0,5024109		0,1972308	0,5070201		-0,7172308	-0,3227692	-0,3227692	-0,7172308
11	-0,66	-1,08	-1,0790909	0,1	0,18	-1,0754581	-0,6636329	-0,6636329	-1,0754581	SD4(229)	0,419090909	0,42		0,2059126	2,0352854	*	0,2059126	2,0397003	*	-1,0759126	-0,6640874	-0,6640874	-1,0759126
	0,000909091	**0,001818182**	**-0,0009091**																				
corr	**0,948775886**	**0,900175681**		**R 2**																			

Ethnic Comparisons for the SD 5 scale

Sotho	vs	Nguni									new		0,5										
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-1,89	-1,51	-1,51	0,25	0,4	-2,1716991	-1,2283009	-1,2283009	-2,1716991	SD5(17)	-0,38	-0,38		0,4716991	-0,8055984		0,4716991	-0,8055984		-2,1716991	-1,2283009	-1,2283009	-2,1716991
2	-0,44	-0,21	-0,21	0,14	0,25	-0,611531	-0,038469	-0,038469	-0,611531	SD5(36)	-0,23	-0,23		0,286531	-0,8027055		0,286531	-0,8027055		-0,611531	-0,038469	-0,038469	-0,611531
3	0,4	0,33	0,33	0,12	0,22	0,1144007	0,6155993	0,6155993	0,1144007	SD5(39)	0,07	0,07		0,2505993	0,2793304		0,2505993	0,2793304		0,1144007	0,6155993	0,6155993	0,1144007
4	-1,57	-2,11	-2,11	0,22	0,51	-2,3954278	-1,2845722	-1,2845722	-2,3954278	SD5(90)	0,54	0,54	*	0,5554278	0,9722236		0,5554278	0,9722236		-2,3954278	-1,2845722	-1,2845722	-2,3954278
5	0,09	-0,48	-0,48	0,12	0,27	-0,4904657	0,1004657	0,1004657	-0,4904657	SD5(104)	0,57	0,57	*	0,2954657	1,9291577		0,2954657	1,9291577		-0,4904657	0,1004657	0,1004657	-0,4904657
6	2,37	2,79	2,79	0,1	0,22	2,3383391	2,8216609	2,8216609	2,3383391	SD5(115)	-0,42	-0,42		0,2416609	-1,7379724		0,2416609	-1,7379724		2,3383391	2,8216609	2,8216609	2,3383391
7	0,29	0,56	0,56	0,12	0,21	0,1831323	0,6668677	0,6668677	0,1831323	SD5(135)	-0,27	-0,27		0,2418677	-1,1163126		0,2418677	-1,1163126		0,1831323	0,6668677	0,6668677	0,1831323
8	0,62	0,51	0,51	0,11	0,21	0,3279346	0,8020654	0,8020654	0,3279346	SD5(162)	0,11	0,11		0,2370654	0,464007		0,2370654	0,464007		0,3279346	0,8020654	0,8020654	0,3279346
9	2,34	2,28	2,28	0,1	0,2	2,0863932	2,5336068	2,5336068	2,0863932	SD5(184)	0,06	0,06		0,2236068	0,2683282		0,2236068	0,2683282		2,0863932	2,5336068	2,5336068	2,0863932
10	-2,02	-1,87	-1,87	0,26	0,46	-2,4733938	-1,4166062	-1,4166062	-2,4733938	SD5(196)	-0,15	-0,15		0,5283938	-0,2838792		0,5283938	-0,2838792		-2,4733938	-1,4166062	-1,4166062	-2,4733938
11	-0,95	-0,8	-0,8	0,17	0,3	-1,2198188	-0,5301812	-0,5301812	-1,2198188	SD5(207)	-0,15	-0,15		0,3448188	-0,4350111		0,3448188	-0,4350111		-1,2198188	-0,5301812	-0,5301812	-1,2198188
12	0,76	0,51	0,51	0,11	0,21	0,3979346	0,8720654	0,8720654	0,3979346	SD5(221)	0,25	0,25		0,2370654	1,0545614		0,2370654	1,0545614		0,3979346	0,8720654	0,8720654	0,3979346
	0	**0**	**0**																				
corr	**0,975979983**	**0,952536927**		**R 2**																			
Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-1,89	-1,37	-1,37	0,25	0,32	-2,0360788	-1,2239212	-1,2239212	-2,0360788	SD5(17)	-0,52	-0,52	*	0,4060788	-1,2805396		0,4060788	-1,2805396		-2,0360788	-1,2239212	-1,2239212	-2,0360788
2	-0,44	-0,67	-0,67	0,14	0,25	-0,841531	-0,268469	-0,268469	-0,841531	SD5(36)	0,23	0,23		0,286531	0,8027055		0,286531	0,8027055		-0,841531	-0,268469	-0,268469	-0,841531
3	0,4	-0,19	-0,19	0,12	0,22	-0,1455993	0,3555993	0,3555993	-0,1455993	SD5(39)	0,59	0,59	*	0,2505993	2,3543563	*	0,2505993	2,3543563	*	-0,1455993	0,3555993	0,3555993	-0,1455993
4	-1,57	-1,47	-1,47	0,22	0,33	-1,9166106	-1,1233894	-1,1233894	-1,9166106	SD5(90)	-0,1	-0,1		0,3966106	-0,2521365		0,3966106	-0,2521365		-1,9166106	-1,1233894	-1,1233894	-1,9166106
5	0,09	-0,28	-0,28	0,12	0,22	-0,3455993	0,1555993	0,1555993	-0,3455993	SD5(104)	0,37	0,37		0,2505993	1,4764607		0,2505993	1,4764607		-0,3455993	0,1555993	0,1555993	-0,3455993
6	2,37	2,61	2,61	0,1	0,18	2,2840874	2,6959126	2,6959126	2,2840874	SD5(115)	-0,24	-0,24		0,2059126	-1,165543		0,2059126	-1,165543		2,2840874	2,6959126	2,6959126	2,2840874
7	0,29	0,68	0,68	0,12	0,18	0,2686669	0,7013331	0,7013331	0,2686669	SD5(135)	-0,39	-0,39		0,2163331	-1,8027756		0,2163331	-1,8027756		0,2686669	0,7013331	0,7013331	0,2686669
8	0,62	-0,19	-0,19	0,11	0,22	-0,0309675	0,4609675	0,4609675	-0,0309675	SD5(162)	0,81	0,81	*	0,2459675	3,2931183	*	0,2459675	3,2931183	*	-0,0309675	0,4609675	0,4609675	-0,0309675
9	**2,34**	**2,64**	2,64	0,1	0,18	2,2840874	2,6959126	2,6959126	2,2840874	SD5(184)	-0,3	-0,3		0,2059126	-1,4569288		0,2059126	-1,4569288		2,2840874	2,6959126	2,6959126	2,2840874
10	-2,02	-1,72	-1,72	0,26	0,37	-2,3222168	-1,4177832	-1,4177832	-2,3222168	SD5(196)	-0,3	-0,3		0,4522168	-0,6633987		0,4522168	-0,6633987		-2,3222168	-1,4177832	-1,4177832	-2,3222168
11	-0,95	-0,79	-0,79	0,17	0,26	-1,1806445	-0,5593555	-0,5593555	-1,1806445	SD5(207)	-0,16	-0,16		0,3106445	-0,5150582		0,3106445	-0,5150582		-1,1806445	-0,5593555	-0,5593555	-1,1806445
12	0,76	0,75	0,75	0,11	0,18	0,5440498	0,9659502	0,9659502	0,5440498	SD5(221)	0,01	0,01		0,2109502	0,0474045		0,2109502	0,0474045		0,5440498	0,9659502	0,9659502	0,5440498
	0	**0**	**0**																				
corr	**0,95945382**	**0,920551632**		**R 2**																			
Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-1,89	-2,28	-2,28	0,25	0,46	-2,6085456	-1,5614544	-1,5614544	-2,6085456	SD5(17)	0,39	0,39		0,5235456	0,7449208		0,5235456	0,7449208		-2,6085456	-1,5614544	-1,5614544	-2,6085456
2	**-0,44**	**-0,04**	-0,04	0,14	0,21	-0,4923886	0,0123886	0,0123886	-0,4923886	SD5(36)	-0,4	-0,4		0,2523886	-1,5848577		0,2523886	-1,5848577		-0,4923886	0,0123886	0,0123886	-0,4923886
3	0,4	0,78	0,78	0,12	0,18	0,3736669	0,8063331	0,8063331	0,3736669	SD5(39)	-0,38	-0,38		0,2163331	-1,7565506		0,2163331	-1,7565506		0,3736669	0,8063331	0,8063331	0,3736669
4	-1,57	-1,32	-1,32	0,22	0,31	-1,8251316	-1,0648684	-1,0648684	-1,8251316	SD5(90)	-0,25	-0,25		0,3801316	-0,6576671		0,3801316	-0,6576671		-1,8251316	-1,0648684	-1,0648684	-1,8251316
5	0,09	0,45	0,45	0,12	0,19	0,0452779	0,4947221	0,4947221	0,0452779	SD5(104)	-0,36	-0,36		0,2247221	-1,601979		0,2247221	-1,601979		0,0452779	0,4947221	0,4947221	0,0452779
6	2,37	2,41	2,41	0,1	0,17	2,1927692	2,5872308	2,5872308	2,1927692	SD5(115)	-0,04	-0,04		0,1972308	-0,2028081		0,1972308	-0,2028081		2,1927692	2,5872308	2,5872308	2,1927692
7	0,29	1	1	0,12	0,17	0,4369135	0,8530865	0,8530865	0,4369135	SD5(135)	-0,71	-0,71	*	0,2080865	-3,4120423	*	0,2080865	-3,4120423	*	0,4369135	0,8530865	0,8530865	0,4369135
8	0,62	0,16	0,16	0,11	0,2	0,1617458	0,6182542	0,6182542	0,1617458	SD5(162)	0,46	0,46		0,2282542	2,0152966	*	0,2282542	2,0152966	*	0,1617458	0,6182542	0,6182542	0,1617458
9	2,34	1,86	1,86	0,1	0,16	1,9113204	2,2886796	2,2886796	1,9113204	SD5(184)	0,48	0,48		0,1886796	2,5439949	*	0,1886796	2,5439949	*	1,9113204	2,2886796	2,2886796	1,9113204
10	-2,02	-2,81	-2,81	0,26	0,59	-3,059748	-1,770252	-1,770252	-3,059748	SD5(196)	0,79	0,79	*	0,644748	1,2252849		0,644748	1,2252849		-3,059748	-1,770252	-1,770252	-3,059748
11	-0,95	-1,32	-1,32	0,17	0,31	-1,4885534	-0,7814466	-0,7814466	-1,4885534	SD5(207)	0,37	0,37		0,3535534	1,046518		0,3535534	1,046518		-1,4885534	-0,7814466	-0,7814466	-1,4885534
12	0,76	1,11	1,11	0,11	0,17	0,7325154	1,1374846	1,1374846	0,7325154	SD5(221)	-0,35	-0,35		0,2024846	-1,7285268		0,2024846	-1,7285268		0,7325154	1,1374846	1,1374846	0,7325154
	0	**0**	**0**																				
corr	**0,957795839**	**0,91737287**		**R 2**																			

Ethnic Comparisons for the C 1 scale

Sotho	vs	Nguni											1										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											2*EE_SOTH	GU	TH	2*EE_NGU
1	-0,93	3,45	3,4475	0,19	0,24	0,9526454	1,5648546	1,5648546	0,9526454	C 1 (5)	-4,3775	-4,4	*	0,3061046	-14,300669	*	0,3061046	-14,308836	*	0,9538954	1,5661046	1,5661046	0,9538954
2	-0,24	1,13	1,1275	0,16	0,24	0,1553059	0,7321941	0,7321941	0,1553059	C 1 (16)	-1,3675	-1,4	*	0,2884441	-4,7409532	*	0,2884441	-4,7496204	*	0,1565559	0,7334441	0,7334441	0,1565559
3	1,45	0,96	0,9575	0,12	0,24	0,9354218	1,4720782	1,4720782	0,9354218	C 1 (48)	0,4925	0,49		0,2683282	1,8354391		0,2683282	1,8261222		0,9366718	1,4733282	1,4733282	0,9366718
4	-2,61	0,36	0,3575	0,37	0,27	-1,5842893	-0,6682107	-0,6682107	-1,5842893	C 1 (89)	-2,9675	-3	*	0,4580393	-6,4787017	*	0,4580393	-6,4841598	*	-1,5830393	-0,6669607	-0,6669607	-1,5830393
5	0,71	0,12	0,1175	0,13	0,29	0,095945	0,731555	0,731555	0,095945	C 1 (122)	0,5925	0,59	*	0,317805	1,8643509		0,317805	1,8564845		0,097195	0,732805	0,732805	0,097195
6	0,09	-1,21	-1,2125	0,14	0,44	-1,0229859	-0,0995141	-0,0995141	-1,0229859	C 1 (133)	1,3025	1,3	*	0,4617359	2,8208769	*	0,4617359	2,8154625	*	-1,0217359	-0,0982641	-0,0982641	-1,0217359
7	-1,46	-1,67	-1,6725	0,23	0,53	-2,1440043	-0,9884957	-0,9884957	-2,1440043	C 1 (172)	0,2125	0,21		0,5777543	0,3678034		0,5777543	0,3634763		-2,1427543	-0,9872457	-0,9872457	-2,1427543
8	3	-3,15	-3,1525	0,12	1,01	-1,0933537	0,9408537	0,9408537	-1,0933537	C 1 (234)	6,1525	6,15	*	1,0171037	6,0490389	*	1,0171037	6,0465809	*	-1,0921037	0,9421037	0,9421037	-1,0921037
	0,00125	**-0,00125**	**0,0025**																				
corr	**-0,407264382**	**0,165864277**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-	D+2*EE_TS	D+2*EE_SO	D-
1	-0,93	-1,49	-1,49125	0,19	0,4	-1,6534568	-0,7677932	-0,7677932	-1,6534568	C 1 (5)	0,56125	0,56	*	0,4428318	1,2674112		0,4428318	1,2645885		-1,6528318	-0,7671682	-0,7671682	-1,6528318
2	-0,24	0,52	0,51875	0,16	0,22	-0,1326544	0,4114044	0,4114044	-0,1326544	C 1 (16)	-0,7588	-0,8	*	0,2720294	-2,7892205	*	0,2720294	-2,7938156	*	-0,1320294	0,4120294	0,4120294	-0,1320294
3	1,45	0,66	0,65875	0,12	0,21	0,8125073	1,2962427	1,2962427	0,8125073	C 1 (48)	0,79125	0,79	*	0,2418677	3,2714161	*	0,2418677	3,266248	*	0,8131323	1,2968677	1,2968677	0,8131323
4	-2,61	-2,41	-2,41125	0,37	0,59	-3,2070444	-1,8142056	-1,8142056	-3,2070444	C 1 (89)	-0,1988	-0,2		0,6964194	-0,2853884		0,6964194	-0,2871833		-3,2064194	-1,8135806	-1,8135806	-3,2064194
5	0,71	0,83	0,82875	0,13	0,21	0,5223932	1,0163568	1,0163568	0,5223932	C 1 (122)	-0,1188	-0,1		0,2469818	-0,4808047		0,2469818	-0,4858658		0,5230182	1,0169818	1,0169818	0,5230182
6	0,09	0,21	0,20875	0,14	0,23	-0,1198832	0,4186332	0,4186332	-0,1198832	C 1 (133)	-0,1188	-0,1		0,2692582	-0,4410264		0,2692582	-0,4456688		-0,1192582	0,4192582	0,4192582	-0,1192582
7	-1,46	-1,66	-1,66125	0,23	0,43	-2,0482724	-1,0729776	-1,0729776	-2,0482724	C 1 (172)	0,20125	0,2		0,4876474	0,4126957		0,4876474	0,4101324		-2,0476474	-1,0723526	-1,0723526	-2,0476474
8	3	3,34	3,33875	0,12	0,21	2,9275073	3,4112427	3,4112427	2,9275073	C 1 (234)	-0,3388	-0,3		0,2418677	-1,4005589		0,2418677	-1,405727		2,9281323	3,4118677	3,4118677	2,9281323
	0,00125	**0**	**0,00125**																				
corr	**0,962080085**	**0,92559809**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											2*EE_SOTH	N	TH	2*EE_VEN
1	-0,93	-1,43	-1,43	0,19	0,39	-1,6138202	-0,7461798	-0,7461798	-1,6138202	C 1 (5)	0,5	0,5		0,4338202	1,1525511		0,4338202	1,1525511		-1,6138202	-0,7461798	-0,7461798	-1,6138202
2	**-0,24**	**-0,14**	-0,14	0,16	0,26	-0,4952868	0,1152868	0,1152868	-0,4952868	C 1 (16)	-0,1	-0,1		0,3052868	-0,3275609		0,3052868	-0,3275609		-0,4952868	0,1152868	0,1152868	-0,4952868
3	1,45	1,05	1,05	0,12	0,2	1,0167619	1,4832381	1,4832381	1,0167619	C 1 (48)	0,4	0,4		0,2332381	1,7149859		0,2332381	1,7149859		1,0167619	1,4832381	1,4832381	1,0167619
4	-2,61	-1,78	-1,78	0,37	0,44	-2,7698913	-1,6201087	-1,6201087	-2,7698913	C 1 (89)	-0,83	-0,8	*	0,5748913	-1,4437512		0,5748913	-1,4437512		-2,7698913	-1,6201087	-1,6201087	-2,7698913
5	0,71	0,75	0,75	0,13	0,21	0,4830182	0,9769818	0,9769818	0,4830182	C 1 (122)	-0,04	-0		0,2469818	-0,1619553		0,2469818	-0,1619553		0,4830182	0,9769818	0,9769818	0,4830182
6	0,09	0,24	0,24	0,14	0,24	-0,1128489	0,4428489	0,4428489	-0,1128489	C 1 (133)	-0,15	-0,2		0,2778489	-0,5398618		0,2778489	-0,5398618		-0,1128489	0,4428489	0,4428489	-0,1128489
7	-1,46	-1,59	-1,59	0,23	0,42	-2,0038528	-1,0461472	-1,0461472	-2,0038528	C 1 (172)	0,13	0,13		0,4788528	0,2714822		0,4788528	0,2714822		-2,0038528	-1,0461472	-1,0461472	-2,0038528
8	3	2,91	2,91	0,12	0,19	2,7302779	3,1797221	3,1797221	2,7302779	C 1 (234)	0,09	0,09		0,2247221	0,4004947		0,2247221	0,4004947		2,7302779	3,1797221	3,1797221	2,7302779
	0,00125	**0,00125**	**-5,5511E-17**																				
corr	0,974544402	0,949736792		2																			

Ethnic Comparisons for the C 2 scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-0,59	-0,79	-0,79	0,12	0,26	-0,9763564	-0,4036436	-0,4036436	-0,9763564	C2(25)	0,2	0,2		0,28635642	0,6984303		0,28635642	0,6984303		-0,9763564	-0,4036436	-0,4036436	-0,9763564
2	-0,08	-0,29	-0,29	0,11	0,23	-0,439951	0,06995098	0,06995098	-0,439951	C2(49)	0,21	0,21		0,25495098	0,82368777		0,25495098	0,82368777		-0,439951	0,06995098	0,06995098	-0,439951
3	-1,57	-1,18	-1,18	0,16	0,3	-1,715	-1,035	-1,035	-1,715	C2(73)	-0,39	-0,39		0,34	-1,1470588		0,34	-1,1470588		-1,715	-1,035	-1,035	-1,715
4	-0,5	0,11	0,11	0,12	0,22	-0,4455993	0,05559928	0,05559928	-0,4455993	C2(137)	-0,61	-0,61	*	0,25059928	-2,434165	*	0,25059928	-2,434165	*	-0,4455993	0,05559928	0,05559928	-0,4455993
5	-0,8	-0,72	-0,72	0,13	0,26	-1,0506888	-0,4693112	-0,4693112	-1,0506888	C2(161)	-0,08	-0,08		0,29068884	-0,2752084		0,29068884	-0,2752084		-1,0506888	-0,4693112	-0,4693112	-1,0506888
6	1,1	0,59	0,59	0,09	0,2	0,62568288	1,06431712	1,06431712	0,62568288	C2(185)	0,51	0,51	*	0,21931712	2,32539984	*	0,21931712	2,32539984	*	0,62568288	1,06431712	1,06431712	0,62568288
7	2,43	2,27	2,27	0,11	0,22	2,10403252	2,59596748	2,59596748	2,10403252	C2(227)	0,16	0,16		0,24596748	0,6504925		0,24596748	0,6504925		2,10403252	2,59596748	2,59596748	2,10403252
	-0,001428571	-0,0014286	6,33174E-17																				
corr	0,962255198	0,92593507		R 2																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-0,59	-1,14	-1,137142857	0,12	0,25	-1,1408799	-0,5862629	-0,5862629	-1,1408799	C2(25)	0,54714286	0,55	*	0,27730849	1,97304761	*	0,27730849	1,98335073	*	-1,1423085	-0,5876915	-0,5876915	-1,1423085
2	-0,08	-0,57	-0,567142857	0,11	0,21	-0,5606368	-0,086506	-0,086506	-0,5606368	C2(49)	0,48714286	0,49		0,23706539	2,05488812	*	0,23706539	2,06694025	*	-0,5620654	-0,0879346	-0,0879346	-0,5620654
3	-1,57	-1,27	-1,267142857	0,16	0,26	-1,7238582	-1,1132847	-1,1132847	-1,7238582	C2(73)	-0,3028571	-0,3		0,30528675	-0,9920416		0,30528675	-0,9826827		-1,7252868	-1,1147132	-1,1147132	-1,7252868
4	-0,5	0,82	0,822857143	0,12	0,17	-0,0466579	0,36951509	0,36951509	-0,0466579	C2(137)	-1,3228571	-1,32	*	0,20808652	-6,3572457	*	0,20808652	-6,3435152	*	-0,0480865	0,36808652	0,36808652	-0,0480865
5	-0,8	-1,14	-1,137142857	0,13	0,25	-1,2503515	-0,6867914	-0,6867914	-1,2503515	C2(161)	0,33714286	0,34		0,28178006	1,19647523		0,28178006	1,20661485		-1,2517801	-0,6882199	-0,6882199	-1,2517801
6	1,1	0,93	0,932857143	0,09	0,17	0,82407473	1,20878241	1,20878241	0,82407473	C2(185)	0,16714286	0,17		0,19235384	0,86893434		0,19235384	0,88378792		0,82264616	1,20735384	1,20735384	0,82264616
7	2,43	2,38	2,382857143	0,11	0,18	2,19547834	2,6173788	2,6173788	2,19547834	C2(227)	0,04714286	0,05		0,21095023	0,22347858		0,21095023	0,23702273		2,19404977	2,61595023	2,61595023	2,19404977
	-0,001428571	0,00142857	-0,002857143																				
corr	0,888956788	0,79024417		R 2																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-0,59	-0,14	-0,137142857	0,12	0,18	-0,5799045	-0,1472384	-0,1472384	-0,5799045	C2(25)	-0,4528571	-0,45		0,21633308	-2,0933329	*	0,21633308	-2,0801257	*	-0,5813331	-0,1486669	-0,1486669	-0,5813331
2	**-0,08**	**-0,11**	-0,107142857	0,11	0,18	-0,3045217	0,1173788	0,1173788	-0,3045217	C2(49)	0,02714286	0,03		0,21095023	0,12866948		0,21095023	0,14221364		-0,3059502	0,11595023	0,11595023	-0,3059502
3	-1,57	-1,71	-1,707142857	0,16	0,28	-1,9610617	-1,3160811	-1,3160811	-1,9610617	C2(73)	0,13714286	0,14		0,32249031	0,42526195		0,32249031	0,43412157		-1,9624903	-1,3175097	-1,3175097	-1,9624903
4	-0,5	-0,48	-0,477142857	0,12	0,19	-0,7132935	-0,2638494	-0,2638494	-0,7132935	C2(137)	-0,0228571	-0,02		0,22472205	-0,101713		0,22472205	-0,0889988		-0,7147221	-0,2652779	-0,2652779	-0,7147221
5	-0,8	-1,04	-1,037142857	0,13	0,22	-1,1741101	-0,6630328	-0,6630328	-1,1741101	C2(161)	0,23714286	0,24		0,25553865	0,92801171		0,25553865	0,93919258		-1,1755386	-0,6644614	-0,6644614	-1,1755386
6	1,1	0,93	0,932857143	0,09	0,16	0,83285297	1,20000417	1,20000417	0,83285297	C2(185)	0,16714286	0,17		0,1835756	0,91048516		0,1835756	0,92604901		0,8314244	1,1985756	1,1985756	0,8314244
7	2,43	2,56	2,562857143	0,11	0,18	2,28547834	2,7073788	2,7073788	2,28547834	C2(227)	-0,1328571	-0,13		0,21095023	-0,6298033		0,21095023	-0,6162591		2,28404977	2,70595023	2,70595023	2,28404977
	-0,001428571	0,00142857	-0,002857143																				
corr	0,98620825	0,97260671		R 2																			

Ethnic Comparisons for the C 3 scale

Sotho	vs	Nguni											0,5										
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
2	3,71	3,18	2,7657143	0,13	0,27	2,9381907	3,5375236	3,5375236	2,9381907	C 3 (47)	0,9442857	0,53	*	0,2996665	3,1511222	*	0,2996665	1,7686329		3,1453335	3,7446665	3,7446665	3,1453335
3	-0,08	-1,17	-1,5842857	0,11	0,27	-1,1236905	-0,5405953	-0,5405953	-1,1236905	C 3 (64)	1,5042857	1,09	*	0,2915476	5,1596574	*	0,2915476	3,7386692	*	-0,9165476	-0,3334524	-0,3334524	-0,9165476
4	-2,18	-3,41	-3,8242857	0,21	0,6	-3,6378315	-2,3664543	-2,3664543	-3,6378315	C 3 (87)	1,6442857	1,23	*	0,6356886	2,5866214	*	0,6356886	1,9349096		-3,4306886	-2,1593114	-2,1593114	-3,4306886
5	-2,91	-2,29	-2,7042857	0,27	0,39	-3,2814845	-2,3328012	-2,3328012	-3,2814845	C 3 (127)	-0,2057143	-0,62	*	0,4743416	-0,4336838		0,4743416	-1,3070748		-3,0743416	-2,1256584	-2,1256584	-3,0743416
6	2,92	2,73	2,3157143	0,11	0,24	2,3538496	2,8818647	2,8818647	2,3538496	C 3 (153)	0,6042857	0,19		0,2640076	2,2888954	*	0,2640076	0,7196763		2,5609924	3,0890076	3,0890076	2,5609924
7	-1,29	-1,59	-2,0042857	0,15	0,31	-1,9915264	-1,3027593	-1,3027593	-1,9915264	C 3 (178)	0,7142857	0,3		0,3443835	2,0740997	*	0,3443835	0,8711219		-1,7843835	-1,0956165	-1,0956165	-1,7843835
8	2,74	2,56	2,1457143	0,11	0,23	2,1879062	2,6978081	2,6978081	2,1879062	C 3 (216)	0,5942857	0,18		0,254951	2,3309803	*	0,254951	0,7060181		2,395049	2,904951	2,904951	2,395049
	0,415714286	**0,001428571**	**0,4142857**																				
corr	**0,973831588**	**0,948347962**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-2,91	-3,39	-3,39	0,27	0,59	-3,7988451	-2,5011549	-2,5011549	-3,7988451	C 3 (10)	0,48	0,48		0,6488451	0,7397759		0,6488451	0,7397759		-3,7988451	-2,5011549	-2,5011549	-3,7988451
2	3,71	3,65	3,65	0,13	0,22	3,4244614	3,9355386	3,9355386	3,4244614	C 3 (47)	0,06	0,06		0,2555386	0,2347981		0,2555386	0,2347981		3,4244614	3,9355386	3,9355386	3,4244614
3	-0,08	0,2	0,2	0,11	0,19	-0,159545	0,279545	0,279545	-0,159545	C 3 (64)	-0,28	-0,28		0,219545	-1,2753651		0,219545	-1,2753651		-0,159545	0,279545	0,279545	-0,159545
4	-2,18	-3,81	-3,81	0,21	0,72	-3,745	-2,245	-2,245	-3,745	C 3 (87)	1,63	1,63	*	0,75	2,1733333	*	0,75	2,1733333	*	-3,745	-2,245	-2,245	-3,745
5	-2,91	-2,47	-2,47	0,27	0,4	-3,1725971	-2,2074029	-2,2074029	-3,1725971	C 3 (127)	-0,44	-0,44		0,4825971	-0,9117335		0,4825971	-0,9117335		-3,1725971	-2,2074029	-2,2074029	-3,1725971
6	2,92	3,01	3,01	0,11	0,19	2,745455	3,184545	3,184545	2,745455	C 3 (153)	-0,09	-0,09		0,219545	-0,4099388		0,219545	-0,4099388		2,745455	3,184545	3,184545	2,745455
7	-1,29	-0,8	-0,8	0,15	0,23	-1,3195906	-0,7704094	-0,7704094	-1,3195906	C 3 (178)	-0,49	-0,49		0,2745906	-1,7844747		0,2745906	-1,7844747		-1,3195906	-0,7704094	-0,7704094	-1,3195906
8	2,74	3,61	3,61	0,11	0,22	2,9290325	3,4209675	3,4209675	2,9290325	C 3 (216)	-0,87	-0,87	*	0,2459675	-3,537053	*	0,2459675	-3,537053	*	2,9290325	3,4209675	3,4209675	2,9290325
	0	**0**	**0**																				
corr	**0,973164687**	**0,947049509**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-2,91	-2,13	-2,13125	0,27	0,35	-2,9626657	-2,0785843	-2,0785843	-2,9626657	C 3 (10)	-0,77875	-0,78	*	0,4420407	-1,7617155		0,4420407	-1,7645433		-2,9620407	-2,0779593	-2,0779593	-2,9620407
2	**3,71**	**3,7**	3,69875	0,13	0,21	3,4573932	3,9513568	3,9513568	3,4573932	C 3 (47)	0,01125	0,01		0,2469818	0,0455499		0,2469818	0,0404888		3,4580182	3,9519818	3,9519818	3,4580182
3	-0,08	0,36	0,35875	0,11	0,18	-0,0715752	0,3503252	0,3503252	-0,0715752	C 3 (64)	-0,43875	-0,44		0,2109502	-2,0798745	*	0,2109502	-2,0858	*	-0,0709502	0,3509502	0,3509502	-0,0709502
4	-2,18	-2,58	-2,58125	0,21	0,43	-2,8591644	-1,9020856	-1,9020856	-2,8591644	C 3 (87)	0,40125	0,4		0,4785394	0,8384889		0,4785394	0,8358768		-2,8585394	-1,9014606	-1,9014606	-2,8585394
5	-2,91	-3,32	-3,32125	0,27	0,59	-3,7644701	-2,4667799	-2,4667799	-3,7644701	C 3 (127)	0,41125	0,41		0,6488451	0,6338184		0,6488451	0,6318919		-3,7638451	-2,4661549	-2,4661549	-3,7638451
6	2,92	2,61	2,60875	0,11	0,17	2,5618904	2,9668596	2,9668596	2,5618904	C 3 (153)	0,31125	0,31		0,2024846	1,5371542		0,2024846	1,5309809		2,5625154	2,9674846	2,9674846	2,5625154
7	-1,29	-1,23	-1,23125	0,15	0,26	-1,5607916	-0,9604584	-0,9604584	-1,5607916	C 3 (178)	-0,05875	-0,06		0,3001666	-0,1957246		0,3001666	-0,199889		-1,5601666	-0,9598334	-0,9598334	-1,5601666
8	2,74	2,58	2,57875	0,11	0,17	2,4568904	2,8618596	2,8618596	2,4568904	C 3 (216)	0,16125	0,16		0,2024846	0,796357		0,2024846	0,7901837		2,4575154	2,8624846	2,8624846	2,4575154
	0	**-0,00125**	**0,00125**																				
corr	**0,988156777**	**0,976453816**		**R 2**																			

Ethnic Comparisons for the C 4 scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-1,58	-1,43	-1,433	0,2	0,39	-1,9447921	-1,0682079	-1,0682079	-1,9447921	C4(7)	-0,147	-0,15		0,43829214	-0,3353927		0,43829214	-0,3422375		-1,9432921	-1,0667079	-1,0667079	-1,9432921
2	0,36	-0,36	-0,363	0,12	0,28	-0,3061309	0,30313092	0,30313092	-0,3061309	C4(33)	0,723	0,72	*	0,30463092	2,37336377	*	0,30463092	2,36351579	*	-0,3046309	0,30463092	0,30463092	-0,3046309
3	2,19	2,35	2,347	0,1	0,21	2,03590593	2,50109407	2,50109407	2,03590593	C4(57)	-0,157	-0,16		0,23259407	-0,6749957		0,23259407	-0,6878937		2,03740593	2,50259407	2,50259407	2,03740593
4	-1,25	-1,43	-1,433	0,18	0,39	-1,7710346	-0,9119654	-0,9119654	-1,7710346	C4(78)	0,183	0,18		0,42953463	0,42604248		0,42953463	0,41905818		-1,7695346	-0,9104654	-0,9104654	-1,7695346
5	3,82	4,32	4,317	0,13	0,27	3,76883352	4,36816648	4,36816648	3,76883352	C4(98)	-0,497	-0,5		0,29966648	-1,6585105		0,29966648	-1,6685216		3,77033352	4,36966648	4,36966648	3,77033352
6	-0,27	-0,36	-0,363	0,14	0,28	-0,6295495	-0,0034505	-0,0034505	-0,6295495	C4(124)	0,093	0,09		0,31304952	0,2970776		0,31304952	0,28749445		-0,6280495	-0,0019505	-0,0019505	-0,6280495
7	0,11	-0,71	-0,713	0,13	0,31	-0,6376547	0,03465473	0,03465473	-0,6376547	C4(146)	0,823	0,82	*	0,33615473	2,44827734	*	0,33615473	2,43935288	*	-0,6361547	0,03615473	0,03615473	-0,6361547
8	-0,52	-0,28	-0,283	0,15	0,28	-0,7191476	-0,0838524	-0,0838524	-0,7191476	C4(168)	-0,237	-0,24		0,3176476	-0,7461098		0,3176476	-0,7555543		-0,7176476	-0,0823524	-0,0823524	-0,7176476
9	-1,35	-0,53	-0,533	0,19	0,3	-1,2966056	-0,5863944	-0,5863944	-1,2966056	C4(199)	-0,817	-0,82	*	0,35510562	-2,3007239	*	0,35510562	-2,3091721	*	-1,2951056	-0,5848944	-0,5848944	-1,2951056
10	-1,5	-1,59	-1,593	0,2	0,41	-2,0026798	-1,0903202	-1,0903202	-2,0026798	C4(222)	0,093	0,09		0,45617979	0,20386699		0,45617979	0,19729063		-2,0011798	-1,0888202	-1,0888202	-2,0011798
	0,001	**-0,002**	**0,003**																				
corr	**0,96423123**	**0,929741874**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-1,58	-1,3	-1,301	0,2	0,32	-1,8178592	-1,0631408	-1,0631408	-1,8178592	C4(7)	-0,279	-0,28		0,37735925	-0,7393485		0,37735925	-0,7419985		-1,8173592	-1,0626408	-1,0626408	-1,8173592
2	0,36	0,12	0,119	0,12	0,22	-0,0110993	0,49009928	0,49009928	-0,0110993	C4(33)	0,241	0,24		0,25059928	0,9616947		0,25059928	0,95770426		-0,0105993	0,49059928	0,49059928	-0,0105993
3	2,19	2,8	2,799	0,1	0,18	2,2885874	2,7004126	2,7004126	2,2885874	C4(57)	-0,609	-0,61	*	0,2059126	-2,9575655	*	0,2059126	-2,9624219	*	2,2890874	2,7009126	2,7009126	2,2890874
4	-1,25	-1,52	-1,521	0,18	0,34	-1,7702077	-1,0007923	-1,0007923	-1,7702077	C4(78)	0,271	0,27		0,38470768	0,70443096		0,38470768	0,70183158		-1,7697077	-1,0002923	-1,0002923	-1,7697077
5	3,82	4,31	4,309	0,13	0,23	3,8003031	4,3286969	4,3286969	3,8003031	C4(98)	-0,489	-0,49		0,2641969	-1,8508923		0,2641969	-1,8546774		3,8008031	4,3291969	4,3291969	3,8008031
6	-0,27	-0,5	-0,501	0,14	0,25	-0,672031	-0,098969	-0,098969	-0,672031	C4(124)	0,231	0,23		0,28653098	0,80619556		0,28653098	0,80270553		-0,671531	-0,098469	-0,098469	-0,671531
7	0,11	-0,31	-0,311	0,13	0,24	-0,3734469	0,17244688	0,17244688	-0,3734469	C4(146)	0,421	0,42		0,27294688	1,54242466		0,27294688	1,53876094		-0,3729469	0,17294688	0,17294688	-0,3729469
8	-0,52	-0,85	-0,851	0,15	0,28	-1,0031476	-0,3678524	-0,3678524	-1,0031476	C4(168)	0,331	0,33		0,3176476	1,04203525		0,3176476	1,03888711		-1,0026476	-0,3673524	-0,3673524	-1,0026476
9	**-1,35**	**-1,11**	-1,111	0,19	0,3	-1,5856056	-0,8753944	-0,8753944	-1,5856056	C4(199)	-0,239	-0,24		0,35510562	-0,6730392		0,35510562	-0,6758553		-1,5851056	-0,8748944	-0,8748944	-1,5851056
10	-1,5	-1,64	-1,641	0,2	0,35	-1,9736129	-1,1673871	-1,1673871	-1,9736129	C4(222)	0,141	0,14		0,40311289	0,34977795		0,40311289	0,34729726		-1,9731129	-1,1668871	-1,1668871	-1,9731129
	0,001	**0**	**0,001**																				
corr	**0,9872774**	**0,974716672**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-1,58	-1,17	-1,17	0,2	0,31	-1,7439173	-1,0060827	-1,0060827	-1,7439173	C4(7)	-0,41	-0,41		0,36891733	-1,1113601		0,36891733	-1,1113601		-1,7439173	-1,0060827	-1,0060827	-1,7439173
2	**0,36**	**-0,06**	-0,06	0,12	0,23	-0,1094224	0,40942244	0,40942244	-0,1094224	C4(33)	0,42	0,42		0,25942244	1,61898102		0,25942244	1,61898102		-0,1094224	0,40942244	0,40942244	-0,1094224
3	2,19	2,23	2,23	0,1	0,17	2,01276917	2,40723083	2,40723083	2,01276917	C4(57)	-0,04	-0,04		0,19723083	-0,2028081		0,19723083	-0,2028081		2,01276917	2,40723083	2,40723083	2,01276917
4	-1,25	-0,83	-0,83	0,18	0,28	-1,3728663	-0,7071337	-0,7071337	-1,3728663	C4(78)	-0,42	-0,42		0,33286634	-1,2617677		0,33286634	-1,2617677		-1,3728663	-0,7071337	-0,7071337	-1,3728663
5	3,82	3,57	3,57	0,13	0,19	3,46478271	3,92521729	3,92521729	3,46478271	C4(98)	0,25	0,25		0,23021729	1,08593061		0,23021729	1,08593061		3,46478271	3,92521729	3,92521729	3,46478271
6	-0,27	0,24	0,24	0,14	0,22	-0,2757681	0,2457681	0,2457681	-0,2757681	C4(124)	-0,51	-0,51	*	0,2607681	-1,9557607		0,2607681	-1,9557607		-0,2757681	0,2457681	0,2457681	-0,2757681
7	0,11	-0,29	-0,29	0,13	0,24	-0,3629469	0,18294688	0,18294688	-0,3629469	C4(146)	0,4	0,4		0,27294688	1,46548661		0,27294688	1,46548661		-0,3629469	0,18294688	0,18294688	-0,3629469
8	-0,52	-0,29	-0,29	0,15	0,24	-0,6880194	-0,1219806	-0,1219806	-0,6880194	C4(168)	-0,23	-0,23		0,28301943	-0,812665		0,28301943	-0,812665		-0,6880194	-0,1219806	-0,1219806	-0,6880194
9	-1,35	-0,61	-0,61	0,19	0,26	-1,3020248	-0,6579752	-0,6579752	-1,3020248	C4(199)	-0,74	-0,74	*	0,32202484	-2,2979593	*	0,32202484	-2,2979593	*	-1,3020248	-0,6579752	-0,6579752	-1,3020248
10	-1,5	-2,78	-2,78	0,2	0,5	-2,6785165	-1,6014835	-1,6014835	-2,6785165	C4(222)	1,28	1,28	*	0,53851648	2,37690033	*	0,53851648	2,37690033	*	-2,6785165	-1,6014835	-1,6014835	-2,6785165
	0,001	**0,001**	**-4,44523E-17**																				
corr	**0,9421869**	**0,887716154**		**R 2**																			

Ethnic Comparisons for the C 5 scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	1,78	2,23	2,2311111	0,11	0,23	1,7506046	2,2605065	2,2605065	1,7506046	C5(18)	-0,4511111	-0,45		0,254951	-1,7694034		0,254951	-1,7650452		1,750049	2,259951	2,259951	1,750049
2	-0,6	-0,54	-0,5388889	0,1	0,21	-0,8020385	-0,3368504	-0,3368504	-0,8020385	C5(50)	-0,0611111	-0,06		0,2325941	-0,2627372		0,2325941	-0,2579601		-0,8025941	-0,3374059	-0,3374059	-0,8025941
3	-0,8	-0,12	-0,1188889	0,11	0,2	-0,6876987	-0,2311902	-0,2311902	-0,6876987	C5(72)	-0,6811111	-0,68	*	0,2282542	-2,984002	*	0,2282542	-2,9791341	*	-0,6882542	-0,2317458	-0,2317458	-0,6882542
4	-1,44	-1,73	-1,7288889	0,13	0,29	-1,9022494	-1,2666395	-1,2666395	-1,9022494	C5(93)	0,2888889	0,29		0,317805	0,9090131		0,317805	0,9125093		-1,902805	-1,267195	-1,267195	-1,902805
5	0,37	0,15	0,1511111	0,09	0,19	0,0503176	0,4707935	0,4707935	0,0503176	C5(138)	0,2188889	0,22		0,210238	1,0411483		0,210238	1,0464333		0,049762	0,470238	0,470238	0,049762
6	-0,36	0	0,0011111	0,1	0,2	-0,4030512	0,0441624	0,0441624	-0,4030512	C5(160)	-0,3611111	-0,36		0,2236068	-1,614938		0,2236068	-1,6099689		-0,4036068	0,0436068	0,0436068	-0,4036068
7	-2,68	-3,29	-3,2888889	0,19	0,53	-3,547472	-2,4214169	-2,4214169	-3,547472	C5(186)	0,6088889	0,61	*	0,5630275	1,0814549		0,5630275	1,0834284		-3,5480275	-2,4219725	-2,4219725	-3,5480275
8	1,86	1,46	1,4611111	0,11	0,2	1,4323013	1,8888098	1,8888098	1,4323013	C5(206)	0,3988889	0,4		0,2282542	1,747564		0,2282542	1,7524318		1,4317458	1,8882542	1,8882542	1,4317458
9	1,86	1,84	1,8411111	0,11	0,21	1,6134902	2,0876209	2,0876209	1,6134902	C5(235)	0,0188889	0,02		0,2370654	0,079678		0,2370654	0,0843649		1,6129346	2,0870654	2,0870654	1,6129346
	-0,001111111	**0**	**-0,0011111**																				
corr	**0,971516203**	**0,943843733**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	1,78	2,15	2,1511111	0,11	0,2	1,7373013	2,1938098	2,1938098	1,7373013	C5(18)	-0,3711111	-0,37		0,2282542	-1,6258673		0,2282542	-1,6209994		1,7367458	2,1932542	2,1932542	1,7367458
2	-0,6	-0,44	-0,4388889	0,1	0,17	-0,7166753	-0,3222136	-0,3222136	-0,7166753	C5(50)	-0,1611111	-0,16		0,1972308	-0,8168658		0,1972308	-0,8112322		-0,7172308	-0,3227692	-0,3227692	-0,7172308
3	-0,8	-1,17	-1,1688889	0,11	0,19	-1,2039894	-0,7648995	-0,7648995	-1,2039894	C5(72)	0,3688889	0,37		0,219545	1,6802428		0,219545	1,6853038		-1,204545	-0,765455	-0,765455	-1,204545
4	-1,44	-1,41	-1,4088889	0,13	0,2	-1,6629817	-1,1859072	-1,1859072	-1,6629817	C5(93)	-0,0311111	-0,03		0,2385372	-0,1304246		0,2385372	-0,1257665		-1,6635372	-1,1864628	-1,1864628	-1,6635372
5	0,37	0,07	0,0711111	0,09	0,16	0,03698	0,4041312	0,4041312	0,03698	C5(138)	0,2988889	0,3		0,1835756	1,6281515		0,1835756	1,6342041		0,0364244	0,4035756	0,4035756	0,0364244
6	-0,36	-0,14	-0,1388889	0,1	0,16	-0,4381241	-0,0607648	-0,0607648	-0,4381241	C5(160)	-0,2211111	-0,22		0,1886796	-1,1718865		0,1886796	-1,1659977		-0,4386796	-0,0613204	-0,0613204	-0,4386796
7	-2,68	-2,76	-2,7588889	0,19	0,32	-3,0916003	-2,3472886	-2,3472886	-3,0916003	C5(186)	0,0788889	0,08		0,3721559	0,2119781		0,3721559	0,2149637		-3,0921559	-2,3478441	-2,3478441	-3,0921559
8	1,86	1,85	1,8511111	0,11	0,19	1,6360106	2,0751005	2,0751005	1,6360106	C5(206)	0,0088889	0,01		0,219545	0,0404878		0,219545	0,0455488		1,635455	2,074545	2,074545	1,635455
9	**1,86**	**1,85**	1,8511111	0,11	0,19	1,6360106	2,0751005	2,0751005	1,6360106	C5(235)	0,0088889	0,01		0,219545	0,0404878		0,219545	0,0455488		1,635455	2,074545	2,074545	1,635455
	-0,001111111	**0**	**-0,0011111**																				
corr	**0,990821848**	**0,981727934**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	1,78	1,84	1,8422222	0,11	0,17	1,6086265	2,0135957	2,0135957	1,6086265	C5(18)	-0,0622222	-0,06		0,2024846	-0,3072937		0,2024846	-0,2963189		1,6075154	2,0124846	2,0124846	1,6075154
2	**-0,6**	**-0,8**	-0,7977778	0,1	0,18	-0,9048015	-0,4929763	-0,4929763	-0,9048015	C5(50)	0,1977778	0,2		0,2059126	0,9604938		0,2059126	0,9712859		-0,9059126	-0,4940874	-0,4940874	-0,9059126
3	-0,8	-0,48	-0,4777778	0,11	0,17	-0,8413735	-0,4364043	-0,4364043	-0,8413735	C5(72)	-0,3222222	-0,32		0,2024846	-1,5913421		0,2024846	-1,5803674		-0,8424846	-0,4375154	-0,4375154	-0,8424846
4	-1,44	-0,94	-0,9377778	0,13	0,19	-1,4191062	-0,9586716	-0,9586716	-1,4191062	C5(93)	-0,5022222	-0,5		0,2302173	-2,1815139	*	0,2302173	-2,1718612	*	-1,4202173	-0,9597827	-0,9597827	-1,4202173
5	0,37	-0,22	-0,2177778	0,09	0,17	-0,1162427	0,268465	0,268465	-0,1162427	C5(138)	0,5877778	0,59	*	0,1923538	3,0557112	*	0,1923538	3,0672639	*	-0,1173538	0,2673538	0,2673538	-0,1173538
6	-0,36	0,07	0,0722222	0,1	0,16	-0,3325685	0,0447907	0,0447907	-0,3325685	C5(160)	-0,4322222	-0,43		0,1886796	-2,2907732	*	0,1886796	-2,2789954	*	-0,3336796	0,0436796	0,0436796	-0,3336796
7	-2,68	-3,35	-3,3477778	0,19	0,46	-3,5115836	-2,5161942	-2,5161942	-3,5115836	C5(186)	0,6677778	0,67	*	0,4976947	1,3417418		0,4976947	1,3462069		-3,5126947	-2,5173053	-2,5173053	-3,5126947
8	1,86	1,81	1,8122222	0,11	0,17	1,6336265	2,0385957	2,0385957	1,6336265	C5(206)	0,0477778	0,05		0,2024846	0,2359576		0,2024846	0,2469324		1,6325154	2,0374846	2,0374846	1,6325154
9	1,86	2,08	2,0822222	0,11	0,18	1,7601609	2,1820613	2,1820613	1,7601609	C5(235)	-0,2222222	-0,22		0,2109502	-1,0534344		0,2109502	-1,0429		1,7590498	2,1809502	2,1809502	1,7590498
	-0,001111111	**0,001111111**	**-0,0022222**																				
corr	**0,970819708**	**0,942490905**		**R 2**																			

Ethnic Comparisons for the ST 1 scale

Sotho	vs	Nguni											0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	1,33	2,11	2,110909091	0,1	0,26	1,4418868	1,9990223	1,9990223	1,4418868	ST1(8)	-0,7809091	-0,78	*	0,2785678	-2,8033003	*	0,2785678	-2,8000368	*	1,4414322	1,9985678	1,9985678	1,4414322
2	3,54	3,69	3,690909091	0,17	0,44	3,1437555	4,0871536	4,0871536	3,1437555	ST1(23)	-0,1509091	-0,15		0,4716991	-0,3199266		0,4716991	-0,3179994		3,1433009	4,0866991	4,0866991	3,1433009
3	0,03	0,47	0,470909091	0,1	0,2	0,0268477	0,4740613	0,4740613	0,0268477	ST1(45)	-0,4409091	-0,44		0,2236068	-1,9718054	*	0,2236068	-1,9677398	*	0,0263932	0,4736068	0,4736068	0,0263932
4	0,64	0,68	0,680909091	0,1	0,2	0,4368477	0,8840613	0,8840613	0,4368477	ST1(76)	-0,0409091	-0,04		0,2236068	-0,182951		0,2236068	-0,1788854		0,4363932	0,8836068	0,8836068	0,4363932
5	-1,82	-1,75	-1,749090909	0,13	0,24	-2,0574923	-1,5115986	-1,5115986	-2,0574923	ST1(96)	-0,0709091	-0,07		0,2729469	-0,2597908		0,2729469	-0,2564602		-2,0579469	-1,5120531	-1,5120531	-2,0579469
6	0,93	1,16	1,160909091	0,1	0,22	0,8037936	1,2871155	1,2871155	0,8037936	ST1(125)	-0,2309091	-0,23		0,2416609	-0,9555086		0,2416609	-0,9517468		0,8033391	1,2866609	1,2866609	0,8033391
7	0,88	0,64	0,640909091	0,1	0,2	0,5368477	0,9840613	0,9840613	0,5368477	ST1(152)	0,2390909	0,24		0,2236068	1,0692471		0,2236068	1,0733126		0,5363932	0,9836068	0,9836068	0,5363932
8	-3,57	-3,96	-3,959090909	0,25	0,48	-4,3057478	-3,2233431	-3,2233431	-4,3057478	ST1(173)	0,3890909	0,39		0,5412024	0,7189379		0,5412024	0,7206177		-4,3062024	-3,2237976	-3,2237976	-4,3062024
9	-1,66	-1,87	-1,869090909	0,13	0,25	-2,0463255	-1,4827654	-1,4827654	-2,0463255	ST1(195)	0,2090909	0,21		0,2817801	0,7420359		0,2817801	0,7452621		-2,0467801	-1,4832199	-1,4832199	-2,0467801
10	-1,68	-1,8	-1,799090909	0,13	0,24	-2,0124923	-1,4665986	-1,4665986	-2,0124923	ST1(215)	0,1190909	0,12		0,2729469	0,4363153		0,2729469	0,439646		-2,0129469	-1,4670531	-1,4670531	-2,0129469
11	1,38	0,64	0,640909091	0,1	0,2	0,7868477	1,2340613	1,2340613	0,7868477	ST1(228)	0,7390909	0,74	*	0,2236068	3,305315	*	0,2236068	3,3093806	*	0,7863932	1,2336068	1,2336068	0,7863932
	0	0,000909091	-0,000909091																				
corr	0,983101542	0,966488643		R 2																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	1,33	1,59	1,590909091	0,1	0,19	1,2457454	1,6751637	1,6751637	1,2457454	ST1(8)	-0,2609091	-0,26		0,2147091	-1,2151748		0,2147091	-1,2109407		1,2452909	1,6747091	1,6747091	1,2452909
2	3,54	3,53	3,530909091	0,17	0,34	3,155323	3,9155861	3,9155861	3,155323	ST1(23)	0,0090909	0,01		0,3801316	0,0239152		0,3801316	0,0263067		3,1548684	3,9151316	3,9151316	3,1548684
3	0,03	0,29	0,290909091	0,1	0,17	-0,0367763	0,3576854	0,3576854	-0,0367763	ST1(45)	-0,2609091	-0,26		0,1972308	-1,3228616		0,1972308	-1,3182523		-0,0372308	0,3572308	0,3572308	-0,0372308
4	0,64	0,89	0,890909091	0,1	0,17	0,5682237	0,9626854	0,9626854	0,5682237	ST1(76)	-0,2509091	-0,25		0,1972308	-1,2721596		0,1972308	-1,2675503		0,5677692	0,9622308	0,9622308	0,5677692
5	-1,82	-2,29	-2,289090909	0,13	0,24	-2,3274923	-1,7815986	-1,7815986	-2,3274923	ST1(96)	0,4690909	0,47		0,2729469	1,7186161		0,2729469	1,7219468		-2,3279469	-1,7820531	-1,7820531	-2,3279469
6	0,93	0,92	0,920909091	0,1	0,17	0,7282237	1,1226854	1,1226854	0,7282237	ST1(125)	0,0090909	0,01		0,1972308	0,0460927		0,1972308	0,050702		0,7277692	1,1222308	1,1222308	0,7277692
7	0,88	1,08	1,080909091	0,1	0,18	0,7745419	1,1863671	1,1863671	0,7745419	ST1(152)	-0,2009091	-0,2		0,2059126	-0,9757008		0,2059126	-0,9712859		0,7740874	1,1859126	1,1859126	0,7740874
8	-3,57	-3,84	-3,839090909	0,25	0,39	-4,1677948	-3,2412961	-3,2412961	-4,1677948	ST1(173)	0,2690909	0,27		0,4632494	0,580877		0,4632494	0,5828394		-4,1682494	-3,2417506	-3,2417506	-4,1682494
9	**-1,66**	**-1,84**	-1,839090909	0,13	0,21	-1,9965272	-1,5025637	-1,5025637	-1,9965272	ST1(195)	0,1790909	0,18		0,2469818	0,7251179		0,2469818	0,7287987		-1,9969818	-1,5030182	-1,5030182	-1,9969818
10	-1,68	-1,63	-1,629090909	0,13	0,2	-1,8930827	-1,4160082	-1,4160082	-1,8930827	ST1(215)	-0,0509091	-0,05		0,2385372	-0,213422		0,2385372	-0,2096109		-1,8935372	-1,4164628	-1,4164628	-1,8935372
11	1,38	1,31	1,310909091	0,1	0,18	1,1395419	1,5513671	1,5513671	1,1395419	ST1(228)	0,0690909	0,07		0,2059126	0,3355351		0,2059126	0,3399501		1,1390874	1,5509126	1,5509126	1,1390874
	0	0,000909091	-0,000909091																				
corr	0,995559456	0,991138631		R 2																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	1,33	1,04	1,038181818	0,1	0,17	0,9868601	1,3813217	1,3813217	0,9868601	ST1(8)	0,2918182	0,29		0,1972308	1,4795769		0,1972308	1,4703584		0,9877692	1,3822308	1,3822308	0,9877692
2	**3,54**	**3**	2,998181818	0,17	0,25	2,9667666	3,5714152	3,5714152	2,9667666	ST1(23)	0,5418182	0,54	*	0,3023243	1,7921753		0,3023243	1,7861612		2,9676757	3,5723243	3,5723243	2,9676757
3	0,03	0,19	0,188181818	0,1	0,16	-0,0795887	0,2977705	0,2977705	-0,0795887	ST1(45)	-0,1581818	-0,16		0,1886796	-0,838362		0,1886796	-0,8479983		-0,0786796	0,2986796	0,2986796	-0,0786796
4	0,64	0,47	0,468181818	0,1	0,16	0,3654113	0,7427705	0,7427705	0,3654113	ST1(76)	0,1718182	0,17		0,1886796	0,9106345		0,1886796	0,9009982		0,3663204	0,7436796	0,7436796	0,3663204
5	-1,82	-1,55	-1,551818182	0,13	0,2	-1,9244463	-1,4473719	-1,4473719	-1,9244463	ST1(96)	-0,2681818	-0,27		0,2385372	-1,1242767		0,2385372	-1,1318989		-1,9235372	-1,4464628	-1,4464628	-1,9235372
6	0,93	0,75	0,748181818	0,1	0,16	0,6504113	1,0277705	1,0277705	0,6504113	ST1(125)	0,1818182	0,18		0,1886796	0,9636344		0,1886796	0,9539981		0,6513204	1,0286796	1,0286796	0,6513204
7	0,88	0,75	0,748181818	0,1	0,16	0,6254113	1,0027705	1,0027705	0,6254113	ST1(152)	0,1318182	0,13		0,1886796	0,698635		0,1886796	0,6889986		0,6263204	1,0036796	1,0036796	0,6263204
8	-3,57	-3,18	-3,181818182	0,25	0,33	-3,7899139	-2,9619043	-2,9619043	-3,7899139	ST1(173)	-0,3881818	-0,39		0,4140048	-0,9376263		0,4140048	-0,942018		-3,7890048	-2,9609952	-2,9609952	-3,7890048
9	-1,66	-1,23	-1,231818182	0,13	0,18	-1,6679451	-1,2238731	-1,2238731	-1,6679451	ST1(195)	-0,4281818	-0,43		0,222036	-1,9284339		0,222036	-1,9366226		-1,667036	-1,222964	-1,222964	-1,667036
10	-1,68	-1,89	-1,891818182	0,13	0,21	-2,0328909	-1,5389273	-1,5389273	-2,0328909	ST1(215)	0,2118182	0,21		0,2469818	0,8576267		0,2469818	0,8502651		-2,0319818	-1,5380182	-1,5380182	-2,0319818
11	1,38	1,63	1,628181818	0,1	0,18	1,2981783	1,7100035	1,7100035	1,2981783	ST1(228)	-0,2481818	-0,25		0,2059126	-1,2052775		0,2059126	-1,2141073		1,2990874	1,7109126	1,7109126	1,2990874
	0	-0,001818182	0,001818182																				
corr	0,992572368	0,985199906		R 2																			

Ethnic Comparisons for the ST 2 scale

Sotho	vs	Nguni																					
													0,5										
											new												
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-0,36	-0,45	-0,4511111	0,14	0,31	-0,7457026	-0,0654085	-0,0654085	-0,7457026	ST2(15)	0,0911111	0,09		0,340147	0,267858		0,340147	0,2645915		-0,745147	-0,064853	-0,064853	-0,745147
2	0,74	0,76	0,7588889	0,11	0,24	0,4854369	1,013452	1,013452	0,4854369	ST2(31)	-0,0188889	-0,02		0,2640076	-0,0715468		0,2640076	-0,0757554		0,4859924	1,0140076	1,0140076	0,4859924
3	-0,91	-1,15	-1,1511111	0,16	0,38	-1,4428661	-0,618245	-0,618245	-1,4428661	ST2(51)	0,2411111	0,24		0,4123106	0,5847803		0,4123106	0,5820855		-1,4423106	-0,6176894	-0,6176894	-1,4423106
4	-1,07	-1,01	-1,0111111	0,17	0,37	-1,447741	-0,6333701	-0,6333701	-1,447741	ST2(84)	-0,0588889	-0,06		0,4071855	-0,1446242		0,4071855	-0,147353		-1,4471855	-0,6328145	-0,6328145	-1,4471855
5	0,34	0,33	0,3288889	0,12	0,26	0,048088	0,6208009	0,6208009	0,048088	ST2(95)	0,0111111	0,01		0,2863564	0,0388017		0,2863564	0,0349215		0,0486436	0,6213564	0,6213564	0,0486436
6	0,47	0,33	0,3288889	0,11	0,26	0,1171326	0,6817563	0,6817563	0,1171326	ST2(132)	0,1411111	0,14		0,2823119	0,4998412		0,2823119	0,4959054		0,1176881	0,6823119	0,6823119	0,1176881
7	-0,12	-0,36	-0,3611111	0,13	0,3	-0,5675112	0,0864001	0,0864001	-0,5675112	ST2(163)	0,2411111	0,24		0,3269557	0,7374429		0,3269557	0,7340445		-0,5669557	0,0869557	0,0869557	-0,5669557
8	0,81	1,73	1,7288889	0,11	0,23	1,0144935	1,5243954	1,5243954	1,0144935	ST2(200)	-0,9188889	-0,92	*	0,254951	-3,6041788	*	0,254951	-3,6085369	*	1,015049	1,524951	1,524951	1,015049
9	0,11	-0,18	-0,1811111	0,12	0,29	-0,3494027	0,2782915	0,2782915	-0,3494027	ST2(232)	0,2911111	0,29		0,3138471	0,9275571		0,3138471	0,9240168		-0,3488471	0,2788471	0,2788471	-0,3488471
	0,001111111	**0**	**0,0011111**																				
corr	**0,930692443**	**0,866188423**		**R 2**																			

Sotho	vs	Tsonga																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-0,36	-0,81	-0,8122222	0,14	0,27	-0,8902492	-0,281973	-0,281973	-0,8902492	ST2(15)	0,4522222	0,45		0,3041381	1,4868975		0,3041381	1,4795909		-0,8891381	-0,2808619	-0,2808619	-0,8891381
2	0,74	1,09	1,0877778	0,11	0,18	0,7029387	1,1248391	1,1248391	0,7029387	ST2(31)	-0,3477778	-0,35		0,2109502	-1,6486248		0,2109502	-1,6591591		0,7040498	1,1259502	1,1259502	0,7040498
3	-0,91	-0,74	-0,7422222	0,16	0,26	-1,1313979	-0,5208244	-0,5208244	-1,1313979	ST2(51)	-0,1677778	-0,17		0,3052868	-0,5495744		0,3052868	-0,5568535		-1,1302868	-0,5197132	-0,5197132	-1,1302868
4	-1,07	-1,56	-1,5622222	0,17	0,35	-1,7052126	-0,9270096	-0,9270096	-1,7052126	ST2(84)	0,4922222	0,49		0,3891015	1,2650226		0,3891015	1,2593114		-1,7041015	-0,9258985	-0,9258985	-1,7041015
5	0,34	0,49	0,4877778	0,12	0,2	0,1806508	0,647127	0,647127	0,1806508	ST2(95)	-0,1477778	-0,15		0,2332381	-0,633592		0,2332381	-0,6431197		0,1817619	0,6482381	0,6482381	0,1817619
6	0,47	0,3	0,2977778	0,11	0,2	0,1556346	0,6121431	0,6121431	0,1556346	ST2(132)	0,1722222	0,17		0,2282542	0,7545193		0,2282542	0,7447835		0,1567458	0,6132542	0,6132542	0,1567458
7	-0,12	0,08	0,0777778	0,13	0,21	-0,2680929	0,2258707	0,2258707	-0,2680929	ST2(163)	-0,1977778	-0,2		0,2469818	-0,8007788		0,2469818	-0,8097763		-0,2669818	0,2269818	0,2269818	-0,2669818
8	0,81	1,29	1,2877778	0,11	0,18	0,8379387	1,2598391	1,2598391	0,8379387	ST2(200)	-0,4777778	-0,48		0,2109502	-2,2648839	*	0,2109502	-2,2754182	*	0,8390498	1,2609502	1,2609502	0,8390498
9	**0,11**	**-0,15**	-0,1522222	0,12	0,22	-0,2717104	0,2294882	0,2294882	-0,2717104	ST2(232)	0,2622222	0,26		0,2505993	1,0463806		0,2505993	1,0375129		-0,2705993	0,2305993	0,2305993	-0,2705993
	0,001111111	**-0,001111111**	**0,0022222**																				
corr	**0,950990227**	**0,904382412**		**R 2**																			

Sotho	vs	Venda																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-0,36	-0,3	-0,3022222	0,14	0,21	-0,5834997	-0,0787225	-0,0787225	-0,5834997	ST2(15)	-0,0577778	-0,06		0,2523886	-0,2289239		0,2523886	-0,2377287		-0,5823886	-0,0776114	-0,0776114	-0,5823886
2	**0,74**	**0,96**	0,9577778	0,11	0,18	0,6379387	1,0598391	1,0598391	0,6379387	ST2(31)	-0,2177778	-0,22		0,2109502	-1,0323657		0,2109502	-1,0429		0,6390498	1,0609502	1,0609502	0,6390498
3	-0,91	-0,95	-0,9522222	0,16	0,24	-1,2195552	-0,642667	-0,642667	-1,2195552	ST2(51)	0,0422222	0,04		0,2884441	0,1463792		0,2884441	0,138675		-1,2184441	-0,6415559	-0,6415559	-1,2184441
4	-1,07	-1,34	-1,3422222	0,17	0,27	-1,5251722	-0,88705	-0,88705	-1,5251722	ST2(84)	0,2722222	0,27		0,3190611	0,8531977		0,3190611	0,8462328		-1,5240611	-0,8859389	-0,8859389	-1,5240611
5	0,34	0,24	0,2377778	0,12	0,19	0,0641668	0,5136109	0,5136109	0,0641668	ST2(95)	0,1022222	0,1		0,2247221	0,4548829		0,2247221	0,4449942		0,0652779	0,5147221	0,5147221	0,0652779
6	0,47	0,31	0,3077778	0,11	0,19	0,1693439	0,6084339	0,6084339	0,1693439	ST2(132)	0,1622222	0,16		0,219545	0,738902		0,219545	0,72878		0,170455	0,609545	0,609545	0,170455
7	-0,12	0,17	0,1677778	0,13	0,19	-0,2063284	0,2541062	0,2541062	-0,2063284	ST2(163)	-0,2877778	-0,29		0,2302173	-1,2500268		0,2302173	-1,2596795		-0,2052173	0,2552173	0,2552173	-0,2052173
8	0,81	0,77	0,7677778	0,11	0,18	0,5779387	0,9998391	0,9998391	0,5779387	ST2(200)	0,0422222	0,04		0,2109502	0,2001525		0,2109502	0,1896182		0,5790498	1,0009502	1,0009502	0,5790498
9	0,11	0,13	0,1277778	0,12	0,19	-0,1058332	0,3436109	0,3436109	-0,1058332	ST2(232)	-0,0177778	-0,02		0,2247221	-0,0791101		0,2247221	-0,0889988		-0,1047221	0,3447221	0,3447221	-0,1047221
	0,001111111	**-0,001111111**	**0,0022222**																				
corr	**0,974706485**	**0,950052731**		**R 2**																			

Ethnic Comparisons for the ST 3 scale

Sotho	vs	Nguni									new		0,5										
;ENTRY	Sotho measure	Ngu measure	Ngu Adj	SOTH err	Ngu err	d-2*esoth	d+2*engu	d+2*esoth	d-2*engu											D-2*EE_SOTH	D+2*EE_NGU	D+2*EE_SOTH	D-2*EE_NGU
1	-0,91	-0,85	-0,8515385	0,13	0,24	-1,1537161	-0,6078223	-0,6078223	-1,1537161	ST3(6)	-0,0584615	-0,06		0,2729469	-0,2141865		0,2729469	-0,219823		-1,1529469	-0,6070531	-0,6070531	-1,1529469
2	0,92	1,11	1,1084615	0,09	0,19	0,8039928	1,2244687	1,2244687	0,8039928	ST3(38)	-0,1884615	-0,19		0,210238	-0,8964201		0,210238	-0,9037378		0,804762	1,225238	1,225238	0,804762
3	0,15	-0,33	-0,3315385	0,1	0,21	-0,3233633	0,1418248	0,1418248	-0,3233633	ST3(56)	0,4815385	0,48		0,2325941	2,0702955	*	0,2325941	2,0636812	*	-0,3225941	0,1425941	0,1425941	-0,3225941
4	-0,22	0,17	0,1684615	0,11	0,2	-0,2540235	0,202485	0,202485	-0,2540235	ST3(77)	-0,3884615	-0,39		0,2282542	-1,7018809		0,2282542	-1,708621		-0,2532542	0,2032542	0,2032542	-0,2532542
5	-3,01	-2,89	-2,8915385	0,28	0,52	-3,5413622	-2,3601763	-2,3601763	-3,5413622	ST3(88)	-0,1184615	-0,12		0,5905929	-0,2005807		0,5905929	-0,2031856		-3,5405929	-2,3594071	-2,3594071	-3,5405929
6	0,29	0,76	0,7584615	0,1	0,19	0,3095217	0,7389399	0,7389399	0,3095217	ST3(97)	-0,4684615	-0,47		0,2147091	-2,1818429	*	0,2147091	-2,1890082	*	0,3102909	0,7397091	0,7397091	0,3102909
7	0,17	0,02	0,0184615	0,1	0,2	-0,129376	0,3178376	0,3178376	-0,129376	ST3(116)	0,1515385	0,15		0,2236068	0,6777006		0,2236068	0,6708204		-0,1286068	0,3186068	0,3186068	-0,1286068
8	1,11	1,18	1,1784615	0,09	0,19	0,9339928	1,3544687	1,3544687	0,9339928	ST3(123)	-0,0684615	-0,07		0,210238	-0,3256383		0,210238	-0,332956		0,934762	1,355238	1,355238	0,934762
9	1,44	1,29	1,2884615	0,09	0,19	1,1539928	1,5744687	1,5744687	1,1539928	ST3(145)	0,1515385	0,15		0,210238	0,720795		0,210238	0,7134772		1,154762	1,575238	1,575238	1,154762
10	-0,76	-1,17	-1,1715385	0,12	0,27	-1,261235	-0,6703035	-0,6703035	-1,261235	ST3(175)	0,4115385	0,41		0,2954657	1,3928467		0,2954657	1,3876398		-1,2604657	-0,6695343	-0,6695343	-1,2604657
11	-0,63	-0,52	-0,5215385	0,12	0,22	-0,8263685	-0,3251699	-0,3251699	-0,8263685	ST3(194)	-0,1084615	-0,11		0,2505993	-0,4328087		0,2505993	-0,4389478		-0,8255993	-0,3244007	-0,3244007	-0,8255993
12	-0,28	-0,68	-0,6815385	0,11	0,23	-0,7357202	-0,2258183	-0,2258183	-0,7357202	ST3(208)	0,4015385	0,4		0,254951	1,5749634		0,254951	1,5689291		-0,734951	-0,225049	-0,225049	-0,734951
13	1,73	1,89	1,8884615	0,1	0,2	1,585624	2,0328376	2,0328376	1,585624	ST3(220)	-0,1584615	-0,16		0,2236068	-0,7086615		0,2236068	-0,7155418		1,5863932	2,0336068	2,0336068	1,5863932
	0	**-0,001538462**	**0,0015385**																				
corr	**0,972515377**	**0,945786159**		**R 2**																			
Sotho	**vs**	**Tsonga**																					
;ENTRY	Sotho measure	Tso measure	Tso Adj	SOTH err	Tso err	d-2*esoth	d+2*etso	d+2*esoth	d-2*etso											D-2*EE_SOTH	D+2*EE_TSO	D+2*EE_SOTH	D-2*EE_TSO
1	-0,91	-1,13	-1,13	0,13	0,22	-1,2755386	-0,7644614	-0,7644614	-1,2755386	ST3(6)	0,22	0,22		0,2555386	0,8609265		0,2555386	0,8609265		-1,2755386	-0,7644614	-0,7644614	-1,2755386
2	0,92	1,43	1,43	0,09	0,16	0,9914244	1,3585756	1,3585756	0,9914244	ST3(38)	-0,51	-0,51	*	0,1835756	-2,778147	*	0,1835756	-2,778147	*	0,9914244	1,3585756	1,3585756	0,9914244
3	0,15	0,44	0,44	0,1	0,16	0,1063204	0,4836796	0,4836796	0,1063204	ST3(56)	-0,29	-0,29		0,1886796	-1,5369969		0,1886796	-1,5369969		0,1063204	0,4836796	0,4836796	0,1063204
4	-0,22	-0,32	-0,32	0,11	0,18	-0,4809502	-0,0590498	-0,0590498	-0,4809502	ST3(77)	0,1	0,1		0,2109502	0,4740455		0,2109502	0,4740455		-0,4809502	-0,0590498	-0,0590498	-0,4809502
5	-3,01	-2,81	-2,81	0,28	0,42	-3,4147772	-2,4052228	-2,4052228	-3,4147772	ST3(88)	-0,2	-0,2		0,5047772	-0,3962144		0,5047772	-0,3962144		-3,4147772	-2,4052228	-2,4052228	-3,4147772
6	0,29	0,66	0,66	0,1	0,16	0,2863204	0,6636796	0,6636796	0,2863204	ST3(97)	-0,37	-0,37		0,1886796	-1,9609961	*	0,1886796	-1,9609961	*	0,2863204	0,6636796	0,6636796	0,2863204
7	0,17	0,34	0,34	0,1	0,16	0,0663204	0,4436796	0,4436796	0,0663204	ST3(116)	-0,17	-0,17		0,1886796	-0,9009982		0,1886796	-0,9009982		0,0663204	0,4436796	0,4436796	0,0663204
8	1,11	0,71	0,71	0,09	0,16	0,7264244	1,0935756	1,0935756	0,7264244	ST3(123)	0,4	0,4		0,1835756	2,1789388	*	0,1835756	2,1789388	*	0,7264244	1,0935756	1,0935756	0,7264244
9	**1,44**	**0,96**	0,96	0,09	0,16	1,0164244	1,3835756	1,3835756	1,0164244	ST3(145)	0,48	0,48		0,1835756	2,6147266	*	0,1835756	2,6147266	*	1,0164244	1,3835756	1,3835756	1,0164244
10	-0,76	-1,29	-1,29	0,12	0,23	-1,2844224	-0,7655776	-0,7655776	-1,2844224	ST3(175)	0,53	0,53	*	0,2594224	2,0429999	*	0,2594224	2,0429999	*	-1,2844224	-0,7655776	-0,7655776	-1,2844224
11	-0,63	-0,59	-0,59	0,12	0,19	-0,8347221	-0,3852779	-0,3852779	-0,8347221	ST3(194)	-0,04	-0,04		0,2247221	-0,1779977		0,2247221	-0,1779977		-0,8347221	-0,3852779	-0,3852779	-0,8347221
12	-0,28	0,04	0,04	0,11	0,17	-0,3224846	0,0824846	0,0824846	-0,3224846	ST3(208)	-0,32	-0,32		0,2024846	-1,5803674		0,2024846	-1,5803674		-0,3224846	0,0824846	0,0824846	-0,3224846
13	1,73	1,56	1,56	0,1	0,16	1,4563204	1,8336796	1,8336796	1,4563204	ST3(220)	0,17	0,17		0,1886796	0,9009982		0,1886796	0,9009982		1,4563204	1,8336796	1,8336796	1,4563204
	0	**0**	**0**																				
corr	**0,961027089**	**0,923573065**		**R 2**																			
Sotho	**vs**	**Venda**																					
;ENTRY	Sotho measure	Ven measure	Ven Adj	SOTH err	Ven err	d-2*esoth	d+2*even	d+2*esoth	d-2*even											D-2*EE_SOTH	D+2*EE_VEN	D+2*EE_SOTH	D-2*EE_VEN
1	-0,91	-0,37	-0,3692308	0,13	0,17	-0,8536247	-0,425606	-0,425606	-0,8536247	ST3(6)	-0,5407692	-0,54	*	0,2140093	-2,5268487	*	0,2140093	-2,5232543	*	-0,8540093	-0,4259907	-0,4259907	-0,8540093
2	**0,92**	**0,98**	0,9807692	0,09	0,15	0,7754561	1,1253132	1,1253132	0,7754561	ST3(38)	-0,0607692	-0,06		0,1749286	-0,3473946		0,1749286	-0,3429972		0,7750714	1,1249286	1,1249286	0,7750714
3	0,15	-0,07	-0,0692308	0,1	0,16	-0,148295	0,2290642	0,2290642	-0,148295	ST3(56)	0,2192308	0,22		0,1886796	1,1619208		0,1886796	1,1659977		-0,1486796	0,2286796	0,2286796	-0,1486796
4	-0,22	-0,65	-0,6492308	0,11	0,18	-0,6455656	-0,2236652	-0,2236652	-0,6455656	ST3(77)	0,4292308	0,43		0,2109502	2,034749	*	0,2109502	2,0383955	*	-0,6459502	-0,2240498	-0,2240498	-0,6459502
5	-3,01	-2,22	-2,2192308	0,28	0,3	-3,0249811	-2,2042497	-2,2042497	-3,0249811	ST3(88)	-0,7907692	-0,79	*	0,4103657	-1,9269867		0,4103657	-1,9251122		-3,0253657	-2,2046343	-2,2046343	-3,0253657
6	0,29	0,36	0,3607692	0,1	0,15	0,1451071	0,5056622	0,5056622	0,1451071	ST3(97)	-0,0707692	-0,07		0,1802776	-0,3925571		0,1802776	-0,3882901		0,1447224	0,5052776	0,5052776	0,1447224
7	0,17	0,36	0,3607692	0,1	0,15	0,0851071	0,4456622	0,4456622	0,0851071	ST3(116)	-0,1907692	-0,19		0,1802776	-1,0581973		0,1802776	-1,0539304		0,0847224	0,4452776	0,4452776	0,0847224
8	1,11	1,1	1,1007692	0,09	0,15	0,9304561	1,2803132	1,2803132	0,9304561	ST3(123)	0,0092308	0,01		0,1749286	0,0527688		0,1749286	0,0571662		0,9300714	1,2799286	1,2799286	0,9300714
9	1,44	0,96	0,9607692	0,09	0,15	1,0254561	1,3753132	1,3753132	1,0254561	ST3(145)	0,4792308	0,48		0,1749286	2,73958	*	0,1749286	2,7439774	*	1,0250714	1,3749286	1,3749286	1,0250714
10	-0,76	-0,75	-0,7492308	0,12	0,18	-0,9709485	-0,5382823	-0,5382823	-0,9709485	ST3(175)	-0,0107692	-0,01		0,2163331	-0,0497808		0,2163331	-0,046225		-0,9713331	-0,5386669	-0,5386669	-0,9713331
11	-0,63	-0,52	-0,5192308	0,12	0,18	-0,7909485	-0,3582823	-0,3582823	-0,7909485	ST3(194)	-0,1107692	-0,11		0,2163331	-0,512031		0,2163331	-0,5084752		-0,7913331	-0,3586669	-0,3586669	-0,7913331
12	-0,28	-0,34	-0,3392308	0,11	0,17	-0,5121	-0,1071308	-0,1071308	-0,5121	ST3(208)	0,0592308	0,06		0,2024846	0,2925199		0,2024846	0,2963189		-0,5124846	-0,1075154	-0,1075154	-0,5124846
13	1,73	1,17	1,1707692	0,1	0,15	1,2701071	1,6306622	1,6306622	1,2701071	ST3(220)	0,5592308	0,56	*	0,1802776	3,1020542	*	0,1802776	3,1063211	*	1,2697224	1,6302776	1,6302776	1,2697224
	0	**0,000769231**	**-0,0007692**																				
corr	**0,969114421**	**0,939182762**		**R 2**																			

Appendix B: Invariance Analysis Sheets: Gender comparisons

Gender Comparisons for the primary NS scale

		Female									new		0,5										
;ENTRY	Male mea	Fem meas	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emale	d-2*efem											D-2*EE_mal	D+2*EE_fem	D+2*EE_Mal	D-2*EE_Fem
1	-1,86	-1,78	-1,7805	0,09	0,11	-1,9623767	-1,6781233	-1,6781233	-1,9623767	NS 1 (1)	-0,0795	-0,08		0,1421267	-0,55936		0,1421267	-0,562878		-1,9621267	-1,6778733	-1,6778733	-1,9621267
2	-1,41	-1,32	-1,3205	0,09	0,1	-1,4997862	-1,2307138	-1,2307138	-1,4997862	NS 1 (29)	-0,0895	-0,09		0,1345362	-0,6652483		0,1345362	-0,6689647		-1,4995362	-1,2304638	-1,2304638	-1,4995362
3	0,41	0,97	0,9695	0,09	0,12	0,53975	0,83975	0,83975	0,53975	NS 1 (52)	-0,5595	-0,56	*	0,15	-3,73	*	0,15	-3,7333333	*	0,54	0,84	0,84	0,54
4	-2,34	-2,08	-2,0805	0,11	0,11	-2,3658135	-2,0546865	-2,0546865	-2,3658135	NS 1 (70)	-0,2595	-0,26		0,1555635	-1,6681292		0,1555635	-1,6713433		-2,3655635	-2,0544365	-2,0544365	-2,3655635
5	0,64	0,47	0,4695	0,1	0,11	0,4060893	0,7034107	0,7034107	0,4060893	NS 1 (99)	0,1705	0,17		0,1486607	1,1469071		0,1486607	1,1435437		0,4063393	0,7036607	0,7036607	0,4063393
6	0,32	0,54	0,5395	0,09	0,11	0,2876233	0,5718767	0,5718767	0,2876233	NS 1 (114)	-0,2195	-0,22		0,1421267	-1,5443966		0,1421267	-1,5479146		0,2878733	0,5721267	0,5721267	0,2878733
7	-2,23	-1,98	-1,9805	0,1	0,11	-2,2539107	-1,9565893	-1,9565893	-2,2539107	NS 1 (144)	-0,2495	-0,25		0,1486607	-1,6783186		0,1486607	-1,681682		-2,2536607	-1,9563393	-1,9563393	-2,2536607
8	-1,43	-1,31	-1,3105	0,09	0,1	-1,5047862	-1,2357138	-1,2357138	-1,5047862	NS 1 (167)	-0,1195	-0,12		0,1345362	-0,8882365		0,1345362	-0,891953		-1,5045362	-1,2354638	-1,2354638	-1,5045362
9	-3,3	-3,23	-3,2305	0,15	0,17	-3,4919657	-3,0385343	-3,0385343	-3,4919657	NS 1 (191)	-0,0695	-0,07		0,2267157	-0,3065514		0,2267157	-0,3087568		-3,4917157	-3,0382843	-3,0382843	-3,4917157
10	-1,93	-2,31	-2,3105	0,1	0,12	-2,276455	-1,964045	-1,964045	-2,276455	NS 1 (211)	0,3805	0,38		0,156205	2,4359016	*	0,156205	2,4327007	*	-2,276205	-1,963795	-1,963795	-2,276205
11	-2,84	-2,82	-2,8205	0,13	0,15	-3,0287443	-2,6317557	-2,6317557	-3,0287443	NS 1 (238)	-0,0195	-0,02		0,1984943	-0,0982396		0,1984943	-0,1007585		-3,0284943	-2,6315057	-2,6315057	-3,0284943
12	-0,25	-0,24	-0,2405	0,08	0,09	-0,3656659	-0,1248341	-0,1248341	-0,3656659	NS 2 (13)	-0,0095	-0,01		0,1204159	-0,0788932		0,1204159	-0,0830455		-0,3654159	-0,1245841	-0,1245841	-0,3654159
13	-0,23	-0,39	-0,3905	0,08	0,09	-0,4306659	-0,1898341	-0,1898341	-0,4306659	NS 2 (35)	0,1605	0,16		0,1204159	1,33288		0,1204159	1,3287277		-0,4304159	-0,1895841	-0,1895841	-0,4304159
14	0,77	1	0,9995	0,1	0,12	0,728545	1,040955	1,040955	0,728545	NS 2 (61)	-0,2295	-0,23		0,156205	-1,4692232		0,156205	-1,4724241		0,728795	1,041205	1,041205	0,728795
15	3,42	3,05	3,0495	0,29	0,27	2,8385177	3,6309823	3,6309823	2,8385177	NS 2 (82)	0,3705	0,37		0,3962323	0,9350576		0,3962323	0,9337958		2,8387677	3,6312323	3,6312323	2,8387677
16	-0,42	-0,46	-0,4605	0,08	0,09	-0,5606659	-0,3198341	-0,3198341	-0,5606659	NS 2 (108)	0,0405	0,04		0,1204159	0,3363342		0,1204159	0,3321819		-0,5604159	-0,3195841	-0,3195841	-0,5604159
17	**0,43**	**0,34**	0,3395	0,09	0,1	0,2502138	0,5192862	0,5192862	0,2502138	NS 2 (130)	0,0905	0,09		0,1345362	0,6726812		0,1345362	0,6689647		0,2504638	0,5195362	0,5195362	0,2504638
18	**2,43**	**1,98**	1,9795	0,19	0,17	1,949799	2,459701	2,459701	1,949799	NS 2 (148)	0,4505	0,45		0,254951	1,7670064		0,254951	1,7650452		1,950049	2,459951	2,459951	1,950049
19	-1,5	-1,4	-1,4005	0,09	0,1	-1,5847862	-1,3157138	-1,3157138	-1,5847862	NS 2 (187)	-0,0995	-0,1		0,1345362	-0,7395777		0,1345362	-0,7432941		-1,5845362	-1,3154638	-1,3154638	-1,5845362
20	1,35	1,58	1,5795	0,12	0,15	1,2726563	1,6568437	1,6568437	1,2726563	NS 2 (203)	-0,2295	-0,23		0,1920937	-1,1947293		0,1920937	-1,1973322		1,2729063	1,6570937	1,6570937	1,2729063
21	2,89	2,91	2,9095	0,23	0,26	2,5526189	3,2468811	3,2468811	2,5526189	NS 2 (237)	-0,0195	-0,02		0,3471311	-0,0561747		0,3471311	-0,0576151		2,5528689	3,2471311	3,2471311	2,5528689
22	0,96	0,59	0,5895	0,11	0,11	0,6191865	0,9303135	0,9303135	0,6191865	NS 3 (19)	0,3705	0,37		0,1555635	2,3816642	*	0,1555635	2,3784501	*	0,6194365	0,9305635	0,9305635	0,6194365
23	1,98	1,84	1,8395	0,15	0,16	1,6904329	2,1290671	2,1290671	1,6904329	NS 3 (41)	0,1405	0,14		0,2193171	0,6406249		0,2193171	0,6383451		1,6906829	2,1293171	2,1293171	1,6906829
24	-1,15	-1,31	-1,3105	0,08	0,1	-1,3583125	-1,1021875	-1,1021875	-1,3583125	NS 3 (66)	0,1605	0,16		0,1280625	1,2532944		0,1280625	1,2493901		-1,3580625	-1,1019375	-1,1019375	-1,3580625
25	1,35	1,44	1,4395	0,12	0,14	1,2103591	1,5791409	1,5791409	1,2103591	NS 3 (109)	-0,0895	-0,09		0,1843909	-0,4853819		0,1843909	-0,4880935		1,2106091	1,5793909	1,5793909	1,2106091
26	0,39	0,46	0,4595	0,09	0,11	0,2826233	0,5668767	0,5668767	0,2826233	NS 3 (139)	-0,0695	-0,07		0,1421267	-0,4890003		0,1421267	-0,4925183		0,2828733	0,5671267	0,5671267	0,2828733
27	1,64	1,74	1,7395	0,13	0,16	1,4835947	1,8959053	1,8959053	1,4835947	NS 3 (155)	-0,0995	-0,1		0,2061553	-0,4826459		0,2061553	-0,4850713		1,4838447	1,8961553	1,8961553	1,4838447
28	-1,28	-1,37	-1,3705	0,08	0,1	-1,4533125	-1,1971875	-1,1971875	-1,4533125	NS 3 (174)	0,0905	0,09		0,1280625	0,7066863		0,1280625	0,7027819		-1,4530625	-1,1969375	-1,1969375	-1,4530625
29	0,96	0,97	0,9695	0,11	0,12	0,8019618	1,1275382	1,1275382	0,8019618	NS 3 (192)	-0,0095	-0,01		0,1627882	-0,058358		0,1627882	-0,0614295		0,8022118	1,1277882	1,1277882	0,8022118
30	0	-0,31	-0,3105	0,08	0,09	-0,2756659	-0,0348341	-0,0348341	-0,2756659	NS 3 (219)	0,3105	0,31		0,1204159	2,5785621	*	0,1204159	2,5744099	*	-0,2754159	-0,0345841	-0,0345841	-0,2754159
31	1,13	0,42	0,4195	0,11	0,1	0,6260893	0,9234107	0,9234107	0,6260893	NS 4 (34)	0,7105	0,71	*	0,1486607	4,7793402	*	0,1486607	4,7759768	*	0,6263393	0,9236607	0,9236607	0,6263393
32	1,42	1,44	1,4395	0,12	0,14	1,2453591	1,6141409	1,6141409	1,2453591	NS 4 (53)	-0,0195	-0,02		0,1843909	-0,1057536		0,1843909	-0,1084652		1,2456091	1,6143909	1,6143909	1,2456091
33	0,44	0,07	0,0695	0,09	0,1	0,1202138	0,3892862	0,3892862	0,1202138	NS 4 (79)	0,3705	0,37		0,1345362	2,7539048	*	0,1345362	2,7501883	*	0,1204638	0,3895362	0,3895362	0,1204638
34	0,27	0,79	0,7895	0,09	0,11	0,3876233	0,6718767	0,6718767	0,3876233	NS 4 (91)	-0,5195	-0,52	*	0,1421267	-3,6551892	*	0,1421267	-3,6587072	*	0,3878733	0,6721267	0,6721267	0,3878733
35	-1,49	-1,42	-1,4205	0,09	0,1	-1,5897862	-1,3207138	-1,3207138	-1,5897862	NS 4 (110)	-0,0695	-0,07		0,1345362	-0,5165894		0,1345362	-0,5203059		-1,5895362	-1,3204638	-1,3204638	-1,5895362
36	1,41	1,44	1,4395	0,12	0,14	1,2403591	1,6091409	1,6091409	1,2403591	NS 4 (141)	-0,0295	-0,03		0,1843909	-0,1599862		0,1843909	-0,1626978		1,2406091	1,6093909	1,6093909	1,2406091
37	-0,01	0,25	0,2495	0,08	0,1	-0,0083125	0,2478125	0,2478125	-0,0083125	NS 4 (165)	-0,2595	-0,26		0,1280625	-2,0263546	*	0,1280625	-2,0302589	*	-0,0080625	0,2480625	0,2480625	-0,0080625
38	1,32	1,32	1,3195	0,12	0,13	1,1428319	1,4966681	1,4966681	1,1428319	NS 4 (183)	0,0005	0		0,1769181	0,0028262		0,1769181	0		1,1430819	1,4969181	1,4969181	1,1430819
39	-1,62	-1,19	-1,1905	0,09	0,1	-1,5397862	-1,2707138	-1,2707138	-1,5397862	NS 4 (204)	-0,4295	-0,43		0,1345362	-3,1924484	*	0,1345362	-3,1961648	*	-1,5395362	-1,2704638	-1,2704638	-1,5395362
40	-0,61	-0,68	-0,6805	0,08	0,09	-0,7656659	-0,5248341	-0,5248341	-0,7656659	NS 4 (212)	0,0705	0,07		0,1204159	0,5854706		0,1204159	0,5813184		-0,7654159	-0,5245841	-0,5245841	-0,7654159
	0,00075	0,00025	0,0005																				
corr	0,98648	0,9731349		R 2																			

Gender Comparisons for the NS sub scales: NS 1 – NS 4

		NS1											0,5										
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emale	d+2*efem	d+2*emale	d-2*efem											D-2*EE_Male	D+2*EE_Fem	D+2*EE_Male	D-2*EE_Fem
1	-0,47	-0,5	-0,501818182	0,1	0,11	-0,6345698	-0,3372484	-0,3372484	-0,6345698	NS1(1)	0,0318182	0,03		0,1486607	0,2140323		0,1486607	0,2018018		-0,633660687	-0,336339313	-0,336339313	-0,633660687
2	0,03	0,02	0,018181818	0,09	0,1	-0,1104453	0,1586271	0,15862715	-0,1104453	NS1(29)	0,0118182	0,01		0,1345362	0,0878439		0,1345362	0,0743294		-0,10953624	0,15953624	0,15953624	-0,10953624
3	2,11	2,63	2,628181818	0,1	0,13	2,2050787	2,5331031	2,5331031	2,2050787	NS1(52)	-0,5181818	-0,52	*	0,1640122	-3,1594103	*	0,1640122	-3,170496	*	2,205987805	2,534012195	2,534012195	2,205987805
4	-1,01	-0,84	-0,841818182	0,11	0,12	-1,0886973	-0,7631209	-0,76312088	-1,0886973	NS1(70)	-0,1681818	-0,17		0,1627882	-1,0331327		0,1627882	-1,0443017		-1,087788206	-0,762211794	-0,762211794	-1,087788206
5	2,38	2,06	2,058181818	0,1	0,11	2,0704302	2,3677516	2,3677516	2,0704302	NS1(99)	0,3218182	0,32		0,1486607	2,1647834	*	0,1486607	2,1525529	*	2,071339313	2,368660687	2,368660687	2,071339313
6	2	2,14	2,138181818	0,1	0,11	1,9204302	2,2177516	2,2177516	1,9204302	NS1(114)	-0,1381818	-0,14		0,1486607	-0,9295115		0,1486607	-0,9417419		1,921339313	2,218660687	2,218660687	1,921339313
7	-0,89	-0,72	-0,721818182	0,11	0,12	-0,9686973	-0,6431209	-0,64312088	-0,9686973	NS1(144)	-0,1681818	-0,17		0,1627882	-1,0331327		0,1627882	-1,0443017		-0,967788206	-0,642211794	-0,642211794	-0,967788206
8	0	0,03	0,028181818	0,09	0,1	-0,1204453	0,1486271	0,14862715	-0,1204453	NS1(167)	-0,0281818	-0,03		0,1345362	-0,2094738		0,1345362	-0,2229882		-0,11953624	0,14953624	0,14953624	-0,11953624
9	-2,04	-2,1	-2,101818182	0,16	0,18	-2,311741	-1,8300772	-1,8300772	-2,311741	NS1(191)	0,0618182	0,06		0,2408319	0,256686		0,2408319	0,2491364		-2,310831892	-1,829168108	-1,829168108	-2,310831892
10	-0,55	-1,08	-1,081818182	0,1	0,13	-0,9799213	-0,6518969	-0,6518969	-0,9799213	NS1(211)	0,5318182	0,53	*	0,1640122	3,2425527	*	0,1640122	3,231467	*	-0,979012195	-0,650987805	-0,650987805	-0,979012195
11	-1,55	-1,65	-1,651818182	0,13	0,15	-1,7994034	-1,4024148	-1,40241476	-1,7994034	NS1(238)	0,1018182	0,1		0,1984943	0,5129526		0,1984943	0,5037927		-1,798494332	-1,401505668	-1,401505668	-1,798494332
	0,000909091	-0,00090909	0,001818182																				
corr	0,985922946	0,97204405		R 2																			

		NS2																					
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emale	d+2*efem	d+2*emale	d-2*efem											D-2*EE_Male	D+2*EE_Fem	D+2*EE_Male	D-2*EE_Fem
1	-1,23	-1,2	-1,2	0,09	0,1	-1,3495362	-1,0804638	-1,08046376	-1,3495362	NS2(13)	-0,03	-0,03		0,1345362	-0,2229882		0,1345362	-0,2229882		-1,34953624	-1,08046376	-1,08046376	-1,34953624
2	-1,21	-1,38	-1,38	0,09	0,1	-1,4295362	-1,1604638	-1,16046376	-1,4295362	NS2(35)	0,17	0,17		0,1345362	1,2636		0,1345362	1,2636		-1,42953624	-1,16046376	-1,16046376	-1,42953624
3	-0,08	0,22	0,22	0,11	0,13	-0,1002939	0,2402939	0,24029386	-0,1002939	NS2(61)	-0,3	-0,3		0,1702939	-1,7616607		0,1702939	-1,7616607		-0,100293864	0,240293864	0,240293864	-0,100293864
4	2,72	2,47	2,47	0,3	0,28	2,1846343	3,0053657	3,00536569	2,1846343	NS2(87)	0,25	0,25		0,4103657	0,6092127		0,4103657	0,6092127		2,184634309	3,005365691	3,005365691	2,184634309
5	-1,43	-1,45	-1,45	0,09	0,1	-1,5745362	-1,3054638	-1,30546376	-1,5745362	NS2(108)	0,02	0,02		0,1345362	0,1486588		0,1345362	0,1486588		-1,57453624	-1,30546376	-1,30546376	-1,57453624
6	-0,46	-0,53	-0,53	0,1	0,11	-0,6436607	-0,3463393	-0,34633931	-0,6436607	NS2(130)	0,07	0,07		0,1486607	0,470871		0,1486607	0,470871		-0,643660687	-0,346339313	-0,346339313	-0,643660687
7	1,7	1,3	1,3	0,19	0,18	1,238275	1,761725	1,76172505	1,238275	NS2(148)	0,4	0,4		0,261725	1,5283214		0,261725	1,5283214		1,238274953	1,761725047	1,761725047	1,238274953
8	-2,74	-2,61	-2,61	0,1	0,11	-2,8236607	-2,5263393	-2,52633931	-2,8236607	NS2(187)	-0,13	-0,13		0,1486607	-0,8744746		0,1486607	-0,8744746		-2,823660687	-2,526339313	-2,526339313	-2,823660687
9	**0,55**	**0,86**	0,86	0,12	0,15	0,5129063	0,8970937	0,89709373	0,5129063	NS2(203)	-0,31	-0,31		0,1920937	-1,6137955		0,1920937	-1,6137955		0,512906273	0,897093727	0,897093727	0,512906273
10	2,18	2,32	2,32	0,23	0,27	1,895317	2,604683	2,60468296	1,895317	NS2(237)	-0,14	-0,14		0,354683	-0,3947187		0,354683	-0,3947187		1,895317043	2,604682957	2,604682957	1,895317043
	0	0	0																				
corr	0,991624302	0,98331876		R 2																			

NS3																							
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emale	d+2*efem	d+2*emale	d-2*efem											D-2*EE_Male	D+2*EE_Fem	D+2*EE_Male	D-2*EE_Fem
1	0,53	0,18	0,18	0,12	0,12	0,1852944	0,5247056	0,52470563	0,1852944	NS3(19)	0,35	0,35		0,1697056	2,0623948	*	0,1697056	2,0623948	*	0,185294373	0,524705627	0,524705627	0,185294373
2	**1,81**	**1,71**	1,71	0,17	0,18	1,5124116	2,0075884	2,00758837	1,5124116	NS3(41)	0,1	0,1		0,2475884	0,4038962		0,2475884	0,4038962		1,512411632	2,007588368	2,007588368	1,512411632
3	-2,12	-2,18	-2,18	0,09	0,11	-2,2921267	-2,0078733	-2,0078733	-2,2921267	NS3(66)	0,06	0,06		0,1421267	0,4221585		0,1421267	0,4221585		-2,292126704	-2,007873296	-2,007873296	-2,292126704
4	1,02	1,22	1,22	0,13	0,15	0,9215057	1,3184943	1,31849433	0,9215057	NS3(109)	-0,2	-0,2		0,1984943	-1,0075854		0,1984943	-1,0075854		0,921505668	1,318494332	1,318494332	0,921505668
5	-0,19	0,02	0,02	0,1	0,12	-0,241205	0,071205	0,07120499	-0,241205	NS3(139)	-0,21	-0,21		0,156205	-1,3443872		0,156205	-1,3443872		-0,241204994	0,071204994	0,071204994	-0,241204994
6	1,38	1,59	1,59	0,15	0,17	1,2582843	1,7117157	1,71171568	1,2582843	NS3(155)	-0,21	-0,21		0,2267157	-0,9262703		0,2267157	-0,9262703		1,258284319	1,711715681	1,711715681	1,258284319
7	-2,29	-2,26	-2,26	0,09	0,11	-2,4171267	-2,1328733	-2,1328733	-2,4171267	NS3(174)	-0,03	-0,03		0,1421267	-0,2110793		0,1421267	-0,2110793		-2,417126704	-2,132873296	-2,132873296	-2,417126704
8	0,53	0,65	0,65	0,12	0,13	0,4130819	0,7669181	0,76691806	0,4130819	NS3(192)	-0,12	-0,12		0,1769181	-0,6782801		0,1769181	-0,6782801		0,41308194	0,76691806	0,76691806	0,41308194
9	-0,68	-0,94	-0,94	0,1	0,11	-0,9586607	-0,6613393	-0,66133931	-0,9586607	NS3(219)	0,26	0,26		0,1486607	1,7489493		0,1486607	1,7489493		-0,958660687	-0,661339313	-0,661339313	-0,958660687
	-0,001111111	-0,00111111	-7,39426E-17																				
corr	0,990627478	0,9813428		R 2																			

NS4																							
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emale	d+2*efem	d+2*emale	d-2*efem											D-2*EE_Male	D+2*EE_Fem	D+2*EE_Male	D-2*EE_Fem
1	0,99	0,2	0,201	0,11	0,11	0,4399365	0,7510635	0,75106349	0,4399365	NS4(34)	0,789	0,79	*	0,1555635	5,0718841	*	0,1555635	5,0783123	*	0,439436508	0,750563492	0,750563492	0,439436508
2	1,29	1,28	1,281	0,13	0,14	1,0944503	1,4765497	1,47654973	1,0944503	NS4(53)	0,009	0,01		0,1910497	0,0471082		0,1910497	0,0523424		1,093950268	1,476049732	1,476049732	1,093950268
3	0,25	-0,18	-0,179	0,1	0,1	-0,1059214	0,1769214	0,17692136	-0,1059214	NS4(79)	0,429	0,43		0,1414214	3,0334881	*	0,1414214	3,0405592	*	-0,106421356	0,176421356	0,176421356	-0,106421356
4	0,06	0,6	0,601	0,09	0,12	0,1805	0,4805	0,4805	0,1805	NS4(91)	-0,541	-0,54	*	0,15	-3,6066667	*	0,15	-3,6	*	0,18	0,48	0,48	0,18
5	-1,88	-1,81	-1,809	0,09	0,1	-1,9790362	-1,7099638	-1,70996376	-1,9790362	NS4(110)	-0,071	-0,07		0,1345362	-0,5277388		0,1345362	-0,5203059		-1,97953624	-1,71046376	-1,71046376	-1,97953624
6	**1,28**	**1,28**	1,281	0,13	0,14	1,0894503	1,4715497	1,47154973	1,0894503	NS4(141)	-0,001	0		0,1910497	-0,0052342		0,1910497	0		1,088950268	1,471049732	1,471049732	1,088950268
7	-0,24	0,02	0,021	0,09	0,1	-0,2440362	0,0250362	0,02503624	-0,2440362	NS4(165)	-0,261	-0,26		0,1345362	-1,9399977		0,1345362	-1,9325648		-0,24453624	0,02453624	0,02453624	-0,24453624
8	1,18	1,16	1,161	0,12	0,14	0,9861091	1,3548909	1,35489089	0,9861091	NS4(183)	0,019	0,02		0,1843909	0,103042		0,1843909	0,1084652		0,985609111	1,354390889	1,354390889	0,985609111
9	-2,03	-1,55	-1,549	0,09	0,1	-1,9240362	-1,6549638	-1,65496376	-1,9240362	NS4(204)	-0,481	-0,48		0,1345362	-3,5752448	*	0,1345362	-3,5678119	*	-1,92453624	-1,65546376	-1,65546376	-1,92453624
10	-0,9	-0,99	-0,989	0,09	0,1	-1,0790362	-0,8099638	-0,80996376	-1,0790362	NS4(212)	0,089	0,09		0,1345362	0,6615318		0,1345362	0,6689647		-1,07953624	-0,81046376	-0,81046376	-1,07953624
	0	**0,001**	**-0,001**																				
corr	0,950232063	0,90294097		R 2																			

Gender Comparisons for the primary HA scale

											new										
;ENTRY	Male m	Female	Female Adj	Male	Fenale	d-2*esMale	d+2*efemal	d+2*emale	d-2*efemale									D-2*EE_SOT	D+2*EE_NGL	D+2*EE_SOT	D-2*EE_NGU
1	1,9	2,13	2,1294286	0,17	0,2	1,7522262	2,2772024	2,2772024	1,7522262	HA 1 (2)	-0,2294286	-0,23		0,2624881	-0,8740532	0,2624881	-0,8762302	1,7525119	2,2774881	2,2774881	1,7525119
2	-0,37	-0,26	-0,2605714	0,09	0,1	-0,449822	-0,1807495	-0,1807495	-0,449822	HA 1 (20)	-0,1094286	-0,11		0,1345362	-0,8133762	0,1345362	-0,8176236	-0,4495362	-0,1804638	-0,1804638	-0,4495362
3	2,8	2,77	2,7694286	0,26	0,27	2,409881	3,1595476	3,1595476	2,409881	HA 1 (42)	0,0305714	0,03		0,3748333	0,0815601	0,3748333	0,0800356	2,4101667	3,1598333	3,1598333	2,4101667
4	1,55	2,02	2,0194286	0,15	0,19	1,5426399	2,0267887	2,0267887	1,5426399	HA 1 (65)	-0,4694286	-0,47		0,2420744	-1,9391916	0,2420744	-1,9415521	1,5429256	2,0270744	2,0270744	1,5429256
5	-0,73	-0,72	-0,7205714	0,09	0,1	-0,859822	-0,5907495	-0,5907495	-0,859822	HA 1 (81)	-0,0094286	-0,01		0,1345362	-0,070082	0,1345362	-0,0743294	-0,8595362	-0,5904638	-0,5904638	-0,8595362
6	-0,37	-0,13	-0,1305714	0,09	0,1	-0,384822	-0,1157495	-0,1157495	-0,384822	HA 1 (112)	-0,2394286	-0,24		0,1345362	-1,7796586	0,1345362	-1,783906	-0,3845362	-0,1154638	-0,1154638	-0,3845362
7	-0,93	-0,96	-0,9605714	0,08	0,1	-1,0733482	-0,8172232	-0,8172232	-1,0733482	HA 1 (119)	0,0305714	0,03		0,1280625	0,2387228	0,1280625	0,2342606	-1,0730625	-0,8169375	-0,8169375	-1,0730625
8	0,52	0,69	0,6894286	0,11	0,12	0,4419261	0,7675025	0,7675025	0,4419261	HA 1 (149)	-0,1694286	-0,17		0,1627882	-1,0407914	0,1627882	-1,0443017	0,4422118	0,7677882	0,7677882	0,4422118
9	-1,22	-1,04	-1,0405714	0,08	0,1	-1,2583482	-1,0022232	-1,0022232	-1,2583482	HA 1 (164)	-0,1794286	-0,18		0,1280625	-1,4011017	0,1280625	-1,4055639	-1,2580625	-1,0019375	-1,0019375	-1,2580625
10	0,73	0,98	0,9794286	0,11	0,13	0,6844204	1,0250081	1,0250081	0,6844204	HA 1 (188)	-0,2494286	-0,25		0,1702939	-1,464695	0,1702939	-1,4680505	0,6847061	1,0252939	1,0252939	0,6847061
11	-1,42	-1,43	-1,4305714	0,08	0,1	-1,5533482	-1,2972232	-1,2972232	-1,5533482	HA 1 (225)	0,0105714	0,01		0,1280625	0,082549	0,1280625	0,0780869	-1,5530625	-1,2969375	-1,2969375	-1,5530625
12	-1,08	-1,01	-1,0105714	0,08	0,1	-1,1733482	-0,9172232	-0,9172232	-1,1733482	HA 2 (12)	-0,0694286	-0,07		0,1280625	-0,5421461	0,1280625	-0,5466082	-1,1730625	-0,9169375	-0,9169375	-1,1730625
13	-1,15	-1,23	-1,2305714	0,08	0,1	-1,3183482	-1,0622232	-1,0622232	-1,3183482	HA 2 (26)	0,0805714	0,08		0,1280625	0,6291572	0,1280625	0,624695	-1,3180625	-1,0619375	-1,0619375	-1,3180625
14	-0,22	-0,45	-0,4505714	0,09	0,1	-0,469822	-0,2007495	-0,2007495	-0,469822	HA 2 (67)	0,2305714	0,23		0,1345362	1,7138239	0,1345362	1,7095765	-0,4695362	-0,2004638	-0,2004638	-0,4695362
15	-0,62	-0,74	-0,7405714	0,09	0,1	-0,814822	-0,5457495	-0,5457495	-0,814822	HA 2 (129)	0,1205714	0,12		0,1345362	0,8962004	0,1345362	0,891953	-0,8145362	-0,5454638	-0,5454638	-0,8145362
16	-1,01	-0,93	-0,9305714	0,08	0,1	-1,0983482	-0,8422232	-0,8422232	-1,0983482	HA 2 (154)	-0,0794286	-0,08		0,1280625	-0,6202329	0,1280625	-0,624695	-1,0980625	-0,8419375	-0,8419375	-1,0980625
17	**-1,14**	**-1,22**	-1,2205714	0,08	0,1	-1,3083482	-1,0522232	-1,0522232	-1,3083482	HA 2 (189)	0,0805714	0,08		0,1280625	0,6291572	0,1280625	0,624695	-1,3080625	-1,0519375	-1,0519375	-1,3080625
18	**-0,32**	**-0,39**	-0,3905714	0,09	0,1	-0,489822	-0,2207495	-0,2207495	-0,489822	HA 2 (217)	0,0705714	0,07		0,1345362	0,5245533	0,1345362	0,5203059	-0,4895362	-0,2204638	-0,2204638	-0,4895362
19	0,35	0,33	0,3294286	0,1	0,11	0,1910536	0,488375	0,488375	0,1910536	HA 3 (27)	0,0205714	0,02		0,1486607	0,1383784	0,1486607	0,1345346	0,1913393	0,4886607	0,4886607	0,1913393
20	0,48	0,41	0,4094286	0,1	0,11	0,2960536	0,593375	0,593375	0,2960536	HA 3 (54)	0,0705714	0,07		0,1486607	0,4747148	0,1486607	0,470871	0,2963393	0,5936607	0,5936607	0,2963393
21	-0,94	-0,76	-0,7605714	0,08	0,1	-0,9783482	-0,7222232	-0,7222232	-0,9783482	HA 3 (80)	-0,1794286	-0,18		0,1280625	-1,4011017	0,1280625	-1,4055639	-0,9780625	-0,7219375	-0,7219375	-0,9780625
22	1,61	1,69	1,6894286	0,15	0,17	1,4229986	1,87643	1,87643	1,4229986	HA 3 (100)	-0,0794286	-0,08		0,2267157	-0,3503444	0,2267157	-0,3528649	1,4232843	1,8767157	1,8767157	1,4232843
23	1,79	1,81	1,8094286	0,16	0,18	1,5588824	2,0405462	2,0405462	1,5588824	HA 3 (142)	-0,0194286	-0,02		0,2408319	-0,0806728	0,2408319	-0,0830455	1,5591681	2,0408319	2,0408319	1,5591681
24	0,31	0,23	0,2294286	0,1	0,11	0,1210536	0,418375	0,418375	0,1210536	HA 3 (157)	0,0805714	0,08		0,1486607	0,5419821	0,1486607	0,5381382	0,1213393	0,4186607	0,4186607	0,1213393
25	-0,23	-0,16	-0,1605714	0,09	0,1	-0,329822	-0,0607495	-0,0607495	-0,329822	HA 3 (209)	-0,0694286	-0,07		0,1345362	-0,5160585	0,1345362	-0,5203059	-0,3295362	-0,0604638	-0,0604638	-0,3295362
26	0,52	0,49	0,4894286	0,11	0,12	0,3419261	0,6675025	0,6675025	0,3419261	HA 3 (231)	0,0305714	0,03		0,1627882	0,1877988	0,1627882	0,1842885	0,3422118	0,6677882	0,6677882	0,3422118
27	1,55	1,07	1,0694286	0,15	0,14	1,1045314	1,5148971	1,5148971	1,1045314	HA 4 (22)	0,4805714	0,48		0,2051828	2,3421618	0,2051828	2,3393769	1,1048172	1,5151828	1,5151828	1,1048172
28	0,57	0,49	0,4894286	0,11	0,12	0,3669261	0,6925025	0,6925025	0,3669261	HA 4 (43)	0,0805714	0,08		0,1627882	0,4949464	0,1627882	0,4914361	0,3672118	0,6927882	0,6927882	0,3672118
29	0,93	0,36	0,3594286	0,12	0,11	0,4819261	0,8075025	0,8075025	0,4819261	HA 4 (63)	0,5705714	0,57	*	0,1627882	3,5049924	0,1627882	3,5014822	0,4822118	0,8077882	0,8077882	0,4822118
30	-0,91	-1,26	-1,2605714	0,08	0,1	-1,2133482	-0,9572232	-0,9572232	-1,2133482	HA 4 (92)	0,3505714	0,35		0,1280625	2,7375029	0,1280625	2,7330408	-1,2130625	-0,9569375	-0,9569375	-1,2130625
31	0,64	0,28	0,2794286	0,11	0,11	0,3041508	0,6152778	0,6152778	0,3041508	HA 4 (113)	0,3605714	0,36		0,1555635	2,3178409	0,1555635	2,3141676	0,3044365	0,6155635	0,6155635	0,3044365
32	-1,03	-0,94	-0,9405714	0,08	0,1	-1,1133482	-0,8572232	-0,8572232	-1,1133482	HA 4 (147)	-0,0894286	-0,09		0,1280625	-0,6983198	0,1280625	-0,7027819	-1,1130625	-0,8569375	-0,8569375	-1,1130625
33	0,96	0,7	0,6994286	0,12	0,12	0,6600087	0,9994199	0,9994199	0,6600087	HA 4 (182)	0,2605714	0,26		0,1697056	1,5354319	0,1697056	1,5320647	0,6602944	0,9997056	0,9997056	0,6602944
34	-0,39	-0,13	-0,1305714	0,09	0,1	-0,394822	-0,1257495	-0,1257495	-0,394822	HA 4 (202)	-0,2594286	-0,26		0,1345362	-1,9283174	0,1345362	-1,9325648	-0,3945362	-0,1254638	-0,1254638	-0,3945362
35	-3,11	-2,69	-2,6905714	0,12	0,12	-3,0699913	-2,7305801	-2,7305801	-3,0699913	HA 4 (236)	-0,4194286	-0,42		0,1697056	-2,4715066	0,1697056	-2,4748737	-3,0697056	-2,7302944	-2,7302944	-3,0697056
	0,0006	0	0,0005714																		
corr	0,982	0,9644		R 2																	

Gender Comparisons for the HA sub scales: HA 1 – HA 4

		HA1									new		0,5										
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	1,79	1,92	1,92	0,18	0,21	1,5784137	2,1315863	2,1315863	1,5784137	HA 1 (2)	-0,13	-0,13		0,2765863	-0,470016		0,2765863	-0,470016		1,5784137	2,1315863	2,1315863	1,5784137
2	-0,62	-0,67	-0,67	0,09	0,11	-0,7871267	-0,5028733	-0,5028733	-0,7871267	HA 1 (20)	0,05	0,05		0,1421267	0,3517988		0,1421267	0,3517988		-0,7871267	-0,5028733	-0,5028733	-0,7871267
3	2,71	2,59	2,59	0,26	0,27	2,2751667	3,0248333	3,0248333	2,2751667	HA 1 (42)	0,12	0,12		0,3748333	0,3201423		0,3748333	0,3201423		2,2751667	3,0248333	3,0248333	2,2751667
4	1,41	1,79	1,79	0,15	0,2	1,35	1,85	1,85	1,35	HA 1 (65)	-0,38	-0,38		0,25	-1,52		0,25	-1,52		1,35	1,85	1,85	1,35
5	-1,01	-1,18	-1,18	0,09	0,1	-1,2295362	-0,9604638	-0,9604638	-1,2295362	HA 1 (81)	0,17	0,17		0,1345362	1,2636		0,1345362	1,2636		-1,2295362	-0,9604638	-0,9604638	-1,2295362
6	-0,62	-0,52	-0,52	0,09	0,11	-0,7121267	-0,4278733	-0,4278733	-0,7121267	HA 1 (112)	-0,1	-0,1		0,1421267	-0,7035975		0,1421267	-0,7035975		-0,7121267	-0,4278733	-0,4278733	-0,7121267
7	-1,23	-1,45	-1,45	0,09	0,1	-1,4745362	-1,2054638	-1,2054638	-1,4745362	HA 1 (119)	0,22	0,22		0,1345362	1,6352471		0,1345362	1,6352471		-1,4745362	-1,2054638	-1,2054638	-1,4745362
8	0,34	0,37	0,37	0,11	0,13	0,1847061	0,5252939	0,5252939	0,1847061	HA 1 (149)	-0,03	-0,03		0,1702939	-0,1761661		0,1702939	-0,1761661		0,1847061	0,5252939	0,5252939	0,1847061
9	-1,54	-1,53	-1,53	0,09	0,1	-1,6695362	-1,4004638	-1,4004638	-1,6695362	HA 1 (164)	-0,01	-0,01		0,1345362	-0,0743294		0,1345362	-0,0743294		-1,6695362	-1,4004638	-1,4004638	-1,6695362
10	0,55	0,68	0,68	0,12	0,14	0,4306091	0,7993909	0,7993909	0,4306091	HA 1 (188)	-0,13	-0,13		0,1843909	-0,705024		0,1843909	-0,705024		0,4306091	0,7993909	0,7993909	0,4306091
11	-1,77	-1,99	-1,99	0,09	0,11	-2,0221267	-1,7378733	-1,7378733	-2,0221267	HA 1 (225)	0,22	0,22		0,1421267	1,5479146		0,1421267	1,5479146		-2,0221267	-1,7378733	-1,7378733	-2,0221267
	0,000909091	0,000909091	-4,04407E-17																				
corr	0,994870091	0,989766497		R 2																			

		HA2																					
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	-0,34	-0,18	-0,178571429	0,09	0,11	-0,4014124	-0,117159	-0,117159	-0,4014124	HA2 (12)	-0,1614	-0,16		0,1421267	-1,1358075		0,1421267	-1,1257561		-0,4021267	-0,1178733	-0,1178733	-0,4021267
2	-0,43	-0,45	-0,448571429	0,09	0,11	-0,5814124	-0,297159	-0,297159	-0,5814124	HA2 (26)	0,0186	0,02		0,1421267	0,1306681		0,1421267	0,1407195		-0,5821267	-0,2978733	-0,2978733	-0,5821267
3	0,68	0,48	0,481428571	0,1	0,11	0,4320536	0,729375	0,729375	0,4320536	HA2 (67)	0,1986	0,2		0,1486607	1,335736		0,1486607	1,3453456		0,4313393	0,7286607	0,7286607	0,4313393
4	0,21	0,14	0,141428571	0,09	0,11	0,0335876	0,317841	0,317841	0,0335876	HA2 (129)	0,0686	0,07		0,1421267	0,4824669		0,1421267	0,4925183		0,0328733	0,3171267	0,3171267	0,0328733
5	-0,26	-0,08	-0,078571429	0,09	0,11	-0,3114124	-0,027159	-0,027159	-0,3114124	HA2 (154)	-0,1814	-0,18		0,1421267	-1,276527		0,1421267	-1,2664756		-0,3121267	-0,0278733	-0,0278733	-0,3121267
6	-0,41	-0,44	-0,438571429	0,09	0,11	-0,5664124	-0,282159	-0,282159	-0,5664124	HA2 (189)	0,0286	0,03		0,1421267	0,2010279		0,1421267	0,2110793		-0,5671267	-0,2828733	-0,2828733	-0,5671267
7	0,56	0,55	0,551428571	0,1	0,11	0,4070536	0,704375	0,704375	0,4070536	HA2 (217)	0,0086	0,01		0,1486607	0,0576577		0,1486607	0,0672673		0,4063393	0,7036607	0,7036607	0,4063393
	0,001428571	0,002857143	-0,001428571																				
corr	0,967566912	0,936185728		R 2																			

		HA3																					
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	-0,12	-0,18	-0,18125	0,12	0,13	-0,3275431	0,0262931	0,0262931	-0,3275431	HA3(27)	0,0613	0,06		0,1769181	0,3462055		0,1769181	0,3391401		-0,3269181	0,0269181	0,0269181	-0,3269181
2	**0,05**	**-0,09**	-0,09125	0,12	0,13	-0,1975431	0,1562931	0,1562931	-0,1975431	HA3(54)	0,1413	0,14		0,1769181	0,7983922		0,1769181	0,7913268		-0,1969181	0,1569181	0,1569181	-0,1969181
3	-2	-1,64	-1,64125	0,11	0,12	-1,9834132	-1,6578368	-1,6578368	-1,9834132	HA3(80)	-0,3588	-0,36		0,1627882	-2,2037837	*	0,1627882	-2,2114624	*	-1,9827882	-1,6572118	-1,6572118	-1,9827882
4	1,42	1,44	1,43875	0,16	0,18	1,1885431	1,6702069	1,6702069	1,1885431	HA3(100)	-0,0188	-0,02		0,2408319	-0,0778551		0,2408319	-0,0830455		1,1891681	1,6708319	1,6708319	1,1891681
5	1,62	1,57	1,56875	0,17	0,19	1,339424	1,849326	1,849326	1,339424	HA3(142)	0,0513	0,05		0,254951	0,201019		0,254951	0,1961161		1,340049	1,849951	1,849951	1,340049
6	-0,17	-0,31	-0,31125	0,12	0,12	-0,4103306	-0,0709194	-0,0709194	-0,4103306	HA3(157)	0,1413	0,14		0,1697056	0,8323236		0,1697056	0,8249579		-0,4097056	-0,0702944	-0,0702944	-0,4097056
7	-0,9	-0,81	-0,81125	0,11	0,12	-1,0184132	-0,6928368	-0,6928368	-1,0184132	HA3(209)	-0,0888	-0,09		0,1627882	-0,5451869		0,1627882	-0,5528656		-1,0177882	-0,6922118	-0,6922118	-1,0177882
8	0,1	0,01	0,00875	0,12	0,13	-0,1225431	0,2312931	0,2312931	-0,1225431	HA3(231)	0,0913	0,09		0,1769181	0,5157755		0,1769181	0,5087101		-0,1219181	0,2319181	0,2319181	-0,1219181
	1,73472E-17	-0,00125	0,00125																				
corr	0,992647561	0,98534918		R 2																			

		HA4																					
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	1,77	1,41	1,411111111	0,15	0,14	1,3853727	1,7957384	1,7957384	1,3853727	HA 4 (22)	0,3589	0,36		0,2051828	1,7491174		0,2051828	1,7545326		1,3848172	1,7951828	1,7951828	1,3848172
2	0,72	0,79	0,791111111	0,11	0,12	0,5927673	0,9183438	0,9183438	0,5927673	HA 4 (43)	-0,0711	-0,07		0,1627882	-0,4368321		0,1627882	-0,4300066		0,5922118	0,9177882	0,9177882	0,5922118
3	1,11	0,65	0,651111111	0,12	0,12	0,7108499	1,0502612	1,0502612	0,7108499	HA 4 (63)	0,4589	0,46		0,1697056	2,7040287	*	0,1697056	2,710576	*	0,7102944	1,0497056	1,0497056	0,7102944
4	-0,9	-1,12	-1,118888889	0,09	0,1	-1,1439807	-0,8749082	-0,8749082	-1,1439807	HA 4 (92)	0,2189	0,22		0,1345362	1,6269883		0,1345362	1,6352471		-1,1445362	-0,8754638	-0,8754638	-1,1445362
5	0,8	0,57	0,571111111	0,11	0,12	0,5227673	0,8483438	0,8483438	0,5227673	HA 4 (113)	0,2289	0,23		0,1627882	1,4060533		0,1627882	1,4128788		0,5222118	0,8477882	0,8477882	0,5222118
6	**-1,04**	**-0,77**	-0,768888889	0,09	0,1	-1,0389807	-0,7699082	-0,7699082	-1,0389807	HA 4 (147)	-0,2711	-0,27		0,1345362	-2,015153	*	0,1345362	-2,0068942	*	-1,0395362	-0,7704638	-0,7704638	-1,0395362
7	1,14	1,02	1,021111111	0,13	0,13	0,8967078	1,2644033	1,2644033	0,8967078	HA 4 (182)	0,1189	0,12		0,1838478	0,6466703		0,1838478	0,652714		0,8961522	1,2638478	1,2638478	0,8961522
8	-0,33	0,12	0,121111111	0,09	0,11	-0,2465711	0,0376823	0,0376823	-0,2465711	HA 4 (202)	-0,4511	-0,45		0,1421267	-3,1740067	*	0,1421267	-3,166189	*	-0,2471267	0,0371267	0,0371267	-0,2471267
9	-3,27	-2,66	-2,658888889	0,12	0,13	-3,1413625	-2,7875264	-2,7875264	-3,1413625	HA 4 (236)	-0,6111	-0,61	*	0,1769181	-3,4542042	*	0,1769181	-3,4479239	*	-3,1419181	-2,7880819	-2,7880819	-3,1419181
	0	**0,001111111**	**-0,001111111**																				
corr	0,983792467	0,967847618		R 2																			

Gender Comparisons for the primary RD scale

		Female									new		0,5										
;ENTRY	Mal measure	Fem measure	fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_Fem	D+2*EE_Mal	D-2*EE_Fem
1	-0,34	0,09	0,0908333	0,09	0,1	-0,2591196	0,0099529	0,0099529	-0,2591196	RD 1 (3)	-0,4308333	-0,43		0,1345362	-3,2023589	*	0,1345362	-3,1961648	*	-0,2595362	0,0095362	0,0095362	-0,2595362
2	0,01	0,04	0,0408333	0,09	0,1	-0,1091196	0,1599529	0,1599529	-0,1091196	RD 1 (28)	-0,0308333	-0,03		0,1345362	-0,2291824		0,1345362	-0,2229882		-0,1095362	0,1595362	0,1595362	-0,1095362
3	1,38	1,48	1,4808333	0,09	0,1	1,2958804	1,5649529	1,5649529	1,2958804	RD 1 (55)	-0,1008333	-0,1		0,1345362	-0,7494883		0,1345362	-0,7432941		1,2954638	1,5645362	1,5645362	1,2954638
4	-2,06	-1,86	-1,8591667	0,15	0,17	-2,186299	-1,7328677	-1,7328677	-2,186299	RD 1 (83)	-0,2008333	-0,2		0,2267157	-0,8858379		0,2267157	-0,8821622		-2,1867157	-1,7332843	-1,7332843	-2,1867157
5	-0,81	-1,13	-1,1291667	0,1	0,13	-1,1335955	-0,8055711	-0,8055711	-1,1335955	RD 1 (102)	0,3191667	0,32		0,1640122	1,9459935		0,1640122	1,9510744		-1,1340122	-0,8059878	-0,8059878	-1,1340122
6	-0,41	-0,47	-0,4691667	0,09	0,11	-0,58171	-0,2974566	-0,2974566	-0,58171	RD 1 (120)	0,0591667	0,06		0,1421267	0,4162952		0,1421267	0,4221585		-0,5821267	-0,2978733	-0,2978733	-0,5821267
7	-0,05	-0,02	-0,0191667	0,09	0,1	-0,1691196	0,0999529	0,0999529	-0,1691196	RD 1 (158)	-0,0308333	-0,03		0,1345362	-0,2291824		0,1345362	-0,2229882		-0,1695362	0,0995362	0,0995362	-0,1695362
8	2,41	1,02	1,0208333	0,11	0,1	1,566756	1,8640774	1,8640774	1,566756	RD 1 (181)	1,3891667	1,39	*	0,1486607	9,3445462	*	0,1486607	9,3501518	*	1,5663393	1,8636607	1,8636607	1,5663393
9	-1,9	-1,78	-1,7791667	0,15	0,16	-2,0589005	-1,6202662	-1,6202662	-2,0589005	RD 1 (210)	-0,1208333	-0,12		0,2193171	-0,5509526		0,2193171	-0,5471529		-2,0593171	-1,6206829	-1,6206829	-2,0593171
10	-0,64	-0,66	-0,6591667	0,1	0,11	-0,798244	-0,5009226	-0,5009226	-0,798244	RD 1 (224)	0,0191667	0,02		0,1486607	0,128929		0,1486607	0,1345346		-0,7986607	-0,5013393	-0,5013393	-0,7986607
11	-1,72	-1,98	-1,9791667	0,14	0,18	-2,0776184	-1,6215482	-1,6215482	-2,0776184	RD 3 (21)	0,2591667	0,26		0,2280351	1,136521		0,2280351	1,1401754		-2,0780351	-1,6219649	-1,6219649	-2,0780351
12	0,25	0,38	0,3808333	0,09	0,1	0,1808804	0,4499529	0,4499529	0,1808804	RD 3 (44)	-0,1308333	-0,13		0,1345362	-0,9724765		0,1345362	-0,9662824		0,1804638	0,4495362	0,4495362	0,1804638
13	-0,93	-1,22	-1,2191667	0,11	0,14	-1,2526283	-0,8965384	-0,8965384	-1,2526283	RD 3 (68)	0,2891667	0,29		0,1780449	1,6241218		0,1780449	1,6288023		-1,2530449	-0,8969551	-0,8969551	-1,2530449
14	-0,61	-0,47	-0,4691667	0,1	0,11	-0,688244	-0,3909226	-0,3909226	-0,688244	RD 3 (117)	-0,1408333	-0,14		0,1486607	-0,9473475		0,1486607	-0,9417419		-0,6886607	-0,3913393	-0,3913393	-0,6886607
15	-0,02	0,13	0,1308333	0,09	0,1	-0,0791196	0,1899529	0,1899529	-0,0791196	RD 3 (143)	-0,1508333	-0,15		0,1345362	-1,1211353		0,1345362	-1,1149412		-0,0795362	0,1895362	0,1895362	-0,0795362
16	1,33	1,53	1,5308333	0,09	0,1	1,2958804	1,5649529	1,5649529	1,2958804	RD 3 (180)	-0,2008333	-0,2		0,1345362	-1,4927824		0,1345362	-1,4865883		1,2954638	1,5645362	1,5645362	1,2954638
17	**0,54**	**0,55**	0,5508333	0,08	0,1	0,4173542	0,6734792	0,6734792	0,4173542	RD 3 (201)	-0,0108333	-0,01		0,1280625	-0,0845941		0,1280625	-0,0780869		0,4169375	0,6730625	0,6730625	0,4169375
18	**-0,86**	**-0,64**	-0,6391667	0,1	0,11	-0,898244	-0,6009226	-0,6009226	-0,898244	RD 3 (226)	-0,2208333	-0,22		0,1486607	-1,4854858		0,1486607	-1,4798801		-0,8986607	-0,6013393	-0,6013393	-0,8986607
19	0,79	0,77	0,7708333	0,08	0,1	0,6523542	0,9084792	0,9084792	0,6523542	RD 4 (14)	0,0191667	0,02		0,1280625	0,1496665		0,1280625	0,1561738		0,6519375	0,9080625	0,9080625	0,6519375
20	1,32	1,22	1,2208333	0,09	0,1	1,1358804	1,4049529	1,4049529	1,1358804	RD 4 (46)	0,0991667	0,1		0,1345362	0,7371		0,1345362	0,7432941		1,1354638	1,4045362	1,4045362	1,1354638
21	-1,04	-0,71	-0,7091667	0,11	0,12	-1,0373715	-0,7117951	-0,7117951	-1,0373715	RD 4 (71)	-0,3308333	-0,33		0,1627882	-2,032293	*	0,1627882	-2,0271739	*	-1,0377882	-0,7122118	-0,7122118	-1,0377882
22	0,89	0,91	0,9108333	0,08	0,1	0,7723542	1,0284792	1,0284792	0,7723542	RD 4 (131)	-0,0208333	-0,02		0,1280625	-0,162681		0,1280625	-0,1561738		0,7719375	1,0280625	1,0280625	0,7719375
23	1,13	1,41	1,4108333	0,08	0,1	1,1423542	1,3984792	1,3984792	1,1423542	RD 4 (156)	-0,2808333	-0,28		0,1280625	-2,1929399	*	0,1280625	-2,1864327	*	1,1419375	1,3980625	1,3980625	1,1419375
24	1,3	1,39	1,3908333	0,09	0,1	1,2108804	1,4799529	1,4799529	1,2108804	RD 4 (193)	-0,0908333	-0,09		0,1345362	-0,6751588		0,1345362	-0,6689647		1,2104638	1,4795362	1,4795362	1,2104638
	-0,00166667	-0,000833333	-0,0008333																				
corr	0,95415812	0,910417725		R 2																			

Gender Comparisons for the RD sub scales: RD 1 – RD 4

		RD1									new		0,5										
;ENTRY	MAL measure	Fem measure	Fem Adj	MALE err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	-0,12	0,44	0,441	0,1	0,1	0,0190786	0,3019214	0,3019214	0,0190786	RD 1 (3)	-0,561	-0,56	*	0,1414214	-3,966869	*	0,1414214	-3,959798	*	0,0185786	0,3014214	0,30142136	0,0185786
2	0,25	0,39	0,391	0,09	0,1	0,1859638	0,4550362	0,4550362	0,1859638	RD 1 (28)	-0,141	-0,14		0,1345362	-1,0480447		0,1345362	-1,0406118		0,1854638	0,4545362	0,45453624	0,1854638
3	1,75	1,96	1,961	0,09	0,11	1,7133733	1,9976267	1,9976267	1,7133733	RD 1 (55)	-0,211	-0,21		0,1421267	-1,4845908		0,1421267	-1,4775548		1,7128733	1,9971267	1,9971267	1,7128733
4	-1,93	-1,62	-1,619	0,16	0,17	-2,0079524	-1,5410476	-1,5410476	-2,0079524	RD 1 (83)	-0,311	-0,31		0,2334524	-1,3321776		0,2334524	-1,3278941		-2,0084524	-1,5415476	-1,54154765	-2,0084524
5	-0,62	-0,87	-0,869	0,11	0,13	-0,9147939	-0,5742061	-0,5742061	-0,9147939	RD 1 (102)	0,249	0,25		0,1702939	1,4621783		0,1702939	1,4680505		-0,9152939	-0,5747061	-0,57470614	-0,9152939
6	-0,2	-0,16	-0,159	0,1	0,11	-0,3281607	-0,0308393	-0,0308393	-0,3281607	RD 1 (120)	-0,041	-0,04		0,1486607	-0,2757958		0,1486607	-0,2690691		-0,3286607	-0,0313393	-0,03133931	-0,3286607
7	0,19	0,32	0,321	0,09	0,1	0,1209638	0,3900362	0,3900362	0,1209638	RD 1 (158)	-0,131	-0,13		0,1345362	-0,9737153		0,1345362	-0,9662824		0,1204638	0,3895362	0,38953624	0,1204638
8	2,9	1,45	1,451	0,11	0,1	2,0268393	2,3241607	2,3241607	2,0268393	RD 1 (181)	1,449	1,45	*	0,1486607	9,7470288	*	0,1486607	9,7537555	*	2,0263393	2,3236607	2,32366069	2,0263393
9	-1,77	-1,54	-1,539	0,15	0,17	-1,8812157	-1,4277843	-1,4277843	-1,8812157	RD 1 (210)	-0,231	-0,23		0,2267157	-1,0188973		0,2267157	-1,0144865		-1,8817157	-1,4282843	-1,42828432	-1,8817157
10	-0,45	-0,36	-0,359	0,1	0,12	-0,560705	-0,248295	-0,248295	-0,560705	RD 1 (224)	-0,091	-0,09		0,156205	-0,5825678		0,156205	-0,576166		-0,561205	-0,248795	-0,24879501	-0,561205
	0	0,001	-0,001																				
corr	0,935402965	0,874978706		R 2																			
		RD3																					
;ENTRY	MAL measure	Fem measure	Fem Adj	MALE err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	-1,74	-2,13	-2,12875	0,15	0,2	-2,184375	-1,684375	-1,684375	-2,184375	RD 3 (21)	0,38875	0,39		0,25	1,555		0,25	1,56		-2,185	-1,685	-1,685	-2,185
2	0,59	0,71	0,71125	0,09	0,11	0,5084983	0,7927517	0,7927517	0,5084983	RD 3 (44)	-0,12125	-0,12		0,1421267	-0,853112		0,1421267	-0,8443171		0,5078733	0,7921267	0,7921267	0,5078733
3	-0,82	-1,23	-1,22875	0,11	0,15	-1,2103858	-0,8383642	-0,8383642	-1,2103858	RD 3 (68)	0,40875	0,41		0,1860108	2,1974536	*	0,1860108	2,2041737	*	-1,2110108	-0,8389892	-0,83898925	-1,2110108
4	-0,43	-0,32	-0,31875	0,11	0,12	-0,5371632	-0,2115868	-0,2115868	-0,5371632	RD 3 (117)	-0,11125	-0,11		0,1627882	-0,6834033		0,1627882	-0,6757246		-0,5377882	-0,2122118	-0,21221179	-0,5377882
5	0,27	0,41	0,41125	0,1	0,11	0,1919643	0,4892857	0,4892857	0,1919643	RD 3 (143)	-0,14125	-0,14		0,1486607	-0,9501503		0,1486607	-0,9417419		0,1913393	0,4886607	0,48866069	0,1913393
6	1,91	2,17	2,17125	0,1	0,12	1,88442	2,19683	2,19683	1,88442	RD 3 (180)	-0,26125	-0,26		0,156205	-1,6724817		0,156205	-1,6644794		1,883795	2,196205	2,19620499	1,883795
7	0,94	0,92	0,92125	0,09	0,11	0,7884983	1,0727517	1,0727517	0,7884983	RD 3 (201)	0,01875	0,02		0,1421267	0,1319245		0,1421267	0,1407195		0,7878733	1,0721267	1,0721267	0,7878733
8	-0,73	-0,53	-0,52875	0,11	0,13	-0,7996689	-0,4590811	-0,4590811	-0,7996689	RD 3 (226)	-0,20125	-0,2		0,1702939	-1,1817807		0,1702939	-1,1744404		-0,8002939	-0,4597061	-0,45970614	-0,8002939
	-0,00125	0	-0,00125																				
corr	0,98956895	0,979246708		R 2																			
		RD4																					
;ENTRY	MAL measure	Fem measure	Fem Adj	MALE err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	0,07	-0,07	-0,07167	0,09	0,1	-0,1353696	0,1337029	0,1337029	-0,1353696	RD 4 (14)	0,1416667	0,14		0,1345362	1,053		0,1345362	1,0406118		-0,1345362	0,1345362	0,13453624	-0,1345362
2	**0,73**	**0,47**	0,46833	0,1	0,11	0,450506	0,7478274	0,7478274	0,450506	RD 4 (46)	0,2616667	0,26		0,1486607	1,7601605		0,1486607	1,7489493		0,4513393	0,7486607	0,74866069	0,4513393
3	-2,2	-1,88	-1,88167	0,12	0,13	-2,2177514	-1,8639153	-1,8639153	-2,2177514	RD 4 (71)	-0,3183333	-0,32		0,1769181	-1,7993264		0,1769181	-1,8087469		-2,2169181	-1,8630819	-1,86308194	-2,2169181
4	0,2	0,09	0,08833	0,09	0,11	0,00204	0,2862934	0,2862934	0,00204	RD 4 (131)	0,1116667	0,11		0,1421267	0,7856839		0,1421267	0,7739573		0,0028733	0,2871267	0,2871267	0,0028733
5	0,5	0,71	0,70833	0,09	0,11	0,46204	0,7462934	0,7462934	0,46204	RD 4 (156)	-0,2083333	-0,21		0,1421267	-1,4658282		0,1421267	-1,4775548		0,4628733	0,7471267	0,7471267	0,4628733
6	0,71	0,68	0,67833	0,1	0,11	0,545506	0,8428274	0,8428274	0,545506	RD 4 (193)	0,0316667	0,03		0,1486607	0,2130131		0,1486607	0,2018018		0,5463393	0,8436607	0,84366069	0,5463393
	0,001666667	0	0,00167																				
corr	0,985978706	0,972154008		R 2																			

Gender Comparisons for the primary PS scale

		P									new											
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem										D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	1,15	0,75	0,75	0,09	0,1	0,8154638	1,0845362	1,0845362	0,8154638	PS (11)	0,4	0,4	0,1345362	2,9731766	*	0,1345362	2,9731766	*	0,8154638	1,0845362	1,0845362	0,8154638
2	-0,62	-0,72	-0,72	0,12	0,13	-0,8469181	-0,4930819	-0,4930819	-0,8469181	PS (37)	0,1	0,1	0,1769181	0,5652334		0,1769181	0,5652334		-0,8469181	-0,4930819	-0,4930819	-0,8469181
3	-0,37	-0,46	-0,46	0,11	0,12	-0,5777882	-0,2522118	-0,2522118	-0,5777882	PS (62)	0,09	0,09	0,1627882	0,5528656		0,1627882	0,5528656		-0,5777882	-0,2522118	-0,2522118	-0,5777882
4	-2,21	-1,91	-1,91	0,2	0,18	-2,3290725	-1,7909275	-1,7909275	-2,3290725	PS (103)	-0,3	-0,3	0,2690725	-1,1149412		0,2690725	-1,1149412		-2,3290725	-1,7909275	-1,7909275	-2,3290725
5	2,12	2,31	2,31	0,1	0,12	2,058795	2,371205	2,371205	2,058795	PS (128)	-0,19	-0,19	0,156205	-1,2163504		0,156205	-1,2163504		2,058795	2,371205	2,371205	2,058795
6	-0,89	-1,13	-1,13	0,13	0,14	-1,2010497	-0,8189503	-0,8189503	-1,2010497	PS (166)	0,24	0,24	0,1910497	1,2562174		0,1910497	1,2562174		-1,2010497	-0,8189503	-0,8189503	-1,2010497
7	1,16	1,48	1,48	0,09	0,1	1,1854638	1,4545362	1,4545362	1,1854638	PS (205)	-0,32	-0,32	0,1345362	-2,3785413	*	0,1345362	-2,3785413	*	1,1854638	1,4545362	1,4545362	1,1854638
8	-0,34	-0,32	-0,32	0,11	0,12	-0,4927882	-0,1672118	-0,1672118	-0,4927882	PS (218)	-0,02	-0,02	0,1627882	-0,122859		0,1627882	-0,122859		-0,4927882	-0,1672118	-0,1672118	-0,4927882
	0	0	0																			
corr	0,983085927	0,9664579		R 2																		

Gender Comparisons for the primary SD scale

											new												
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emale	d+2*efem	d+2*emal	d-2*efem											D-2*EE_mal	D+2*EE_fem	D+2*EE_mal	D-2*EE_fem
1	0,43	0,21	0,231428571	0,09	0,11	0,1885876	0,472841	0,472841	0,1885876	SD 1 (4)	0,1985714	0,22		0,1421267	1,3971437		0,1421267	1,5479146		0,1778733	0,4621267	0,4621267	0,1778733
2	2,91	2,44	2,461428571	0,1	0,11	2,5370536	2,834375	2,834375	2,5370536	SD 1 (24)	0,4485714	0,47		0,1486607	3,017418	*	0,1486607	3,1615621	*	2,5263393	2,8236607	2,8236607	2,5263393
3	0,27	0,28	0,301428571	0,09	0,11	0,1435876	0,427841	0,427841	0,1435876	SD 1 (58)	-0,0314286	-0,01		0,1421267	-0,2211307		0,1421267	-0,0703598		0,1328733	0,4171267	0,4171267	0,1328733
4	-0,72	-1,07	-1,048571429	0,12	0,16	-1,0842857	-0,6842857	-0,6842857	-1,0842857	SD 1 (86)	0,3285714	0,35		0,2	1,6428571		0,2	1,75		-1,095	-0,695	-0,695	-1,095
5	0,74	1,16	1,181428571	0,09	0,1	0,826178	1,0952505	1,0952505	0,826178	SD 1 (121)	-0,4414286	-0,42		0,1345362	-3,2811127	*	0,1345362	-3,1218354	*	0,8154638	1,0845362	1,0845362	0,8154638
6	-1,88	-1,8	-1,778571429	0,19	0,21	-2,1124818	-1,5460897	-1,5460897	-2,1124818	SD 1 (151)	-0,1014286	-0,08		0,283196	-0,3581567		0,283196	-0,2824898		-2,123196	-1,556804	-1,556804	-2,123196
7	0,7	0,85	0,871428571	0,09	0,1	0,651178	0,9202505	0,9202505	0,651178	SD 1 (169)	-0,1714286	-0,15		0,1345362	-1,2742185		0,1345362	-1,1149412		0,6404638	0,9095362	0,9095362	0,6404638
8	-0,37	-0,52	-0,498571429	0,11	0,13	-0,6045796	-0,2639919	-0,2639919	-0,6045796	SD 1 (198)	0,1285714	0,15		0,1702939	0,7549974		0,1702939	0,8808303		-0,6152939	-0,2747061	-0,2747061	-0,6152939
9	0,8	1,2	1,221428571	0,09	0,1	0,876178	1,1452505	1,1452505	0,876178	SD 2 (9)	-0,4214286	-0,4		0,1345362	-3,1324539	*	0,1345362	-2,9731766	*	0,8654638	1,1345362	1,1345362	0,8654638
10	-0,3	-0,16	-0,138571429	0,11	0,12	-0,3820739	-0,0564975	-0,0564975	-0,3820739	SD 2 (30)	-0,1614286	-0,14		0,1627882	-0,9916478		0,1627882	-0,8600132		-0,3927882	-0,0672118	-0,0672118	-0,3927882
11	-3,22	-3,28	-3,258571429	0,36	0,41	-3,7849046	-2,6936668	-2,6936668	-3,7849046	SD 2 (59)	0,0385714	0,06		0,5456189	0,070693		0,5456189	0,1099669		-3,7956189	-2,7043811	-2,7043811	-3,7956189
12	0,18	0,42	0,441428571	0,1	0,1	0,1692929	0,4521356	0,4521356	0,1692929	SD 2 (105)	-0,2614286	-0,24		0,1414214	-1,8485792		0,1414214	-1,6970563		0,1585786	0,4414214	0,4414214	0,1585786
13	-1,43	-1,43	-1,408571429	0,16	0,18	-1,6601176	-1,1784538	-1,1784538	-1,6601176	SD 2 (126)	-0,0214286	0		0,2408319	-0,0889773		0,2408319	0		-1,6708319	-1,1891681	-1,1891681	-1,6708319
14	0,39	-0,03	-0,008571429	0,09	0,11	0,0485876	0,332841	0,332841	0,0485876	SD 2 (159)	0,3985714	0,42		0,1421267	2,8043388	*	0,1421267	2,9551097	*	0,0378733	0,3221267	0,3221267	0,0378733
15	-1,88	-1,75	-1,728571429	0,19	0,2	-2,080148	-1,5284234	-1,5284234	-2,080148	SD 2 (177)	-0,1514286	-0,13		0,2758623	-0,5489281		0,2758623	-0,4712496		-2,0908623	-1,5391377	-1,5391377	-2,0908623
16	-2,9	-2,99	-2,968571429	0,31	0,36	-3,4093647	-2,4592068	-2,4592068	-3,4093647	SD 2 (223)	0,0685714	0,09		0,4750789	0,1443369		0,4750789	0,1894422		-3,4200789	-2,4699211	-2,4699211	-3,4200789
17	**-0,41**	**-0,41**	-0,388571429	0,11	0,12	-0,5620739	-0,2364975	-0,2364975	-0,5620739	SD 3 (40)	-0,0214286	0		0,1627882	-0,1316347		0,1627882	0		-0,5727882	-0,2472118	-0,2472118	-0,5727882
18	**-1,45**	**-0,93**	-0,908571429	0,16	0,15	-1,3986028	-0,9599686	-0,9599686	-1,3986028	SD 3 (106)	-0,5414286	-0,52	*	0,2193171	-2,4687018	*	0,2193171	-2,3709959	*	-1,4093171	-0,9706829	-0,9706829	-1,4093171
19	-0,17	0,26	0,281428571	0,1	0,11	-0,0929464	0,204375	0,204375	-0,0929464	SD 3 (171)	-0,4514286	-0,43		0,1486607	-3,0366372	*	0,1486607	-2,892493	*	-0,1036607	0,1936607	0,1936607	-0,1036607
20	0,62	0,68	0,701428571	0,09	0,1	0,526178	0,7952505	0,7952505	0,526178	SD 3 (197)	-0,0814286	-0,06		0,1345362	-0,6052538		0,1345362	-0,4459765		0,5154638	0,7845362	0,7845362	0,5154638
21	-1,88	-1,93	-1,908571429	0,19	0,22	-2,1849746	-1,6035969	-1,6035969	-2,1849746	SD 3 (233)	0,0285714	0,05		0,2906888	0,0982887		0,2906888	0,1720052		-2,1956888	-1,6143112	-1,6143112	-2,1956888
22	0,92	0,5	0,521428571	0,09	0,1	0,586178	0,8552505	0,8552505	0,586178	SD 4 (32)	0,3985714	0,42		0,1345362	2,9625581	*	0,1345362	3,1218354	*	0,5754638	0,8445362	0,8445362	0,5754638
23	2,11	2,24	2,261428571	0,09	0,1	2,051178	2,3202505	2,3202505	2,051178	SD 4 (60)	-0,1514286	-0,13		0,1345362	-1,1255597		0,1345362	-0,9662824		2,0404638	2,3095362	2,3095362	2,0404638
24	1,27	1,64	1,661428571	0,08	0,1	1,3376518	1,5937768	1,5937768	1,3376518	SD 4 (74)	-0,3914286	-0,37		0,1280625	-3,0565436	*	0,1280625	-2,8892146	*	1,3269375	1,5830625	1,5830625	1,3269375
25	1,68	1,66	1,681428571	0,08	0,1	1,5526518	1,8087768	1,8087768	1,5526518	SD 4 (85)	-0,0014286	0,02		0,1280625	-0,0111553		0,1280625	0,1561738		1,5419375	1,7980625	1,7980625	1,5419375
26	0,76	0,6	0,621428571	0,09	0,1	0,556178	0,8252505	0,8252505	0,556178	SD 4 (94)	0,1385714	0,16		0,1345362	1,0299933		0,1345362	1,1892706		0,5454638	0,8145362	0,8145362	0,5454638
27	-0,05	0,41	0,431428571	0,1	0,1	0,0492929	0,3321356	0,3321356	0,0492929	SD 4 (107)	-0,4814286	-0,46		0,1414214	-3,4042141	*	0,1414214	-3,2526912	*	0,0385786	0,3214214	0,3214214	0,0385786
28	0,98	0,8	0,821428571	0,08	0,1	0,7726518	1,0287768	1,0287768	0,7726518	SD 4 (136)	0,1585714	0,18		0,1280625	1,2382348		0,1280625	1,4055639		0,7619375	1,0180625	1,0180625	0,7619375
29	1,58	1,63	1,651428571	0,08	0,1	1,4876518	1,7437768	1,7437768	1,4876518	SD 4 (150)	-0,0714286	-0,05		0,1280625	-0,5577634		0,1280625	-0,3904344		1,4769375	1,7330625	1,7330625	1,4769375
30	3,17	3,64	3,661428571	0,11	0,15	3,2297035	3,601725	3,601725	3,2297035	SD 4 (179)	-0,4914286	-0,47		0,1860108	-2,6419364	*	0,1860108	-2,5267357	*	3,2189892	3,5910108	3,5910108	3,2189892
31	1,1	0,81	0,831428571	0,08	0,1	0,8376518	1,0937768	1,0937768	0,8376518	SD 4 (214)	0,2685714	0,29		0,1280625	2,0971905	*	0,1280625	2,2645195	*	0,8269375	1,0830625	1,0830625	0,8269375
32	0,82	0,6	0,621428571	0,09	0,1	0,586178	0,8552505	0,8552505	0,586178	SD 4 (229)	0,1985714	0,22		0,1345362	1,4759698		0,1345362	1,6352471		0,5754638	0,8445362	0,8445362	0,5754638
33	-2,13	-1,8	-1,778571429	0,21	0,21	-2,2512706	-1,6573009	-1,6573009	-2,2512706	SD 5 (17)	-0,3514286	-0,33		0,2969848	-1,1833216		0,2969848	-1,1111678		-2,2619848	-1,6680152	-1,6680152	-2,2619848
34	-0,73	-0,77	-0,748571429	0,12	0,14	-0,9236766	-0,5548948	-0,5548948	-0,9236766	SD 5 (36)	0,0185714	0,04		0,1843909	0,1007177		0,1843909	0,2169305		-0,9343909	-0,5656091	-0,5656091	-0,9343909
35	0	-0,07	-0,048571429	0,1	0,11	-0,1729464	0,124375	0,124375	-0,1729464	SD 5 (39)	0,0485714	0,07		0,1486607	0,3267268		0,1486607	0,470871		-0,1836607	0,1136607	0,1136607	-0,1836607
36	-1,78	-2,15	-2,128571429	0,18	0,24	-2,2542857	-1,6542857	-1,6542857	-2,2542857	SD 5 (90)	0,3485714	0,37		0,3	1,1619048		0,3	1,2333333		-2,265	-1,665	-1,665	-2,265
37	-0,46	-0,29	-0,268571429	0,11	0,12	-0,5270739	-0,2014975	-0,2014975	-0,5270739	SD 5 (104)	-0,1914286	-0,17		0,1627882	-1,1759364		0,1627882	-1,0443017		-0,5377882	-0,2122118	-0,2122118	-0,5377882
38	1,75	1,66	1,681428571	0,08	0,1	1,5876518	1,8437768	1,8437768	1,5876518	SD 5 (115)	0,0685714	0,09		0,1280625	0,5354529		0,1280625	0,7027819		1,5769375	1,8330625	1,8330625	1,5769375
39	0,2	-0,11	-0,088571429	0,09	0,11	-0,0864124	0,197841	0,197841	-0,0864124	SD 5 (135)	0,2885714	0,31		0,1421267	2,0303815	*	0,1421267	2,1811524	*	-0,0971267	0,1871267	0,1871267	-0,0971267
40	-0,11	0,02	0,041428571	0,1	0,11	-0,1829464	0,114375	0,114375	-0,1829464	SD 5 (162)	-0,1514286	-0,13		0,1486607	-1,0186188		0,1486607	-0,8744746		-0,1936607	0,1036607	0,1036607	-0,1936607
41	1,5	1,67	1,691428571	0,08	0,1	1,4676518	1,7237768	1,7237768	1,4676518	SD 5 (184)	-0,1914286	-0,17		0,1280625	-1,494806		0,1280625	-1,327477		1,4569375	1,7130625	1,7130625	1,4569375
42	-1,96	-2,99	-2,968571429	0,2	0,36	-2,8761109	-2,0524605	-2,0524605	-2,8761109	SD 5 (196)	1,0085714	1,03	*	0,4118252	2,4490279	*	0,4118252	2,5010611	*	-2,8868252	-2,0631748	-2,0631748	-2,8868252
43	-1,38	-1,17	-1,148571429	0,16	0,16	-1,4905599	-1,0380115	-1,0380115	-1,4905599	SD 5 (207)	-0,2314286	-0,21		0,2262742	-1,0227795		0,2262742	-0,9280777		-1,5012742	-1,0487258	-1,0487258	-1,5012742
44	0,33	0,29	0,311428571	0,09	0,11	0,1785876	0,462841	0,462841	0,1785876	SD 5 (221)	0,0185714	0,04		0,1421267	0,1306681		0,1421267	0,281439		0,1678733	0,4521267	0,4521267	0,1678733
	1,89243E-17	0,021428571	-0,021428571																				
corr	0,979383664	0,959192362		R 2																			

Gender Comparisons for the SD sub scales: SD 1 – SD 5

		SD1											0,5										
;ENTRY	Male measure	Fem measure	Fem Adj	Mal err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_EFEM	D+2*EE_MAL	D-2*EE_FEM
1	0,15	-0,02	-0,01875	0,1	0,12	-0,09058	0,22183	0,22183	-0,09058	SD1(4)	0,16875	0,17		0,156205	1,0803112		0,156205	1,0883135		-0,091205	0,221205	0,221205	-0,091205
2	3,21	2,72	2,72125	0,12	0,12	2,7959194	3,1353306	3,1353306	2,7959194	SD1(24)	0,48875	0,49		0,1697056	2,879987	*	0,1697056	2,8873527	*	2,7952944	3,1347056	3,1347056	2,7952944
3	-0,02	0,06	0,06125	0,1	0,11	-0,1280357	0,1692857	0,1692857	-0,1280357	SD1(58)	-0,08125	-0,08		0,1486607	-0,5465466		0,1486607	-0,5381382		-0,1286607	0,1686607	0,1686607	-0,1286607
4	-1,17	-1,47	-1,46875	0,13	0,16	-1,5255303	-1,1132197	-1,1132197	-1,5255303	SD1(86)	0,29875	0,3		0,2061553	1,4491504		0,2061553	1,4552138		-1,5261553	-1,1138447	-1,1138447	-1,5261553
5	0,53	1,11	1,11125	0,09	0,11	0,6784983	0,9627517	0,9627517	0,6784983	SD1(121)	-0,58125	-0,58	*	0,1421267	-4,0896607	*	0,1421267	-4,0808658	*	0,6778733	0,9621267	0,9621267	0,6778733
6	-2,43	-2,27	-2,26875	0,2	0,22	-2,6466964	-2,0520536	-2,0520536	-2,6466964	SD1(151)	-0,16125	-0,16		0,2973214	-0,5423424		0,2973214	-0,5381382		-2,6473214	-2,0526786	-2,0526786	-2,6473214
7	0,48	0,73	0,73125	0,09	0,11	0,4634983	0,7477517	0,7477517	0,4634983	SD1(169)	-0,25125	-0,25		0,1421267	-1,7677888		0,1421267	-1,7589939		0,4628733	0,7471267	0,7471267	0,4628733
8	-0,76	-0,86	-0,85875	0,12	0,14	-0,9937659	-0,6249841	-0,6249841	-0,9937659	SD1(198)	0,09875	0,1		0,1843909	0,5355471		0,1843909	0,5423261		-0,9943909	-0,6256091	-0,6256091	-0,9943909
	-0,00125	0	-0,00125																				
corr	0,978544486	0,957549311		R 2																			
		SD2																					
;ENTRY	Male measure	Fem measure	Fem Adj	Mal err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_EFEM	D+2*EE_MAL	D-2*EE_FEM
1	2,13	2,53	2,53	0,1	0,11	2,1813393	2,4786607	2,4786607	2,1813393	SD2(9)▯	-0,4	-0,4		0,1486607	-2,6906912	*	0,1486607	-2,6906912	*	2,1813393	2,4786607	2,4786607	2,1813393
2	0,77	0,85	0,85	0,12	0,12	0,6402944	0,9797056	0,9797056	0,6402944	SD2(30)	-0,08	-0,08		0,1697056	-0,4714045		0,1697056	-0,4714045		0,6402944	0,9797056	0,9797056	0,6402944
3	-2,4	-2,31	-2,31	0,36	0,39	-2,8857542	-1,8242458	-1,8242458	-2,8857542	SD2(59)	-0,09	-0,09		0,5307542	-0,16957		0,5307542	-0,16957		-2,8857542	-1,8242458	-1,8242458	-2,8857542
4	1,37	1,54	1,54	0,1	0,11	1,3063393	1,6036607	1,6036607	1,3063393	SD2(105)	-0,17	-0,17		0,1486607	-1,1435437		0,1486607	-1,1435437		1,3063393	1,6036607	1,6036607	1,3063393
5	-0,5	-0,55	-0,55	0,17	0,18	-0,7725884	-0,2774116	-0,2774116	-0,7725884	SD2(126)▯	0,05	0,05		0,2475884	0,2019481		0,2475884	0,2019481		-0,7725884	-0,2774116	-0,2774116	-0,7725884
6	1,61	1	1	0,1	0,12	1,148795	1,461205	1,461205	1,148795	SD2(159)	0,61	0,61	*	0,156205	3,9051248	*	0,156205	3,9051248	*	1,148795	1,461205	1,461205	1,148795
7	-0,92	-0,89	-0,89	0,19	0,21	-1,188196	-0,621804	-0,621804	-1,188196	SD2(177)	-0,03	-0,03		0,283196	-0,1059337		0,283196	-0,1059337		-1,188196	-0,621804	-0,621804	-1,188196
8	-2,06	-2,17	-2,17	0,31	0,36	-2,5900789	-1,6399211	-1,6399211	-2,5900789	SD2(223)	0,11	0,11		0,4750789	0,2315405		0,4750789	0,2315405		-2,5900789	-1,6399211	-1,6399211	-2,5900789
	0	0	0																				
corr	0,986280396	0,972749019		R 2																			
		SD3																					
;ENTRY	Male measure	Fem measure	Fem Adj	Mal err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_EFEM	D+2*EE_MAL	D-2*EE_FEM
1	0,24	0,01	0,008	0,13	0,14	-0,0670497	0,3150497	0,3150497	-0,0670497	SD3(40)	0,232	0,23		0,1910497	1,2143435		0,1910497	1,203875		-0,0660497	0,3160497	0,3160497	-0,0660497
2	**-1,04**	**-0,65**	-0,652	0,17	0,16	-1,0794524	-0,6125476	-0,6125476	-1,0794524	SD3(106)	-0,388	-0,39		0,2334524	-1,6620094		0,2334524	-1,6705765		-1,0784524	-0,6115476	-0,6115476	-1,0784524
3	0,56	0,92	0,918	0,12	0,13	0,5620819	0,9159181	0,9159181	0,5620819	SD3(171)	-0,358	-0,36		0,1769181	-2,0235356	*	0,1769181	-2,0348403	*	0,5630819	0,9169181	0,9169181	0,5630819
4	1,74	1,55	1,548	0,12	0,13	1,4670819	1,8209181	1,8209181	1,4670819	SD3(197)	0,192	0,19		0,1769181	1,0852482		0,1769181	1,0739435		1,4680819	1,8219181	1,8219181	1,4680819
5	-1,5	-1,84	-1,842	0,2	0,24	-1,98341	-1,35859	-1,35859	-1,98341	SD3(233)	0,342	0,34		0,31241	1,0947153		0,31241	1,0883135		-1,98241	-1,35759	-1,35759	-1,98241
	0	-0,002	0,002																				
corr	0,965001236	0,931227386		R 2																			

		SD4																					
;ENTRY	**Male measure**	**Fem measure**	**Fem Adj**	**Mal err**	**Fem err**	**d-2*emal**	**d+2*efem**	**d+2*emal**	**d-2*efem**											**D-2*EE_MAL**	**D+2*EE_EFEM**	**D+2*EE_MAL**	**D-2*EE_FEM**
1	-0,47	-0,96	-0,9590909	0,09	0,11	-0,8566722	-0,5724188	-0,5724188	-0,8566722	SD4(32)	0,49	0,49		0,1421267	3,4412316	*	0,1421267	3,447628	*	-0,8571267	-0,5728733	-0,5728733	-0,8571267
2	0,96	1,08	1,0809091	0,1	0,11	0,8717939	1,1691152	1,1691152	0,8717939	SD4(60)	-0,12	-0,12		0,1486607	-0,8133226		0,1486607	-0,8072074		0,8713393	1,1686607	1,1686607	0,8713393
3	-0,04	0,37	0,3709091	0,09	0,1	0,0309183	0,2999908	0,2999908	0,0309183	SD4(74)	-0,41	-0,41		0,1345362	-3,0542632	*	0,1345362	-3,047506	*	0,0304638	0,2995362	0,2995362	0,0304638
4	0,44	0,4	0,4009091	0,09	0,1	0,2859183	0,5549908	0,5549908	0,2859183	SD4(85)	0,04	0,04		0,1345362	0,2905604		0,1345362	0,2973177		0,2854638	0,5545362	0,5545362	0,2854638
5	-0,64	-0,83	-0,8290909	0,09	0,11	-0,8766722	-0,5924188	-0,5924188	-0,8766722	SD4(94)	0,19	0,19		0,1421267	1,330439		0,1421267	1,3368353		-0,8771267	-0,5928733	-0,5928733	-0,8771267
6	**-1,6**	**-1,07**	-1,0690909	0,11	0,11	-1,4901089	-1,178982	-1,178982	-1,4901089	SD4(107)	-0,53	-0,53	*	0,1555635	-3,4128129	*	0,1555635	-3,406969	*	-1,4905635	-1,1794365	-1,1794365	-1,4905635
7	-0,37	-0,6	-0,5990909	0,09	0,11	-0,6266722	-0,3424188	-0,3424188	-0,6266722	SD4(136)	0,23	0,23		0,1421267	1,611878		0,1421267	1,6182744		-0,6271267	-0,3428733	-0,3428733	-0,6271267
8	0,32	0,37	0,3709091	0,09	0,1	0,2109183	0,4799908	0,4799908	0,2109183	SD4(150)	-0,05	-0,05		0,1345362	-0,3784043		0,1345362	-0,3716471		0,2104638	0,4795362	0,4795362	0,2104638
9	2,23	2,68	2,6809091	0,12	0,16	2,2554545	2,6554545	2,6554545	2,2554545	SD4(179)	-0,45	-0,45		0,2	-2,2545455	*	0,2	-2,25	*	2,255	2,655	2,655	2,255
10	-0,25	-0,6	-0,5990909	0,09	0,11	-0,5666722	-0,2824188	-0,2824188	-0,5666722	SD4(214)	0,35	0,35		0,1421267	2,4561951	*	0,1421267	2,4625914	*	-0,5671267	-0,2828733	-0,2828733	-0,5671267
11	-0,58	-0,83	-0,8290909	0,09	0,11	-0,8466722	-0,5624188	-0,5624188	-0,8466722	SD4(229)	0,25	0,25		0,1421267	1,7525975		0,1421267	1,7589939		-0,8471267	-0,5628733	-0,5628733	-0,8471267
	0	**0,000909091**	**-0,0009091**																				
corr	0,95664271	0,915165274		R 2																			

		SD5											**0,5**										
;ENTRY	**Male measure**	**Fem measure**	**Fem Adj**	**Male err**	**Fem err**	**d-2*emal**	**d+2*efem**	**d+2*emal**	**d-2*efem**											**D-2*EE_MAL**	**D+2*EE_FEM**	**D+2*EE_MAL**	**D-2*EE_FEM**
1	-1,87	-1,46	-1,4608333	0,22	0,21	-1,9695548	-1,3612785	-1,3612785	-1,9695548	SD5(17)	-0,41	-0,41		0,3041381	-1,3453317		0,3041381	-1,3480717		-1,9691381	-1,3608619	-1,3608619	-1,9691381
2	-0,41	-0,36	-0,3608333	0,13	0,14	-0,5764664	-0,1943669	-0,1943669	-0,5764664	SD5(36)	-0,05	-0,05		0,1910497	-0,2573501		0,1910497	-0,261712		-0,5760497	-0,1939503	-0,1939503	-0,5760497
3	0,39	0,38	0,3791667	0,1	0,12	0,2283783	0,5407883	0,5407883	0,2283783	SD5(39)	0,01	0,01		0,156205	0,0693533		0,156205	0,0640184		0,228795	0,541205	0,541205	0,228795
4	-1,47	-1,76	-1,7608333	0,18	0,24	-1,9154167	-1,3154167	-1,3154167	-1,9154167	SD5(90)	0,29	0,29		0,3	0,9694444		0,3	0,9666667		-1,915	-1,315	-1,315	-1,915
5	**-0,11**	**0,14**	0,1391667	0,12	0,13	-0,1623347	0,1915014	0,1915014	-0,1623347	SD5(104)	-0,25	-0,25		0,1769181	-1,4083733		0,1769181	-1,4130835		-0,1619181	0,1919181	0,1919181	-0,1619181
6	2,43	2,43	2,4291667	0,09	0,11	2,2874566	2,57171	2,57171	2,2874566	SD5(115)	0,00	0		0,1421267	0,0058633		0,1421267	0		2,2878733	2,5721267	2,5721267	2,2878733
7	0,64	0,36	0,3591667	0,1	0,12	0,3433783	0,6557883	0,6557883	0,3433783	SD5(135)	0,28	0,28		0,156205	1,7978512		0,156205	1,7925163		0,343795	0,656205	0,656205	0,343795
8	0,26	0,48	0,4791667	0,11	0,12	0,2067951	0,5323715	0,5323715	0,2067951	SD5(162)	-0,22	-0,22		0,1627882	-1,3463301		0,1627882	-1,3514493		0,2072118	0,5327882	0,5327882	0,2072118
9	2,11	2,43	2,4291667	0,09	0,11	2,1274566	2,41171	2,41171	2,1274566	SD5(184)	-0,32	-0,32		0,1421267	-2,2456488	*	0,1421267	-2,2515121	*	2,1278733	2,4121267	2,4121267	2,1278733
10	-1,69	-2,67	-2,6708333	0,2	0,36	-2,5922419	-1,7685915	-1,7685915	-2,5922419	SD5(196)	0,98	0,98	*	0,4118252	2,3816739	*	0,4118252	2,3796504	*	-2,5918252	-1,7681748	-1,7681748	-2,5918252
11	-1,06	-0,78	-0,7808333	0,16	0,16	-1,1466908	-0,6941425	-0,6941425	-1,1466908	SD5(207)	-0,28	-0,28		0,2262742	-1,233754		0,2262742	-1,2374369		-1,1462742	-0,6937258	-0,6937258	-1,1462742
12	0,78	0,8	0,7991667	0,1	0,11	0,6409226	0,938244	0,938244	0,6409226	SD5(221)	-0,02	-0,02		0,1486607	-0,128929		0,1486607	-0,1345346		0,6413393	0,9386607	0,9386607	0,6413393
	0	-0,000833333	0,0008333																				
corr	0,971288466	0,943401285		2																			

Gender Comparisons for the primary C scale

;ENTRY	Male measure	Fem measure	fem Adj	Mal er	fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAI	D-2*EE_FEM
1	-1,73	-1,77	-1,7704762	0,18	0,22	-2,0344915	-1,4659847	-1,4659847	-2,0344915	C 1 (5)	0,0404762	0,04		0,2842534	0,1423947		0,2842534	0,1407195		-2,0342534	-1,4657466	-1,4657466	-2,0342534
2	-1,09	-0,4	-0,4004762	0,14	0,13	-0,9362878	-0,5541884	-0,5541884	-0,9362878	C 1 (16)	-0,6895238	-0,69	*	0,1910497	-3,6091326	*	0,1910497	-3,6116251	*	-0,9360497	-0,5539503	-0,5539503	-0,9360497
3	0,2	0,09	0,0895238	0,09	0,11	0,0026352	0,2868886	0,2868886	0,0026352	C 1 (48)	0,1104762	0,11		0,1421267	0,7773078		0,1421267	0,7739573		0,0028733	0,2871267	0,2871267	0,0028733
4	-2,71	-2,64	-2,6404762	0,28	0,32	-3,1004439	-2,2500323	-2,2500323	-3,1004439	C 1 (89)	-0,0695238	-0,07		0,4252058	-0,1635062		0,4252058	-0,1646262		-3,1002058	-2,2497942	-2,2497942	-3,1002058
5	-0,18	-0,06	-0,0604762	0,1	0,12	-0,2764431	0,0359669	0,0359669	-0,2764431	C 1 (122)	-0,1195238	-0,12		0,156205	-0,7651728		0,156205	-0,7682213		-0,276205	0,036205	0,036205	-0,276205
6	-0,72	-0,47	-0,4704762	0,12	0,13	-0,7721562	-0,41832	-0,41832	-0,7721562	C 1 (133)	-0,2495238	-0,25		0,1769181	-1,410392		0,1769181	-1,4130835		-0,7719181	-0,4180819	-0,4180819	-0,7719181
7	-2,07	-2,22	-2,2204762	0,21	0,26	-2,4794536	-1,8110226	-1,8110226	-2,4794536	C 1 (172)	0,1504762	0,15		0,3342155	0,450237		0,3342155	0,4488122		-2,4792155	-1,8107845	-1,8107845	-2,4792155
8	1,64	1,2	1,1995238	0,08	0,09	1,299346	1,5401779	1,5401779	1,299346	C 1 (234)	0,4404762	0,44		0,1204159	3,6579557	*	0,1204159	3,6540011	*	1,2995841	1,5404159	1,5404159	1,2995841
9	-0,19	-0,45	-0,4504762	0,1	0,13	-0,4842503	-0,1562259	-0,1562259	-0,4842503	C 2 (25)	0,2604762	0,26		0,1640122	1,5881514		0,1640122	1,585248		-0,4840122	-0,1559878	-0,1559878	-0,4840122
10	-0,02	0,13	0,1295238	0,1	0,11	-0,0938988	0,2034226	0,2034226	-0,0938988	C 2 (49)	-0,1495238	-0,15		0,1486607	-1,005806		0,1486607	-1,0090092		-0,0936607	0,2036607	0,2036607	-0,0936607
11	-1,07	-1,28	-1,2804762	0,14	0,18	-1,4032732	-0,947203	-0,947203	-1,4032732	C 2 (73)	0,2104762	0,21		0,2280351	0,9229992		0,2280351	0,9209109		-1,4030351	-0,9469649	-0,9469649	-1,4030351
12	0,14	0,08	0,0795238	0,09	0,11	-0,0323648	0,2518886	0,2518886	-0,0323648	C 2 (137)	0,0604762	0,06		0,1421267	0,425509		0,1421267	0,4221585		-0,0321267	0,2521267	0,2521267	-0,0321267
13	-0,52	-0,73	-0,7304762	0,11	0,14	-0,803283	-0,4471932	-0,4471932	-0,803283	C 2 (161)	0,2104762	0,21		0,1780449	1,1821521		0,1780449	1,1794775		-0,8030449	-0,4469551	-0,4469551	-0,8030449
14	0,9	1,36	1,3595238	0,08	0,09	1,009346	1,2501779	1,2501779	1,009346	C 2 (185)	-0,4595238	-0,46		0,1204159	-3,8161375	*	0,1204159	-3,8200921	*	1,0095841	1,2504159	1,2504159	1,0095841
15	2,33	2,38	2,3795238	0,09	0,1	2,2202257	2,4892981	2,4892981	2,2202257	C 2 (227)	-0,0495238	-0,05		0,1345362	-0,3681076		0,1345362	-0,3716471		2,2204638	2,4895362	2,4895362	2,2204638
16	-2,63	-2,3	-2,3004762	0,27	0,27	-2,8470758	-2,0834004	-2,0834004	-2,8470758	C 3 (10)	-0,3295238	-0,33		0,3818377	-0,8629945		0,3818377	-0,8642416		-2,8468377	-2,0831623	-2,0831623	-2,8468377
17	**3,1**	**3,08**	3,0795238	0,11	0,12	2,9269737	3,2525501	3,2525501	2,9269737	C 3 (47)	0,0204762	0,02		0,1627882	0,1257842		0,1627882	0,122859		2,9272118	3,2527882	3,2527882	2,9272118
18	**0,26**	**-0,06**	-0,0604762	0,09	0,12	-0,0502381	0,2497619	0,2497619	-0,0502381	C 3 (64)	0,3204762	0,32		0,15	2,1365079	*	0,15	2,1333333	*	-0,05	0,25	0,25	-0,05
19	-1,99	-2,22	-2,2204762	0,2	0,26	-2,4332625	-1,7772137	-1,7772137	-2,4332625	C 3 (87)	0,2304762	0,23		0,3280244	0,7026191		0,3280244	0,7011674		-2,4330244	-1,7769756	-1,7769756	-2,4330244
20	-2,5	-1,97	-1,9704762	0,25	0,24	-2,5817926	-1,8886836	-1,8886836	-2,5817926	C 3 (127)	-0,5295238	-0,53	*	0,3465545	-1,527967		0,3465545	-1,5293411		-2,5815545	-1,8884455	-1,8884455	-2,5815545
21	2,46	2,58	2,5795238	0,09	0,11	2,3776352	2,6618886	2,6618886	2,3776352	C 3 (153)	-0,1195238	-0,12		0,1421267	-0,8409666		0,1421267	-0,8443171		2,3778733	2,6621267	2,6621267	2,3778733
22	-1	-0,71	-0,7104762	0,13	0,14	-1,0462878	-0,6641884	-0,6641884	-1,0462878	C 3 (178)	-0,2895238	-0,29		0,1910497	-1,5154369		0,1910497	-1,5179294		-1,0460497	-0,6639503	-0,6639503	-1,0460497
23	2,41	2,52	2,5195238	0,09	0,11	2,3226352	2,6068886	2,6068886	2,3226352	C 3 (216)	-0,1095238	-0,11		0,1421267	-0,7706068		0,1421267	-0,7739573		2,3228733	2,6071267	2,6071267	2,3228733
24	-1,26	-1,48	-1,4804762	0,15	0,19	-1,6123125	-1,1281637	-1,1281637	-1,6123125	C 4 (7)	0,2204762	0,22		0,2420744	0,9107787		0,2420744	0,9088116		-1,6120744	-1,1279256	-1,1279256	-1,6120744
25	-0,03	-0,47	-0,4704762	0,1	0,13	-0,4142503	-0,0862259	-0,0862259	-0,4142503	C 4 (33)	0,4404762	0,44		0,1640122	2,6856307	*	0,1640122	2,6827273	*	-0,4140122	-0,0859878	-0,0859878	-0,4140122
26	1,3	1,7	1,6995238	0,08	0,1	1,3716994	1,6278244	1,6278244	1,3716994	C 4 (57)	-0,3995238	-0,4		0,1280625	-3,1197568	*	0,1280625	-3,1234752	*	1,3719375	1,6280625	1,6280625	1,3719375
27	-1,28	-1,25	-1,2504762	0,15	0,17	-1,4919538	-1,0385224	-1,0385224	-1,4919538	C 4 (78)	-0,0295238	-0,03		0,2267157	-0,1302239		0,2267157	-0,1323243		-1,4917157	-1,0382843	-1,0382843	-1,4917157
28	2,74	2,48	2,4795238	0,1	0,1	2,4683405	2,7511833	2,7511833	2,4683405	C 4 (98)	0,2604762	0,26		0,1414214	1,8418448		0,1414214	1,8384776		2,4685786	2,7514214	2,7514214	2,4685786
29	-0,42	-0,49	-0,4904762	0,11	0,13	-0,625532	-0,2849442	-0,2849442	-0,625532	C 4 (124)	0,0704762	0,07		0,1702939	0,4138504		0,1702939	0,4110542		-0,6252939	-0,2847061	-0,2847061	-0,6252939
30	-0,3	-0,6	-0,6004762	0,11	0,14	-0,628283	-0,2721932	-0,2721932	-0,628283	C 4 (146)	0,3004762	0,3		0,1780449	1,6876424		0,1780449	1,6849679		-0,6280449	-0,2719551	-0,2719551	-0,6280449
31	-0,69	-0,65	-0,6504762	0,12	0,14	-0,854629	-0,4858472	-0,4858472	-0,854629	C 4 (168)	-0,0395238	-0,04		0,1843909	-0,214348		0,1843909	-0,2169305		-0,8543909	-0,4856091	-0,4856091	-0,8543909
32	-1,07	-1,16	-1,1604762	0,14	0,17	-1,3354653	-0,8950109	-0,8950109	-1,3354653	C 4 (199)	0,0904762	0,09		0,2202272	0,4108312		0,2202272	0,4086689		-1,3352272	-0,8947728	-0,8947728	-1,3352272
33	-1,61	-1,82	-1,8204762	0,17	0,22	-1,9932669	-1,4372093	-1,4372093	-1,9932669	C 4 (222)	0,2104762	0,21		0,2780288	0,7570302		0,2780288	0,7553175		-1,9930288	-1,4369712	-1,4369712	-1,9930288
34	2,66	2,33	2,3295238	0,1	0,1	2,3533405	2,6361833	2,6361833	2,3533405	C 5 (18)	0,3304762	0,33		0,1414214	2,3368196	*	0,1414214	2,3334524	*	2,3535786	2,6364214	2,6364214	2,3535786
35	0,43	0,18	0,1795238	0,09	0,11	0,1626352	0,4468886	0,4468886	0,1626352	C 5 (50)	0,2504762	0,25		0,1421267	1,7623443		0,1421267	1,7589939		0,1628733	0,4471267	0,4471267	0,1628733
36	0,43	-0,09	-0,0904762	0,09	0,12	0,0197619	0,3197619	0,3197619	0,0197619	C 5 (72)	0,5204762	0,52	*	0,15	3,4698413	*	0,15	3,4666667	*	0,02	0,32	0,32	0,02
37	-0,31	-0,47	-0,4704762	0,11	0,13	-0,560532	-0,2199442	-0,2199442	-0,560532	C 5 (93)	0,1604762	0,16		0,1702939	0,9423486		0,1702939	0,9395524		-0,5602939	-0,2197061	-0,2197061	-0,5602939
38	0,93	1,12	1,1195238	0,08	0,1	0,8966994	1,1528244	1,1528244	0,8966994	C 5 (138)	-0,1895238	-0,19		0,1280625	-1,4799323		0,1280625	-1,4836507		0,8969375	1,1530625	1,1530625	0,8969375
39	0,64	0,79	0,7895238	0,09	0,1	0,5802257	0,8492981	0,8492981	0,5802257	C 5 (160)	-0,1495238	-0,15		0,1345362	-1,1114017		0,1345362	-1,1149412		0,5804638	0,8495362	0,8495362	0,5804638
40	-1,8	-1,82	-1,8204762	0,19	0,22	-2,1009269	-1,5195493	-1,5195493	-2,1009269	C 5 (186)	0,0204762	0,02		0,2906888	0,0704402		0,2906888	0,0688021		-2,1006888	-1,5193112	-1,5193112	-2,1006888
41	2,25	2,73	2,7295238	0,09	0,11	2,3476352	2,6318886	2,6318886	2,3476352	C 5 (206)	-0,4795238	-0,48		0,1421267	-3,3739178	*	0,1421267	-3,3772682	*	2,3478733	2,6321267	2,6321267	2,3478733
42	2,41	2,85	2,8495238	0,09	0,11	2,4876352	2,7718886	2,7718886	2,4876352	C 5 (235)	-0,4395238	-0,44		0,1421267	-3,0924787	*	0,1421267	-3,0958292	*	2,4878733	2,7721267	2,7721267	2,4878733
	0,000952381	0,00047619	0,0004762																				
corr	0,984245214	0,968738641		R 2																			

Gender Comparisons for the C sub scales: C 1 – C 5

		C1											0,5										
;ENTRY	Males measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	-1,18	-1,21	-1,2125	0,19	0,23	-1,4945787	-0,8979213	-0,8979213	-1,4945787	C1(5)	0,0325	0,03		0,2983287	0,1089402		0,2983287	0,1005602		-1,4933287	-0,8966713	-0,8966713	-1,4933287
2	-0,43	0,39	0,3875	0,15	0,14	-0,2264328	0,1839328	0,1839328	-0,2264328	C1(16)	-0,8175	-0,82	*	0,2051828	-3,9842512	*	0,2051828	-3,9964355	*	-0,2251828	0,1851828	0,1851828	-0,2251828
3	1,22	1,02	1,0175	0,11	0,13	0,9484561	1,2890439	1,2890439	0,9484561	C1(48)	0,2025	0,2		0,1702939	1,1891209		0,1702939	1,1744404		0,9497061	1,2902939	1,2902939	0,9497061
4	-2,24	-2,19	-2,1925	0,29	0,34	-2,6631281	-1,7693719	-1,7693719	-2,6631281	C1(89)	-0,0475	-0,05		0,4468781	-0,106293		0,4468781	-0,1118873		-2,6618781	-1,7681219	-1,7681219	-2,6618781
5	0,71	0,82	0,8175	0,12	0,13	0,5868319	0,9406681	0,9406681	0,5868319	C1(122)	-0,1075	-0,11		0,1769181	-0,6076259		0,1769181	-0,6217568		0,5880819	0,9419181	0,9419181	0,5880819
6	0,02	0,31	0,3075	0,14	0,14	-0,0342399	0,3617399	0,3617399	-0,0342399	C1(133)	-0,2875	-0,29		0,1979899	-1,4520943		0,1979899	-1,4647212		-0,0329899	0,3629899	0,3629899	-0,0329899
7	-1,55	-1,72	-1,7225	0,22	0,28	-1,9923399	-1,2801601	-1,2801601	-1,9923399	C1(172)	0,1725	0,17		0,3560899	0,4844283		0,3560899	0,4774076		-1,9910899	-1,2789101	-1,2789101	-1,9910899
8	3,47	2,58	2,5775	0,12	0,12	2,8540444	3,1934556	3,1934556	2,8540444	C1(234)	0,8925	0,89	*	0,1697056	5,2591067	*	0,1697056	5,2443753	*	2,8552944	3,1947056	3,1947056	2,8552944
	0,0025	**0**	**0,0025**																				
corr	**0,967895035**	**0,936820799**		**R 2**																			

		C2																					
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	-0,48	-0,75	-0,7557143	0,11	0,13	-0,788151	-0,4475633	-0,4475633	-0,788151	C2(25)	0,2757143	0,27		0,1702939	1,61905		0,1702939	1,5854946		-0,7852939	-0,4447061	-0,4447061	-0,7852939
2	-0,29	-0,12	-0,1257143	0,1	0,12	-0,3640621	-0,0516521	-0,0516521	-0,3640621	C2(49)	-0,1642857	-0,17		0,156205	-1,0517315		0,156205	-1,0883135		-0,361205	-0,048795	-0,048795	-0,361205
3	-1,42	-1,62	-1,6257143	0,14	0,18	-1,7508922	-1,2948221	-1,2948221	-1,7508922	C2(73)	0,2057143	0,2		0,2280351	0,9021168		0,2280351	0,877058		-1,7480351	-1,2919649	-1,2919649	-1,7480351
4	-0,12	-0,17	-0,1757143	0,1	0,12	-0,3040621	0,0083479	0,0083479	-0,3040621	C2(137)	0,0557143	0,05		0,156205	0,3566742		0,156205	0,3200922		-0,301205	0,011205	0,011205	-0,301205
5	-0,83	-1,04	-1,0457143	0,12	0,15	-1,1299509	-0,7457634	-0,7457634	-1,1299509	C2(161)	0,2157143	0,21		0,1920937	1,1229637		0,1920937	1,0932163		-1,1270937	-0,7429063	-0,7429063	-1,1270937
6	0,74	1,25	1,2442857	0,09	0,1	0,8576066	1,1266791	1,1266791	0,8576066	C2(185)	-0,5042857	-0,51	*	0,1345362	-3,7483262	*	0,1345362	-3,7908001	*	0,8604638	1,1295362	1,1295362	0,8604638
7	2,42	2,43	2,4242857	0,1	0,11	2,2734822	2,5708035	2,5708035	2,2734822	C2(227)	-0,0042857	-0,01		0,1486607	-0,0288288		0,1486607	-0,0672673		2,2763393	2,5736607	2,5736607	2,2763393
	0,002857143	**-0,002857143**	**0,0057143**																				
corr	**0,984880822**	**0,969990233**		**R 2**																			

		C3																					
;ENTRY	Male measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	-3,11	-2,78	-2,7825	0,28	0,28	-3,3422298	-2,5502702	-2,5502702	-3,3422298	C3(10)	-0,3275	-0,33		0,3959798	-0,8270624		0,3959798	-0,8333758		-3,3409798	-2,5490202	-2,5490202	-3,3409798
2	**3,75**	**3,52**	3,5175	0,12	0,13	3,4568319	3,8106681	3,8106681	3,4568319	C3(47)	0,2325	0,23		0,1769181	1,3141677		0,1769181	1,3000369		3,4580819	3,8119181	3,8119181	3,4580819
3	0,2	-0,3	-0,3025	0,1	0,13	-0,2152622	0,1127622	0,1127622	-0,2152622	C3(64)	0,5025	0,5		0,1640122	3,0637966	*	0,1640122	3,0485538	*	-0,2140122	0,1140122	0,1140122	-0,2140122
4	-2,41	-2,7	-2,7025	0,21	0,27	-2,8983026	-2,2141974	-2,2141974	-2,8983026	C3(87)	0,2925	0,29		0,3420526	0,8551316		0,3420526	0,8478228		-2,8970526	-2,2129474	-2,2129474	-2,8970526
5	-2,96	-2,43	-2,4325	0,26	0,24	-3,0500861	-2,3424139	-2,3424139	-3,0500861	C3(127)	-0,5275	-0,53	*	0,3538361	-1,4908031		0,3538361	-1,4978686		-3,0488361	-2,3411639	-2,3411639	-3,0488361
6	2,95	2,9	2,8975	0,1	0,12	2,767545	3,079955	3,079955	2,767545	C3(153)	0,0525	0,05		0,156205	0,3360968		0,156205	0,3200922		2,768795	3,081205	3,081205	2,768795
7	-1,3	-1,05	-1,0525	0,14	0,15	-1,3814328	-0,9710672	-0,9710672	-1,3814328	C3(178)	-0,2475	-0,25		0,2051828	-1,2062412		0,2051828	-1,2184254		-1,3801828	-0,9698172	-0,9698172	-1,3801828
8	2,89	2,83	2,8275	0,1	0,12	2,702545	3,014955	3,014955	2,702545	C3(216)	0,0625	0,06		0,156205	0,4001152		0,156205	0,3841106		2,703795	3,016205	3,016205	2,703795
	0,00125	**-0,00125**	**0,0025**																				
corr	**0,993793109**	**0,987624744**		**R 2**																			

		C4																					
;ENTRY	**Male measure**	**Fem measure**	**Fem Adj**	**Male err**	**Fem err**	**d-2*emal**	**d+2*efem**	**d+2*emal**	**d-2*efem**											**D-2*EE_MAL**	**D+2*EE_FEM**	**D+2*EE_MAL**	**D-2*EE_FEM**
1	-1,28	-1,35	-1,348	0,16	0,19	-1,5623948	-1,0656052	-1,0656052	-1,5623948	C4(7)	0,068	0,07		0,2483948	0,2737577		0,2483948	0,2818094		-1,5633948	-1,0666052	-1,0666052	-1,5633948
2	0,26	-0,09	-0,088	0,11	0,13	-0,0842939	0,2562939	0,2562939	-0,0842939	C4(33)	0,348	0,35		0,1702939	2,0435264	*	0,1702939	2,0552708	*	-0,0852939	0,2552939	0,2552939	-0,0852939
3	1,99	2,77	2,772	0,09	0,1	2,2464638	2,5155362	2,5155362	2,2464638	C4(57)	-0,782	-0,78	*	0,1345362	-5,8125602	*	0,1345362	-5,7976943	*	2,2454638	2,5145362	2,5145362	2,2454638
4	-1,31	-1,22	-1,218	0,17	0,18	-1,5115884	-1,0164116	-1,0164116	-1,5115884	C4(78)	-0,092	-0,09		0,2475884	-0,3715845		0,2475884	-0,3635066		-1,5125884	-1,0174116	-1,0174116	-1,5125884
5	4	3,82	3,822	0,12	0,12	3,7412944	4,0807056	4,0807056	3,7412944	C4(98)	0,178	0,18		0,1697056	1,0488751		0,1697056	1,0606602		3,7402944	4,0797056	4,0797056	3,7402944
6	**-0,23**	**-0,12**	-0,118	0,12	0,13	-0,3509181	0,0029181	0,0029181	-0,3509181	C4(124)	-0,112	-0,11		0,1769181	-0,6330614		0,1769181	-0,6217568		-0,3519181	0,0019181	0,0019181	-0,3519181
7	-0,09	-0,29	-0,288	0,12	0,14	-0,3733909	-0,0046091	-0,0046091	-0,3733909	C4(146)	0,198	0,2		0,1843909	1,0738058		0,1843909	1,0846523		-0,3743909	-0,0056091	-0,0056091	-0,3743909
8	-0,58	-0,43	-0,428	0,13	0,15	-0,7024943	-0,3055057	-0,3055057	-0,7024943	C4(168)	-0,152	-0,15		0,1984943	-0,7657649		0,1984943	-0,7556891		-0,7034943	-0,3065057	-0,3065057	-0,7034943
9	-1,06	-1,06	-1,058	0,15	0,17	-1,2857157	-0,8322843	-0,8322843	-1,2857157	C4(199)	-0,002	0		0,2267157	-0,0088216		0,2267157	0		-1,2867157	-0,8332843	-0,8332843	-1,2867157
10	-1,71	-2,02	-2,018	0,19	0,24	-2,1701046	-1,5578954	-1,5578954	-2,1701046	C4(222)	0,308	0,31		0,3061046	1,0061921		0,3061046	1,0127259		-2,1711046	-1,5588954	-1,5588954	-2,1711046
	-0,001	**0,001**	**-0,002**																				
corr	**0,985418447**	**0,971049517**		**R 2**																			

		C5											0,5										
;ENTRY	**Male measure**	**Fem measure**	**Fem Adj**	**Male err**	**Fem err**	**d-2*emal**	**d+2*efem**	**d+2*emal**	**d-2*efem**											**D-2*EE_MAL**	**D+2*EE_FEM**	**L**	**D-2*EE_FEM**
1	2,03	1,63	1,6288889	0,1	0,11	1,6807838	1,9781051	1,9781051	1,6807838	C5(18)	0,4011111	0,4		0,1486607	2,6981653	*	0,1486607	2,6906912	*	1,6813393	1,9786607	1,9786607	1,6813393
2	-0,48	-0,75	-0,7511111	0,09	0,11	-0,7576823	-0,4734289	-0,4734289	-0,7576823	C5(50)	0,2711111	0,27		0,1421267	1,9075311		0,1421267	1,8997134		-0,7571267	-0,4728733	-0,4728733	-0,7571267
3	-0,48	-1,04	-1,0411111	0,09	0,12	-0,9105556	-0,6105556	-0,6105556	-0,9105556	C5(72)	0,5611111	0,56	*	0,15	3,7407407	*	0,15	3,7333333	*	-0,91	-0,61	-0,61	-0,91
4	-1,3	-1,45	-1,4511111	0,11	0,14	-1,5536005	-1,1975106	-1,1975106	-1,5536005	C5(93)	0,1511111	0,15		0,1780449	0,8487246		0,1780449	0,8424839		-1,5530449	-1,1969551	-1,1969551	-1,5530449
5	0,08	0,28	0,2788889	0,09	0,1	0,0449082	0,3139807	0,3139807	0,0449082	C5(138)	-0,1988889	-0,2		0,1345362	-1,4783295		0,1345362	-1,4865883		0,0454638	0,3145362	0,3145362	0,0454638
6	-0,24	-0,08	-0,0811111	0,09	0,1	-0,2950918	-0,0260193	-0,0260193	-0,2950918	C5(160)	-0,1588889	-0,16		0,1345362	-1,1810118		0,1345362	-1,1892706		-0,2945362	-0,0254638	-0,0254638	-0,2945362
7	-2,89	-2,87	-2,8711111	0,19	0,22	-3,1712444	-2,5898667	-2,5898667	-3,1712444	C5(186)	-0,0188889	-0,02		0,2906888	-0,0649798		0,2906888	-0,0688021		-3,1706888	-2,5893112	-2,5893112	-3,1706888
8	1,56	2,08	2,0788889	0,09	0,12	1,6694444	1,9694444	1,9694444	1,6694444	C5(206)	-0,5188889	-0,52	*	0,15	-3,4592593	*	0,15	-3,4666667	*	1,67	1,97	1,97	1,67
9	1,74	2,21	2,2088889	0,1	0,12	1,8182395	2,1306494	2,1306494	1,8182395	C5(235)	-0,4688889	-0,47		0,156205	-3,0017535	*	0,156205	-3,0088667	*	1,818795	2,131205	2,131205	1,818795
	0,002222222	0,001111111	0,0011111																				
corr	0,978066575	0,956614226		R 2																			

Gender Comparisons for the primary ST scale

;ENTRY	Mal measure	Fem measure	Fem Adj	male err	fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_Mal	D+2*EE_Fem	D+2*EE_Mal	D-2*EE_Fem
1	1,77	1,86	1,85969697	0,09	0,1	1,6803122	1,9493847	1,9493847	1,6803122	ST 1 (8)	-0,089697	-0,09		0,1345362	-0,6667123		0,1345362	-0,6689647		1,6804638	1,9495362	1,9495362	1,6804638
2	3,58	3,56	3,55969697	0,15	0,18	3,335541	3,804156	3,804156	3,335541	ST 1 (23)	0,020303	0,02		0,2343075	0,0866512		0,2343075	0,0853579		3,3356925	3,8043075	3,8043075	3,3356925
3	0,86	0,7	0,69969697	0,08	0,09	0,6594325	0,9002644	0,9002644	0,6594325	ST 1 (45)	0,160303	0,16		0,1204159	1,3312442		0,1204159	1,3287277		0,6595841	0,9004159	0,9004159	0,6595841
4	1,22	1,19	1,18969697	0,08	0,09	1,0844325	1,3252644	1,3252644	1,0844325	ST 1 (76)	0,030303	0,03		0,1204159	0,251653		0,1204159	0,2491364		1,0845841	1,3254159	1,3254159	1,0845841
5	-0,79	-1,15	-1,15030303	0,11	0,14	-1,1481965	-0,7921066	-0,7921066	-1,1481965	ST 1 (96)	0,360303	0,36		0,1780449	2,0236634	*	0,1780449	2,0219614	*	-1,1480449	-0,7919551	-0,7919551	-1,1480449
6	1,43	1,44	1,43969697	0,08	0,1	1,306786	1,562911	1,562911	1,306786	ST 1 (125)	-0,009697	-0,01		0,1280625	-0,0757206		0,1280625	-0,0780869		1,3069375	1,5630625	1,5630625	1,3069375
7	1,43	1,3	1,29969697	0,08	0,1	1,236786	1,492911	1,492911	1,236786	ST 1 (152)	0,130303	0,13		0,1280625	1,0174957		0,1280625	1,0151295		1,2369375	1,4930625	1,4930625	1,2369375
8	-2,48	-2,34	-2,34030303	0,21	0,22	-2,7142896	-2,1060134	-2,1060134	-2,7142896	ST 1 (173)	-0,139697	-0,14		0,3041381	-0,4593208		0,3041381	-0,4603172		-2,7141381	-2,1058619	-2,1058619	-2,7141381
9	-0,59	-0,9	-0,90030303	0,1	0,13	-0,9091637	-0,5811393	-0,5811393	-0,9091637	ST 1 (195)	0,310303	0,31		0,1640122	1,891951		0,1640122	1,8901034		-0,9090122	-0,5809878	-0,5809878	-0,9090122
10	-0,67	-0,97	-0,97030303	0,1	0,13	-0,9841637	-0,6561393	-0,6561393	-0,9841637	ST 1 (215)	0,300303	0,3		0,1640122	1,8309799		0,1640122	1,8291323		-0,9840122	-0,6559878	-0,6559878	-0,9840122
11	1,84	1,67	1,66969697	0,09	0,1	1,6203122	1,8893847	1,8893847	1,6203122	ST 1 (228)	0,170303	0,17		0,1345362	1,2658525		0,1345362	1,2636		1,6204638	1,8895362	1,8895362	1,6204638
12	-1,18	-1	-1,00030303	0,12	0,13	-1,2670696	-0,9132335	-0,9132335	-1,2670696	ST 2 (15)	-0,179697	-0,18		0,1769181	-1,0157073		0,1769181	-1,0174202		-1,2669181	-0,9130819	-0,9130819	-1,2669181
13	-0,47	0,4	0,39969697	0,1	0,1	-0,1765729	0,1062698	0,1062698	-0,1765729	ST 2 (31)	-0,869697	-0,87	*	0,1414214	-6,1496862	*	0,1414214	-6,151829	*	-0,1764214	0,1064214	0,1064214	-0,1764214
14	-1,6	-1,39	-1,39030303	0,14	0,15	-1,7003344	-1,2899687	-1,2899687	-1,7003344	ST 2 (51)	-0,209697	-0,21		0,2051828	-1,0220005		0,2051828	-1,0234774		-1,7001828	-1,2898172	-1,2898172	-1,7001828
15	-1,66	-1,78	-1,78030303	0,15	0,17	-1,9468672	-1,4934358	-1,4934358	-1,9468672	ST 2 (84)	0,120303	0,12		0,2267157	0,5306339		0,2267157	0,5292973		-1,9467157	-1,4932843	-1,4932843	-1,9467157
16	-0,55	-0,31	-0,31030303	0,1	0,11	-0,5788122	-0,2814908	-0,2814908	-0,5788122	ST 2 (95)	-0,239697	-0,24		0,1486607	-1,6123763		0,1486607	-1,6144147		-0,5786607	-0,2813393	-0,2813393	-0,5786607
17	**-0,45**	**-0,44**	-0,44030303	0,1	0,11	-0,5938122	-0,2964908	-0,2964908	-0,5938122	ST 2 (132)	-0,009697	-0,01		0,1486607	-0,0652289		0,1486607	-0,0672673		-0,5936607	-0,2963393	-0,2963393	-0,5936607
18	**-0,78**	**-0,74**	-0,74030303	0,11	0,12	-0,9229397	-0,5973633	-0,5973633	-0,9229397	ST 2 (163)	-0,039697	-0,04		0,1627882	-0,2438565		0,1627882	-0,245718		-0,9227882	-0,5972118	-0,5972118	-0,9227882
19	0,03	0,12	0,11969697	0,09	0,1	-0,0596878	0,2093847	0,2093847	-0,0596878	ST 2 (200)	-0,089697	-0,09		0,1345362	-0,6667123		0,1345362	-0,6689647		-0,0595362	0,2095362	0,2095362	-0,0595362
20	-0,49	-1,04	-1,04030303	0,1	0,13	-0,9291637	-0,6011393	-0,6011393	-0,9291637	ST 2 (232)	0,550303	0,55	*	0,1640122	3,3552568	*	0,1640122	3,3534092	*	-0,9290122	-0,6009878	-0,6009878	-0,9290122
21	-0,64	-1,02	-1,02030303	0,1	0,13	-0,9941637	-0,6661393	-0,6661393	-0,9941637	ST 3 (6)	0,380303	0,38		0,1640122	2,3187485	*	0,1640122	2,3169009	*	-0,9940122	-0,6659878	-0,6659878	-0,9940122
22	0,93	0,9	0,89969697	0,08	0,09	0,7944325	1,0352644	1,0352644	0,7944325	ST 3 (38)	0,030303	0,03		0,1204159	0,251653		0,1204159	0,2491364		0,7945841	1,0354159	1,0354159	0,7945841
23	0,1	-0,02	-0,02030303	0,09	0,1	-0,0946878	0,1743847	0,1743847	-0,0946878	ST 3 (56)	0,120303	0,12		0,1345362	0,8942054		0,1345362	0,891953		-0,0945362	0,1745362	0,1745362	-0,0945362
24	-0,13	-0,39	-0,39030303	0,09	0,11	-0,4022782	-0,1180248	-0,1180248	-0,4022782	ST 3 (77)	0,260303	0,26		0,1421267	1,8314857		0,1421267	1,8293536		-0,4021267	-0,1178733	-0,1178733	-0,4021267
25	-2,56	-2,56	-2,56030303	0,21	0,24	-2,8790559	-2,2412471	-2,2412471	-2,8790559	ST 3 (88)	0,000303	0		0,3189044	0,0009502		0,3189044	0		-2,8789044	-2,2410956	-2,2410956	-2,8789044
26	0,23	0,58	0,57969697	0,09	0,09	0,2775693	0,5321277	0,5321277	0,2775693	ST 3 (97)	-0,349697	-0,35		0,1272792	-2,7474789	*	0,1272792	-2,7498597	*	0,2777208	0,5322792	0,5322792	0,2777208
27	0,17	0,23	0,22969697	0,09	0,1	0,0653122	0,3343847	0,3343847	0,0653122	ST 3 (116)	-0,059697	-0,06		0,1345362	-0,4437241		0,1345362	-0,4459765		0,0654638	0,3345362	0,3345362	0,0654638
28	0,86	0,97	0,96969697	0,08	0,09	0,7944325	1,0352644	1,0352644	0,7944325	ST 3 (123)	-0,109697	-0,11		0,1204159	-0,9109837		0,1204159	-0,9135003		0,7945841	1,0354159	1,0354159	0,7945841
29	1,11	1,08	1,07969697	0,08	0,09	0,9744325	1,2152644	1,2152644	0,9744325	ST 3 (145)	0,030303	0,03		0,1204159	0,251653		0,1204159	0,2491364		0,9745841	1,2154159	1,2154159	0,9745841
30	-0,89	-0,79	-0,79030303	0,11	0,12	-1,0029397	-0,6773633	-0,6773633	-1,0029397	ST 3 (175)	-0,099697	-0,1		0,1627882	-0,6124336		0,1627882	-0,6142951		-1,0027882	-0,6772118	-0,6772118	-1,0027882
31	-0,72	-0,37	-0,37030303	0,11	0,11	-0,700715	-0,389588	-0,389588	-0,700715	ST 3 (194)	-0,349697	-0,35		0,1555635	-2,2479373	*	0,1555635	-2,2498852	*	-0,7005635	-0,3894365	-0,3894365	-0,7005635
32	-0,24	-0,32	-0,32030303	0,09	0,11	-0,4222782	-0,1380248	-0,1380248	-0,4222782	ST 3 (208)	0,080303	0,08		0,1421267	0,5650101		0,1421267	0,562878		-0,4221267	-0,1378733	-0,1378733	-0,4221267
33	1,33	1,52	1,51969697	0,08	0,1	1,296786	1,552911	1,552911	1,296786	ST 3 (220)	-0,189697	-0,19		0,1280625	-1,4812845		0,1280625	-1,4836507		1,2969375	1,5530625	1,5530625	1,2969375
	0	-0,00030303	0,00030303																				
corr	0,98028625	0,960961131		R 2																			

Gender Comparisons for the ST sub scales: ST 1 – ST 3

		ST1									new		0,5										
;ENTRY	Mal measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	1,27	1,52	1,52	0,1	0,11	1,246339313	1,543660687	1,543660687	1,246339313	ST 1 (8)	-0,25	-0,3		0,14866069	-1,68168198		0,14866069	-1,68168198		1,246339313	1,543660687	1,543660687	1,246339313
2	3,41	3,46	3,46	0,16	0,18	3,194168108	3,675831892	3,675831892	3,194168108	ST 1 (23)	-0,05	-0		0,24083189	-0,2076137		0,24083189	-0,2076137		3,194168108	3,675831892	3,675831892	3,194168108
3	0,19	0,14	0,14	0,09	0,1	0,03046376	0,29953624	0,29953624	0,03046376	ST 1 (45)	0,05	0,05		0,13453624	0,371647073		0,13453624	0,371647073		0,03046376	0,29953624	0,29953624	0,03046376
4	0,61	0,72	0,72	0,09	0,1	0,53046376	0,79953624	0,79953624	0,53046376	ST 1 (76)	-0,11	-0,1		0,13453624	-0,81762356		0,13453624	-0,81762356		0,53046376	0,79953624	0,79953624	0,53046376
5	-1,76	-2,03	-2,03	0,12	0,15	-2,08709373	-1,70290627	-1,70290627	-2,08709373	ST 1 (96)	0,27	0,27		0,19209373	1,405563857		0,19209373	1,405563857		-2,08709373	-1,70290627	-1,70290627	-2,08709373
6	0,87	1,02	1,02	0,09	0,11	0,802873296	1,087126704	1,087126704	0,802873296	ST 1 (125)	-0,15	-0,2		0,1421267	-1,05539632		0,1421267	-1,05539632		0,802873296	1,087126704	1,087126704	0,802873296
7	0,86	0,86	0,86	0,09	0,1	0,72546376	0,99453624	0,99453624	0,72546376	ST 1 (152)	0	0		0,13453624	8,25222E-16		0,13453624	0		0,72546376	0,99453624	0,99453624	0,72546376
8	-3,65	-3,39	-3,39	0,21	0,23	-3,83144823	-3,20855177	-3,20855177	-3,83144823	ST 1 (173)	-0,26	-0,3		0,31144823	-0,83480969		0,31144823	-0,83480969		-3,83144823	-3,20855177	-3,20855177	-3,83144823
9	-1,53	-1,75	-1,75	0,11	0,14	-1,81804494	-1,46195506	-1,46195506	-1,81804494	ST 1 (195)	0,22	0,22		0,17804494	1,235643104		0,17804494	1,235643104		-1,81804494	-1,46195506	-1,46195506	-1,81804494
10	-1,62	-1,83	-1,83	0,11	0,14	-1,90304494	-1,54695506	-1,54695506	-1,90304494	ST 1 (215)	0,21	0,21		0,17804494	1,179477508		0,17804494	1,179477508		-1,90304494	-1,54695506	-1,54695506	-1,90304494
11	1,36	1,29	1,29	0,1	0,11	1,176339313	1,473660687	1,473660687	1,176339313	ST 1 (228)	0,07	0,07		0,14866069	0,470870956		0,14866069	0,470870956		1,176339313	1,473660687	1,473660687	1,176339313
	0,000909091	0,000909091	8,06646E-17																				
corr	0,995971016	0,991958265		R 2																			
		ST2																					
;ENTRY	Mal measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	-0,47	-0,39	-0,38666667	0,13	0,14	-0,61938307	-0,2372836	-0,2372836	-0,61938307	ST 2 (15)	-0,08333333	-0,1		0,19104973	-0,4361866		0,19104973	-0,41873914		-0,62104973	-0,23895027	-0,23895027	-0,62104973
2	0,37	1,34	1,343333333	0,11	0,11	0,701103175	1,012230159	1,012230159	0,701103175	ST 2 (31)	-0,97333333	-1	*	0,15556349	-6,25682364	*	0,15556349	-6,23539616	*	0,699436508	1,010563492	1,010563492	0,699436508
3	-0,95	-0,84	-0,83666667	0,15	0,16	-1,11265046	-0,67401621	-0,67401621	-1,11265046	ST 2 (51)	-0,11333333	-0,1		0,21931712	-0,51675552		0,21931712	-0,50155683		-1,11431712	-0,67568288	-0,67568288	-1,11431712
4	-1,02	-1,28	-1,27666667	0,15	0,18	-1,38264082	-0,91402584	-0,91402584	-1,38264082	ST 2 (84)	0,256666667	0,26		0,23430749	1,095426639		0,23430749	1,109652959		-1,38430749	-0,91569251	-0,91569251	-1,38430749
5	0,28	0,44	0,443333333	0,11	0,12	0,198878461	0,524454873	0,524454873	0,198878461	ST 2 (95)	-0,16333333	-0,2		0,16278821	-1,00334869		0,16278821	-0,98287219		0,197211794	0,522788206	0,522788206	0,197211794
6	0,41	0,28	0,283333333	0,11	0,12	0,183878461	0,509454873	0,509454873	0,183878461	ST 2 (132)	0,126666667	0,13		0,16278821	0,778107148		0,16278821	0,798583652		0,182211794	0,507788206	0,507788206	0,182211794
7	0	-0,08	-0,07666667	0,12	0,13	-0,21525139	0,138584727	0,138584727	-0,21525139	ST 2 (163)	0,076666667	0,08		0,17691806	0,433345621		0,17691806	0,452186735		-0,21691806	0,13691806	0,13691806	-0,21691806
8	1,02	0,98	0,983333333	0,1	0,11	0,853005979	1,150327354	1,150327354	0,853005979	ST 2 (200)	0,036666667	0,04		0,14866069	0,246646691		0,14866069	0,269069118		0,851339313	1,148660687	1,148660687	0,851339313
9	**0,35**	**-0,43**	-0,42666667	0,11	0,14	-0,21637827	0,139711605	0,139711605	-0,21637827	ST 2 (232)	0,776666667	0,78	*	0,17804494	4,362194594	*	0,17804494	4,380916459	*	-0,21804494	0,138044938	0,138044938	-0,21804494
	-0,00111111	0,002222222	-0,00333333																				
corr	0,840382945	0,706243494		R 2																			
		ST3																					
;ENTRY	Mal measure	Fem measure	Fem Adj	Male err	Fem err	d-2*emal	d+2*efem	d+2*emal	d-2*efem											D-2*EE_MAL	D+2*EE_FEM	D+2*EE_MAL	D-2*EE_FEM
1	-0,57	-1,28	-1,28230769	0,1	0,16	-1,11483347	-0,73747422	-0,73747422	-1,11483347	ST 3 (6)	0,712307692	0,71	*	0,18867962	3,775223219	*	0,18867962	3,762992474	*	-1,11367962	-0,73632038	-0,73632038	-1,11367962
2	**0,84**	**1,32**	1,317692308	0,09	0,1	0,944309913	1,213382394	1,213382394	0,944309913	ST 3 (38)	-0,47769231	-0,5		0,13453624	-3,55065896	*	0,13453624	-3,5678119	*	0,94546376	1,21453624	1,21453624	0,94546376
3	-0,16	0,44	0,437692308	0,09	0,1	0,004309913	0,273382394	0,273382394	0,004309913	ST 3 (56)	-0,59769231	-0,6	*	0,13453624	-4,44261194	*	0,13453624	-4,45976488	*	0,00546376	0,27453624	0,27453624	0,00546376
4	-0,18	-0,27	-0,27230769	0,09	0,12	-0,37615385	-0,07615385	-0,07615385	-0,37615385	ST 3 (77)	0,092307692	0,09		0,15	0,615384615		0,15	0,6		-0,375	-0,075	-0,075	-0,375
5	-2,34	-3,78	-3,78230769	0,18	0,45	-3,54581868	-2,57648901	-2,57648901	-3,54581868	ST 3 (88)	1,442307692	1,44	*	0,48466483	2,97588683	*	0,48466483	2,971125411	*	-3,54466483	-2,57533517	-2,57533517	-3,54466483
6	0,36	0,61	0,607692308	0,09	0,1	0,349309913	0,618382394	0,618382394	0,349309913	ST 3 (97)	-0,24769231	-0,3		0,13453624	-1,84108242		0,13453624	-1,85823537		0,35046376	0,61953624	0,61953624	0,35046376
7	0,18	0,38	0,377692308	0,09	0,1	0,144309913	0,413382394	0,413382394	0,144309913	ST 3 (116)	-0,19769231	-0,2		0,13453624	-1,46943535		0,13453624	-1,48658829		0,14546376	0,41453624	0,41453624	0,14546376
8	1,08	0,97	0,967692308	0,09	0,1	0,889309913	1,158382394	1,158382394	0,889309913	ST 3 (123)	0,112307692	0,11		0,13453624	0,834776503		0,13453624	0,817623561		0,89046376	1,15953624	1,15953624	0,89046376
9	1,14	1,38	1,377692308	0,09	0,1	1,124309913	1,393382394	1,393382394	1,124309913	ST 3 (145)	-0,23769231	-0,2		0,13453624	-1,76675301		0,13453624	-1,78390595		1,12546376	1,39453624	1,39453624	1,12546376
10	-1,06	-0,6	-0,60230769	0,11	0,13	-1,00144771	-0,66085998	-0,66085998	-1,00144771	ST 3 (175)	-0,45769231	-0,5		0,17029386	-2,68766177	*	0,17029386	-2,70121301	*	-1,00029386	-0,65970614	-0,65970614	-1,00029386
11	-0,46	-0,73	-0,73230769	0,1	0,13	-0,76016604	-0,43214165	-0,43214165	-0,76016604	ST 3 (194)	0,272307692	0,27		0,16401219	1,660289303		0,16401219	1,646219054		-0,75901219	-0,43098781	-0,43098781	-0,75901219
12	-0,31	-0,16	-0,16230769	0,1	0,11	-0,38481453	-0,08749316	-0,08749316	-0,38481453	ST 3 (208)	-0,14769231	-0,2		0,14866069	-0,99348597		0,14866069	-1,00900919		-0,38366069	-0,08633931	-0,08633931	-0,38366069
13	1,5	1,71	1,707692308	0,09	0,1	1,469309913	1,738382394	1,738382394	1,469309913	ST 3 (220)	-0,20769231	-0,2		0,13453624	-1,54376477		0,13453624	-1,56091771		1,47046376	1,73953624	1,73953624	1,47046376
	0,001538462	-0,00076923	0,002307692																				
corr	0,953700903	0,909545412		R 2																			

Appendix C: Cloninger's Temperament and Character Inventory

SECTION B

Each statement can be answered TRUE or FALSE. Read the statement and **decide which choice best describes you**. To answer you only need to circle either "1" or "2" after each question. Here is an example:

	TRUE	FALSE
I understand how to fill out this questionnaire.	1	2

(If you understand how to fill out this questionnaire, circle "1" to show that the statement is TRUE.)

	TRUE	FALSE	
I often try new things just for fun or thrills, even if most people think it is a waste of time.	1	2	B1
I usually am confident that everything will go well, even in situations that worry most people.	1	2	B2
I am often moved deeply by a fine speech or poetry.	1	2	B3
I often feel that I am the victim of circumstances	1	2	B4
I can usually accept other people as they are, even when they are very different from me.	1	2	B5
I believe that miracles happen.	1	2	B6
I enjoy getting revenge on people who hurt me.	1	2	B7
Often when I am concentrating on something, I lose awareness of the passage of time.	1	2	B8
Often I feel that my life has little purpose or meaning.	1	2	B9
I like to help find a solution to problems so that everyone comes out ahead.	1	2	B10
I could probably accomplish more than I do, but I don't see the point in pushing myself harder than is necessary to get by.	1	2	B11
I often feel tense and worried in unfamiliar situations, even when others feel there is little to worry about.	1	2	B12
I often do things based on how I feel at the moment without thinking about how they were done in the past.	1	2	B13
I usually do things my own way - rather than giving in to the wishes of other people.	1	2	B14
I often feel so connected to the people around me that it is like there is no separation between us.	1	2	B15
I generally don't like people who have different ideas from me.	1	2	B16
In most situations my natural responses are based on good habits that I have developed.	1	2	B17

	TRUE	FALSE	
I would do almost anything legal in order to become rich and famous, even if I would lose the trust of many old friends.	1	2	B18
I am much more reserved and controlled than most people.	1	2	B19
I often have to stop what I am doing because I start worrying about what might go wrong.	1	2	B20
I like to discuss my experiences and feelings openly with friends instead of keeping them to myself.	1	2	B21
I have less energy and get tired more quickly than most people.	1	2	B22
I am often called "absent-minded" because I get so wrapped up in what I am doing that I lose track of everything else.	1	2	B23
I seldom feel free to choose what I want to do.	1	2	B24
I often consider another person's feelings as much as my own.	1	2	B25
Most of the time I would prefer to do something a little risky (like riding a fast automobile over steep hills and sharp turns) – rather than having to stay quiet and inactive for a few hours.	1	2	B26
I often avoid meeting strangers because I lack confidence with people I do not know.	1	2	B27
I like to please other people as much as I can.	1	2	B28
I like old "tried and true" ways of doing things much better than trying "new and improved" ways.	1	2	B29
Usually I am not able to do things according to their priority of importance to me because of lack of time.	1	2	B30
I often do things to help protect animals and plants from extinction.	1	2	B31
I often wish that I was smarter than everyone else.	1	2	B32
It gives me pleasure to see my enemies suffer.	1	2	B33
I like to be very organised and set up rules for people whenever I can.	1	2	B34
It is difficult for me to keep the same interests for a long time because my attention often shifts to something else.	1	2	B35
Repeated practice has given me good habits that are stronger than most momentary impulses or persuasion.	1	2	B36
I am usually so determined that I continue to work long after other people have given up.	1	2	B37
I am fascinated by the many things in life that cannot be scientifically explained.	1	2	B38
I have many bad habits that I wish I could break.	1	2	B39
I often wait for someone else to provide a solution to my problems.	1	2	B40
I often spend money until I run out of cash or get into debt from using too much credit.	1	2	B41
I think I will have very good luck in the future.	1	2	B42

	TRUE	FALSE	
I recover more slowly than most people from minor illnesses or stress.	1	2	B43
It wouldn't bother me to be alone all the time.	1	2	B44
Often I have unexpected flashes of insight or understanding while relaxing.	1	2	B45
I don't care very much whether other people like me or the way I do things.	1	2	B46
I usually try to get just what I want for myself because it is not possible to satisfy everyone anyway.	1	2	B47
I have no patience with people who don't accept my views.	1	2	B48
I don't seem to understand most people very well.	1	2	B49
You don't have to be dishonest to succeed in business.	1	2	B50
I sometimes feel so connected to nature that everything seems to be part of one living organism.	1	2	B51
In conversations I am much better as a listener than as a talker.	1	2	B52
I lose my temper more quickly than most people.	1	2	B53
When I have to meet a group of strangers, I am more shy than most people.	1	2	B54
I am more sentimental than most people.	1	2	B55
I seem to have a "sixth sense" that sometimes allows me to know what is going to happen.	1	2	B56
When someone hurts me in any way, I usually try to get even.	1	2	B57
My attitudes are determined largely by influences outside my control.	1	2	B58
Each day I try to take another step toward my goals.	1	2	B59
I often wish I was stronger than everyone else.	1	2	B60
I like to think about things for a long time before I make a decision.	1	2	B61
I am more hard-working than most people.	1	2	B62
I often need naps or extra rest periods because I get tired so easily.	1	2	B63
I like to be of service to others.	1	2	B64
Regardless of any temporary problem that I have to overcome, I always think it will turn out well.	1	2	B65
It is hard for me to enjoy spending money on myself, even when I have saved plenty of money.	1	2	B66
I usually stay calm and secure in a situation that most people would find physically dangerous.	1	2	B67
I like to keep my problems to myself.	1	2	B68
I am often troubled by the difficulties I have dealing with others.	1	2	B69
I like to stay at home better than to travel or explore new places.	1	2	B70
I do not think it is smart to help weak people who cannot help themselves.	1	2	B71

	TRUE	FALSE	
I cannot have any peace of mind if I treat other people unfairly, even if they are unfair to me.	1	2	B72
People will usually tell me how they feel.	1	2	B73
I often wish I could stay young forever.	1	2	B74
Sometimes I get upset.	1	2	B75
Sometimes I have felt like I was part of something with no limits or boundaries in time and space.	1	2	B76
I sometimes feel a spiritual connection to other people that I cannot explain in words.	1	2	B77
I try to be considerate of other people's feelings, even when they have been unfair to me in the past.	1	2	B78
I like it when people can do whatever they want without strict rules and regulations.	1	2	B79
I would probably stay relaxed and outgoing when meeting a group of strangers, even if I were told they are unfriendly.	1	2	B80
Usually I am more worried than most people that something might go wrong in the future.	1	2	B81
I usually think about all the facts in detail before I make a decision.	1	2	B82
I feel it is more important to be sympathetic and understanding of other people than to be practical and tough-minded.	1	2	B83
I often feel a strong sense of unity with all the things around me.	1	2	B84
I often wish I had special powers like Superman.	1	2	B85
Other people control me too much.	1	2	B86
I like to share what I have learned with other people.	1	2	B87
Religious experiences have helped me understand the real purpose of my life.	1	2	B88
I often learn a lot from people	1	2	B89
Repeated practice has allowed me to become good at many things that help me to be successful.	1	2	B90
I am usually able to get other people to believe me, even when I know that what I am saying is exaggerated or untrue.	1	2	B91
I need much extra rest, support, or reassurance to recover from minor illnesses or stress.	1	2	B92
I know there are principles for living that no one can violate without suffering in the long run.	1	2	B93
I don't want to be richer than everyone else.	1	2	B94
I would gladly risk my own life to make the world a better place.	1	2	B95
Even after thinking about something a long time, I have learned to trust my feelings more than my logical reasons.	1	2	B96

	TRUE	FALSE	
Sometimes I have felt my life was being directed by a spiritual force greater than any human being.	1	2	B97
I usually enjoy being mean to anyone who has been mean to me.	1	2	B98
I have a reputation as someone who is very practical and does not act on emotion.	1	2	B99
It is easy for me to organize my thoughts while talking to someone.	1	2	B100
I haven't gotten as far as I'd like to in life because of the kind of person I am	1	2	B101
I am strongly moved by sentimental appeals (like when asked to help crippled children).	1	2	B102
I usually push myself harder than most people do because I want to do as well as I possibly can.	1	2	B103
I have so many faults that I don't like myself very much.	1	2	B104
I have too little time to look for long-term solutions for my problems.	1	2	B105
I often cannot deal with problems because I just don't know what to do.	1	2	B106
I often wish I could stop the passage of time.	1	2	B107
I hate to make decisions based only on my first impressions.	1	2	B108
I prefer spending money rather than saving it.	1	2	B109
I can usually do a good job of stretching the truth to tell a funnier story or to play a joke on someone.	1	2	B110
Occasionally I talk about people behind their backs.	1	2	B111
If I am embarrassed or humiliated, I get over it very quickly.	1	2	B112
It is extremely difficult for me to adjust to changes in my usual way of doing things because I get so tense, tired, or worried.	1	2	B113
I usually demand very good practical reasons before I am willing to change my old ways of doing things.	1	2	B114
I need a lot of help from other people to train me to have good habits.	1	2	B115
I think that extra-sensory perception (ESP like telepathy or precognition) is really possible.	1	2	B116
I would like to have warm and close friends with me most of the time.	1	2	B117
A nuclear war may not be such a bad idea.	1	2	B118
I nearly always stay relaxed and carefree, even when nearly everyone else is fearful.	1	2	B119
I find sad songs and movies pretty boring.	1	2	B120
Circumstances often force me to do things against my will.	1	2	B121
It is hard for me to tolerate people who are different from me.	1	2	B122
I think that most things that are called miracles are just chance.	1	2	B123
I would rather be kind than to get revenge when someone hurts me.	1	2	B124

	TRUE	FALSE	
I often become so fascinated with what I'm doing that I get lost in the moment - like I'm detached from time and place.	1	2	B125
I do not think I have a real sense of purpose for my life.	1	2	B126
I try to cooperate with others as much as possible.	1	2	B127
I am satisfied with my accomplishments, and have little desire to do better.	1	2	B128
I often feel tense and worried in unfamiliar situations, even when others feel there is no danger at all.	1	2	B129
I often follow my instincts, hunches, or intuition without thinking through all the details.	1	2	B130
Other people often think that I am too independent because I won't do what they want.	1	2	B131
I often feel a strong spiritual or emotional connection with all the people around me.	1	2	B132
It is usually easy for me to like people who have different values from me.	1	2	B133
Other people often seem bothered by the things I do or say.	1	2	B134
Good habits have become "second nature" to me - they are automatic and spontaneous actions nearly all the time.	1	2	B135
I don't mind the fact that other people often know more than I do about something.	1	2	B136
I usually try to imagine myself "in other people's shoes", so I can really understand them.	1	2	B137
Principles like fairness and honesty have little role in same aspects of my life.	1	2	B138
I am better at saving money than most people.	1	2	B139
I have never told a lie.	1	2	B140
Even when most people feel it is not important, I often insist on things being done in a strict and orderly way.	1	2	B141
I feel very confident and sure of myself in almost all social situations.	1	2	B142
My friends find it hard to know my feelings because I seldom tell them about my private thoughts.	1	2	B143
I hate to change the way I do things, even if many people tell me there is a new and better way to do it.	1	2	B144
I think it is unwise to believe in things that cannot be explained scientifically.	1	2	B145
I like to imagine my enemies suffering.	1	2	B146
I am more energetic and tire less quickly than most people.	1	2	B147
I like to pay close attention to details in everything I do.	1	2	B148
I often stop what I am doing because I get worried, even when my friends tell me everything will go well.	1	2	B149
I often wish I was more powerful than everyone else.	1	2	B150
I usually am free to choose what I will do.	1	2	B151

	TRUE	FALSE	
Often I become so involved in what I am doing that I forget where I am for a while.	1	2	B152
Members of a team rarely get their fair share.	1	2	B153
Most of the time I would prefer to do something risky (like hang-gliding or parachute jumping) - rather than having to stay quiet and inactive for a few hours.	1	2	B154
Because I so often spend too much money on impulse, it is hard for me to save money – even for special plans like a vacation	1	2	B155
I don't go out of any way to please other people	1	2	B156
I am not shy with strangers at all.	1	2	B157
I often give in to the wishes of friends.	1	2	B158
I spend most of my time doing things that seem necessary but not really important to me.	1	2	B159
I don't think that religious or ethical principles about what is right and wrong should have much influence in business decisions	1	2	B160
I often try to put aside my own judgment so that I can better understand what other people are experiencing.	1	2	B161
Many of my habits make it hard for me to accomplish worthwhile goals.	1	2	B162
I have made real personal sacrifices in order to make the world a better place - like trying to prevent war, poverty and injustice.	1	2	B163
I never worry about terrible things that might happen in the future.	1	2	B164
I almost never get so excited that I lose control of myself.	1	2	B165
I often give up a job if it takes much longer than I thought it would.	1	2	B166
I prefer to start conversations, rather than waiting for others to talk to me.	1	2	B167
Most of the time I quickly forgive anyone who does me wrong.	1	2	B168
My actions are determined largely by influences outside my control.	1	2	B169
The way I behave often gets me into trouble on the job, at school or at home.	1	2	B170
I prefer to wait for someone else to take the lead in getting things done.	1	2	B171
I usually respect the opinions of others.	1	2	B172
I have had experiences that made my role in life so clear to me that I felt very excited and happy.	1	2	B173
It is fun for me to buy things for myself.	1	2	B174
I believe that I have experienced extra-sensory perception myself.	1	2	B175
I believe that my brain is not working properly.	1	2	B176
My behaviour is strongly guided by certain goals that I have set for my life.	1	2	B177
It is usually foolish to promote the success of other people.	1	2	B178
I often wish I could live forever.	1	2	B179
I usually like to stay cool and detached from other people.	1	2	B180

	TRUE	FALSE	
I am more likely to cry at a sad movie than most people.	1	2	B181
I recover more quickly than most people from minor illnesses or stress.	1	2	B182
I often break rules and regulations when I think I can get away with it.	1	2	B183
I need much more practice in developing good habits before I will be able to trust myself in many tempting situations.	1	2	B184
I wish other people didn't talk as much as they do.	1	2	B185
Everyone should be treated with dignity and respect, even if they seem to be unimportant or bad.	1	2	B186
I like to make quick decisions so I can get on with what has to be done.	1	2	B187
I usually have good luck in whatever I try to do.	1	2	B188
I am usually confident that I can easily do things that most people would consider dangerous (such as driving an automobile fast on a wet or icy road).	1	2	B189
I am bothered by the kind of person I am.	1	2	B190
I like to explore new ways to do things.	1	2	B191
I enjoy saving money more than spending it on entertainment or thrills.	1	2	B192
Individual rights are more important than the needs of any group.	1	2	B193
I have had personal experiences in which I felt in contact with a divine and wonderful spiritual power.	1	2	B194
I have had moments of great joy in which I suddenly had a clear, deep feeling of oneness with all that exists.	1	2	B195
Good habits make it easier for me to do things the way I want.	1	2	B196
Most people seem more resourceful than I am.	1	2	B197
Other people and conditions are often to blame for my problems.	1	2	B198
It gives me pleasure to help others, even if they have treated me badly.	1	2	B199
I often feel like I am a part of the spiritual force on which all life depends.	1	2	B200
Even when I am with friends, I prefer not to "open up" very much.	1	2	B201
I usually can stay "on the go" all day without having to push myself.	1	2	B202
I nearly always think about all the facts in detail before I make a decision, even when other people demand a quick decision.	1	2	B203
I am not very good at talking my way out of trouble when I am caught doing something wrong.	1	2	B204
I am more of a perfectionist than most people.	1	2	B205
Whether something is right or wrong is just a matter of opinion.	1	2	B206
I think my natural responses now are usually consistent with my principles and long-term goals.	1	2	B207

	TRUE	FALSE	
I believe that all life depends on some spiritual order or power that cannot be completely explained.	1	2	B208
I think I would stay confident and relaxed when meeting strangers, even if I were told they are angry at me.	1	2	B209
People find it easy to come to me for help, sympathy, and warm understanding.	1	2	B210
I am slower than most people to get excited about new ideas and activities.	1	2	B211
I have trouble telling a lie, even when it is meant to spare someone else's feelings.	1	2	B212
There are some people I don't like.	1	2	B213
I don't want to be more admired than everyone else.	1	2	B214
Often when I look at an ordinary thing, something wonderful happens - I get the feeling that I am seeing it fresh for the first time.	1	2	B215
Most people I know look out only for themselves, no matter who else gets hurt.	1	2	B216
I usually feel tense and worried when I have to do something new and unfamiliar.	1	2	B217
I often push myself to the point of exhaustion or try to do more than I really can.	1	2	B218
Some people think I am too stingy or tight with my money.	1	2	B219
Reports of mystical experiences are probably just wishful thinking.	1	2	B220
My will power is too weak to overcome very strong temptations, even if I know I will suffer as a consequence.	1	2	B221
I hate to see anyone suffer.	1	2	B222
I know what I want to do in my life.	1	2	B223
I regularly take time to consider whether what I am doing is right or wrong.	1	2	B224
Things often go wrong for me unless I am very careful.	1	2	B225
If I am feeling upset, I usually feel better around friends than when left alone.	1	2	B226
I don't think it is possible for one person to share feelings with someone else who hasn't had the same experiences.	1	2	B227
It often seem to other people like I am in another world because I am so completely unaware of things going on around me.	1	2	B228
I wish I were better looking than everyone else.	1	2	B229
I have lied a lot on this questionnaire.	1	2	B230
I usually stay away from social situations where I would have to meet strangers, even if I am assured that they will be friendly.	1	2	B231
I love the blooming of flowers in the spring as much as seeing an old friend again.	1	2	B232
I usually look at a difficult situation as a challenge or opportunity.	1	2	B233
People involved with me have to learn how to do things my way.	1	2	B234
Dishonesty only causes problems if you get caught.	1	2	B235
I usually feel much more confident and energetic than most people, even after minor illnesses or stress.	1	2	B236
I like to read everything when I am asked to sign any papers.	1	2	B237
When nothing new is happening, I usually start looking for something that is thrilling or exciting.	1	2	B238

Appendix D: TCI Item sub-scale and coding

Item	Sub-scale of item	Example raw score	Reverse coding Y/N	Recoded score
B1	NS 1	1		1
B2	HA 1 -	0	Y	1
B3	RD 1	1		1
B4	SD 1 -	1	Y	0
B5	C 1	1		1
B6	ST 3	1		1
B7	C 4 -	1	Y	0
B8	ST 1	0		0
B9	SD 2 -	0	Y	1
B10	C 3	1		1
B11	P -	0	Y	1
B12	HA 2	0		0
B13	NS 2	0		0
B14	RD 4 -	0	Y	1
B15	ST 2	0		0
B16	C 1 -	0	Y	1
B17	SD 5	1		1
B18	C 5 -	0	Y	1
B19	NS 3 -	0	Y	1
B20	HA 1	0		0
B21	RD 3	0		0
B22	HA 4	0		0
B23	ST 1	0		0
B24	SD 1 -	1	Y	0
B25	C 2	0		0
B26	HA 2 -	1	Y	0
B27	HA 3	1		1
B28	RD 1	0		0
B29	NS 1 -	1	Y	0
B30	SD 2 -	1	Y	0
B31	ST 2	0		0
B32	SD 4-	0	Y	1
B33	C 4 -	1	Y	0
B34	NS 4 -	0	Y	1
B35	NS 2	1		1
B36	SD 5	1		1
B37	P	1		1
B38	ST 3	1		1
B39	SD 5 -	1	Y	0
B40	SD 3 -	1	Y	0
B41	NS 3	0		0
B42	HA 1 -	0	Y	1
B43	HA 4	0		0
B44	RD 3 -	0	Y	1
B45	ST 1	1		1
B46	RD 4 -	0	Y	1
B47	C 3 -	0	Y	1
B48	C 1 -	0	Y	1
B49	C 2 -	0	Y	1
B50	C 5	1		1
B51	ST 2	1		1
B52	NS 1 -	0	Y	1
B53	NS 4	0		0
B54	HA 3	1		1
B55	RD 1	1		1
B56	ST 3	0		0
B57	C 4 -	1	Y	0
B58	SD 1 -	1	Y	0
B59	SD 2	1		1
B60	SD 4 -	0	Y	1
B61	NS 2 -	0	Y	1
B62	P	1		1
B63	HA 4	0		0
B64	C 3	0		0
B65	HA 1 -	0	Y	1

Item	Sub-scale of item	Example raw score	Reverse coding Y/N	Recoded score
B66	NS 3 -	0	Y	1
B67	HA 2 -	0	Y	1
B68	RD 3 -	0	Y	1
B69	Monitor Item	0		0
B70	NS 1 -	0	Y	1
B71	RD 4 -	1	Y	0
B72	C 5	1		1
B73	C 2	1		1
B74	SD 4 -	0	Y	1
B75	Monitor Item	1		1
B76	ST 1	1		1
B77	ST 3	0		0
B78	C 4	1		1
B79	NS 4	1		1
B80	HA 3 -	1	Y	0
B81	HA 1	0		0
B82	NS 2 -	0	Y	1
B83	RD 1	1		1
B84	ST 2	1		1
B85	SD 4 -	1	Y	0
B86	SD 1 -	1	Y	0
B87	C 3	0		0
B88	ST 3	0		0
B89	C 1	0		0
B90	SD 5	0		0
B91	NS 4	1		1
B92	HA 4	0		0
B93	C 5	1		1
B94	SD 4	0		0
B95	ST 2	1		1
B96	ST 1	1		1
B97	ST 3	0		0
B98	C 4 -	1	Y	0
B99	NS 1 -	0	Y	1
B100	HA 3 -	1	Y	0
B101	Monitor Item	0		0
B102	RD 1	1		1
B103	P	1		1
B104	SD 5 -	0	Y	1
B105	SD 2 -	0	Y	1
B106	SD 3 -	1	Y	0
B107	SD 4 -	1	Y	0
B108	NS 2 -	0	Y	1
B109	NS 3	0		0
B110	NS 4	1		1
B111	Monitor Item	0		0
B112	HA 1 -	1	Y	0
B113	HA 4	0		0
B114	NS 1 -	1	Y	0
B115	SD 5 -	1	Y	0
B116	ST 3	1		1
B117	RD 3	0		0
B118	Monitor Item	0		0
B119	HA 1 -	0	Y	1
B120	RD 1 -	1	Y	0
B121	SD 1 -	0	Y	1
B122	C 1 -	0	Y	1
B123	ST 3 -	0	Y	1
B124	C 4	1		1
B125	ST 1	1		1
B126	SD 2 -	1	Y	0
B127	C 3	1		1
B128	P -	1	Y	0
B129	HA 2	0		0
B130	NS 2	1		1
B131	RD 4 -	0	Y	1
B132	ST 2	0		0
B133	C 1	0		0

Item	Sub-scale of item	Example raw score	Reverse coding Y/N	Recoded score
B134	Monitor Item	1		1
B135	SD 5	1		1
B136	SD 4	1		1
B137	C2	1		1
B138	C 5 -	0	Y	1
B139	NS 3 -	0	Y	1
B140	Monitor Item	0		0
B141	NS 4 -	0	Y	1
B142	HA 3 -	0	Y	1
B143	RD 3 -	0	Y	1
B144	NS 1 -	0	Y	1
B145	ST 3 -	0	Y	1
B146	C 4 -	1	Y	0
B147	HA 4 -	0	Y	1
B148	NS 2 -	0	Y	1
B149	HA 1	0		0
B150	SD 4 -	1	Y	0
B151	SD 1	1		1
B152	ST 1	1		1
B153	C 3 -	1	Y	0
B154	HA 2 -	0	Y	1
B155	NS 3	0		0
B156	RD 4 -	0	Y	1
B157	HA 3 -	1	Y	0
B158	RD 1	1		1
B159	SD 2 -	1	Y	0
B160	C 5 -	0	Y	1
B161	C 2	1		1
B162	SD 5 -	1	Y	0
B163	ST 2	1		1
B164	HA 1 -	0	Y	1
B165	NS 4 -	1	Y	0
B166	P -	1	Y	0
B167	NS 1	0		0
B168	C 4	1		1
B169	SD 1 -	0	Y	1
B170	Monitor Item	0		0
B171	SD 3 -	1	Y	0
B172	C 1	1		1
B173	ST 1	1		1
B174	NS 3	1		1
B175	ST 3	1		1
B176	Monitor Item	0		0
B177	SD 2	1		1
B178	C 3 -	1	Y	0
B179	SD 4 -	1	Y	0
B180	RD 3 -	0	Y	1
B181	RD 1	0		0
B182	HA 4 -	0	Y	1
B183	NS 4	0		0
B184	SD 5 -	1	Y	0
B185	C 2 -	0	Y	1
B186	C 5	1		1
B187	NS 2	0		0
B188	HA 1 -	0	Y	1
B189	HA 2 -	0	Y	1
B190	Monitor Item	1		1
B191	NS 1	0		0
B192	NS 3 -	0	Y	1
B193	RD 4 -	0	Y	1
B194	ST 3	0		0
B195	ST 1	1		1
B196	SD 5	1		1
B197	SD 3 -	1	Y	0
B198	SD 1 -	0	Y	1
B199	C 4	1		1
B200	ST 2	0		0
B201	RD 3 -	0	Y	1

Item	Sub-scale of item	Example raw score	Reverse coding Y/N	Recoded score
B202	HA 4 -	0	Y	1
B203	NS 2 -	1	Y	0
B204	NS 4 -	0	Y	1
B205	P	0		0
B206	C 5 -	0	Y	1
B207	SD 5	1		1
B208	ST 3	0		0
B209	HA 3 -	0	Y	1
B210	RD 1	1		1
B211	NS 1 -	1	Y	0
B212	NS 4 -	0	Y	1
B213	Monitor Item	1		1
B214	SD 4	1		1
B215	ST 1	1		1
B216	C 3 -	0	Y	1
B217	HA 2	0		0
B218	P	1		1
B219	NS 3 -	0	Y	1
B220	ST 3 -	1	Y	0
B221	SD 5 -	1	Y	0
B222	C 4	1		1
B223	SD 2	1		1
B224	RD 1	1		1
B225	HA 1	1		1
B226	RD 3	0		0
B227	C 2 -	0	Y	1
B228	ST 1	0		0
B229	SD 4 -	1	Y	0
B230	Monitor Item	0		0
B231	HA 3	1		1
B232	ST 2	1		1
B233	SD 3	1		1
B234	C 1 -	1	Y	0
B235	C 5 -	0	Y	1
B236	HA 4 -	0	Y	1
B237	NS 2 -	0	Y	1
B238	NS 1	0		0