An Evaluation of the Psychometric Properties of the STPI (Form Y) for South African Students

by

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A mini-dissertation submitted in partial fulfilment of the requirements for the degree

MAGISTER IN RESEARCH PSYCHOLOGY

IN THE DEPARTMENT OF PSYCHOLOGY

at the

UNIVERSITY OF PRETORIA

FACULTY OF HUMANITIES

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DECEMBER, 2013

ACKNOWLEDGEMENTS

I would like to thank the following people for making this dissertation possible:

My family, for their never-ending love, support and guidance. I am truly grateful for every word of encouragement and support, always offered with good humour and compassion.

The wonderful friends who listened to my thoughts and encouraged me with so much patience. You gave me the courage to keep on going, and reminded me of all that was possible.

My colleagues, Dr Nicola Taylor and Casper van Zyl, for their time, attention and guidance. I am honoured to work with such incredible people.

My supervisors, Dr. Nicoleen Coetzee and Prof. David Maree for the opportunities sent my way and the confidence in my ability.

Dr. Peet du Toit from the Department of Physiology and Dr. Nicoleen Coetzee for providing me with the secondary data used in this research.

DECLARATION

I declare that the mini-dissertation which I hereby submit in partial fulfilment of the degree, Magister in Research Psychology, at the University of Pretoria, is my own original work and has not previously been submitted by me for a degree at another university. Where other sources of information have been used, they have been duly acknowledged.

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May, 2014

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SUMMARY

This study investigated the psychometric properties of the State Trait Personality Inventory (STPI-Y) with a South African student sample. Both classical test theory and item response theory (Rasch Model) were used. The sample comprised 2298 students. The students ranged in age from 17 years to 51 years.

The reliability of the STPI-Y was evaluated using both the Cronbach's alpha internal consistency reliability and the person and item separation indices obtained using Rasch analysis. The Cronbach's alpha reliability coefficient for all eight scales ranged from satisfactory (.72) to excellent (.92). The person separation indices were mostly below .80, which indicates that more items need to be added to these scales to adequately distinguish between those with higher levels and those with lower levels of each state or trait. The item separation indices were generally above .90, indicating that the sample was large enough to confirm the hierarchy of item difficulties.

Rasch analysis of the fit of the different scales of the STPI-Y indicated that two items on the State Curiosity scale and one item on the Trait Curiosity scale appear to measure a different dimension from the remaining items on each scale. Exploratory and confirmatory factor analysis also indicated that certain items on the State Curiosity and Trait Curiosity scales had poor factor loadings. These findings are consistent with previous research studies.

Nonparametric statistics were used to determine if differences existed between gender and ethnic groups. With the exception of the Trait Anger scale, statistically significant median differences between the gender groups were reported on each of the scales of the STPI-Y. Statistically significant differences were also found when comparing ethnic

group medians. The effect sizes of these differences, however, were below .10 and are unlikely to impact the interpretation of the scores across the groups.

Uniform differential item functioning (DIF) was used to explore possible bias between gender and ethnic groups. There was minimal evidence of DIF when comparing gender groups. When comparing ethnic groups, there was little evidence of DIF on the State and Trait Curiosity scales. Differences on the remaining scales were across different ethnic groups and in different directions, therefore, it was concluded that these results are unlikely to result in bias at scale level.

The suitability of the language of the STPI-Y items was also investigated. Some items were found to be problematic. However, if these items were deleted, little change would occur in the reliability of their scales.

It appears that the STPI-Y scales have acceptable psychometric properties for the South African student population. However, the State and Trait Curiosity subscales need to be interpreted with caution. It is recommended that the tool is constantly refined and researched to continually improve the quality of the instrument.

CHAPTER 1

INTRODUCTION TO THE STUDY

1.1 Introduction

Psychological assessment is fundamental to the practice of psychology (Groth-Marnat, 2009) and can serve many purposes - such as identifying personal strengths and weaknesses, making decisions regarding employment and career development, and understanding a person's well-being (Foxcroft & Roodt, 2009).

Well-being, a multifaceted construct, is increasingly recognised world-wide as an important indicator of progress (Forgeard, Jayawickreme, Kern, & Seligman, 2011). For example, Forgeard et al. (2011) discuss how in the United States, National Gross Domestic Product (GDP) has tripled over the past 50 years, but rates of depression and anxiety have also increased dramatically in this same time period. Introducing objective initiatives to improve quality of life does not always translate into a subjective improvement in well-being (Forgeard et al., 2011).

The hedonic approach is interested in a person's subjective experience of well-being, and can include investigating dimensions such as life satisfaction, happiness and the influence of positive and negative affect (Foxcroft & Roodt, 2009). Negative affect, such as anxiety, depression and anger, has been linked to diseases such as coronary heart disease and cancer (Barlow, 2005; Foxcroft & Roodt, 2009; Sue, Sue, & Sue, 2006). Measuring the experience of these emotions may be essential in diagnosing and treating symptoms of distress in order to assist people in better managing these negative experiences (Spielberger & Reheiser, 2009). In contrast, curiosity has been linked to better coping with stressful events, seeking out new information, and stronger inter- and intrapersonal skills (Kashdan et al., 2013). Measuring well-being is not only essential for assistance at an individual level,

but, according to Forgeard et al. (2011), can be considered as a fundamental component in measuring the welfare of a country's citizens, and this includes student groups.

The State-Trait Personality Inventory (STPI-Form Y) measures the constructs of anxiety, anger, depression and curiosity (Spielberger & Reheiser, 2009). This measure has high value in the South African context for a variety of reasons. This chapter will investigate these reasons and introduce the aims, objectives, and rationale for the study. A brief summary of the layout of the dissertation will be provided.

1.2 Problem Statement

South Africa is currently in a place in its history where its population faces several challenges. One of these challenges relates to the fact that one in three South Africans will have a psychiatric disorder at some point in their lives (Foxcroft & Roodt, 2009). The South African Stress and Health (SASH) study was a large scale investigation into mental disorders in South Africa. This study used the Composite International Diagnostic Interview (CIDI) to collect data from a nationally representative sample of 4 351 adults to assess mental disorders (Herman et al., 2009). As described by Kessler et al. (2012), the CIDI was developed to generate diagnoses of lifetime and recent disorders, as categorised by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV-TR) and the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, (ICD-10). The results of the SASH study indicated that the most prevalent 12-month and lifetime disorders in South Africa were anxiety disorders followed by substance abuse disorders and mood disorders, particularly major depression (Herman et al., 2009). Between 16% and 17% of South Africans were found to have experienced a common mental disorder such as

anxiety, depression or substance abuse in the previous year (Lund, Kleintjes, Kakuma, & Flisher, 2009).

The results of the SASH study were compared to results obtained from the World Health Organization's World Mental Health (WMH) Survey Initiative. South Africa has relatively high rates of anxiety and mood disorders compared to certain other countries that participated in the survey. For example, in comparison with Nigeria, the only other African country in this survey, South Africans had twice as many lifetime anxiety disorders, four times as many lifetime mood disorders, and six times as many substance abuse disorders (Herman et al., 2009).

South African university students are a subset of the broader population and are therefore also at risk for these disorders. Out of 722 students surveyed at a South African University, 39.5% reported significant depressive symptoms (Pengpid, Peltzer, & Skaal, 2013). Of a sample of 214 university students, 17.8 % were found to suffer from severe anxiety (Pillay, Edwards, Sargent, & Dhlomo, 2001).

The most predominant symptom of anxiety disorders is the experience of anxiety, while depression is experienced in 90% of mood disorders (Barlow, 2005; Sue et al., 2006). By 2020, depression is expected to be the second leading cause of disability after chronic heart disease (Foxcroft & Roodt, 2009). Anger is strongly emphasised in psychodynamic explanations of depression, where it is generally believed that depression is anger turned against oneself (Sue et al., 2006). Hamdan-Mansour, Dardas, Nawafleh, and Abu-Asba (2012) noted that 20% of individuals have problems in their social relationships as a result of their methods of expressing and managing anger. Terasaki, Gelaye, Berhane, and Williams (2009) found that the outward expression of anger and violent behaviour was significantly related to depressive symptoms.

Assessing the rates of anxiety, depression and anger in the South African student population will enable appropriate interventions for at-risk individuals. Improved understanding of how South African students experience curiosity is advantageous as this latent trait has been found to demonstrate inverse correlations with anxiety, anger and depression (Spielberger & Reheiser, 2003). A first step in measuring the experience of these constructs is to ensure that psychometrically sound tools are available. Psychometrically sounds tools are those that have been empirically shown to be reliable, valid and fair for different groups (Foxcroft & Roodt, 2009).

1.2.1 Contributors to anxiety, depression and anger in South Africa.

There are a multitude of factors that contribute to the experience of anxiety, depression and anger. These constructs can be exacerbated by daily stressors such as financial worry, family pressures, overload at work or school, and interpersonal conflict (Sue et al., 2006). South African students experience many of these stressors in the form of family conflict due to unemployment or employment stress and financial pressure. The uncertain environment may foster a fear of failing in their studies. Many students experience trauma as a result of the deaths of friends or family, physical or sexual home abuse and witnessing violent crime (McGowan & Kagee, 2013). These stressors are often connected and can detract from well-being. The following section will focus on a few risk factors contributing to the experience of anxiety, depression and anger.

1.2.1.1 Unemployment.

The South African economy is unstable and characterised by a high unemployment rate (Bishop, 2012) adding to a stressful environment which can increase the onset of depression (Seedat et al., 2009). The unemployment rate in South Africa in the first quarter of 2013 was 25.2% (Statistics South Africa, 2013). People who are unemployed experience

lower self-esteem and an increase in depression and anxiety. Children of unemployed workers also experience increased distress and depressive symptoms (Bolger, 2013). Many South African students have to cope with the stress of having parents or family members who are unemployed.

It is also likely that students fear being unemployed once leaving university. A report by Goldman Sachs (2013) found that 71% of unemployed people in South Africa are aged between 15 and 34 indicating that unemployment is largely a youth issue. Students, however, have some protection if they graduate from university as in the second quarter of 2013 the unemployment rate for South Africans with a degree was only 5.2 % (Statistics South Africa, 2013). However, this could place additional pressure on South African students to succeed at university, with the fear of failing adding to academic anxiety (Bojuwoye, 2002).

1.2.1.2 Employment pressure.

The LexisNexis 2010 International Workplace Productivity Survey (2010) assessed white collar workers in the United States, Australia, China, the United Kingdom, and South Africa. It found that 51% of employees in these countries considered themselves near breaking point due to information overload. The survey also found that South African workers spend more time at work in comparison with other countries. South Africans work an average of 9.5 hours daily, compared to the United States (8.8 hours), the United Kingdom (8.5 hours), Australia (8.6 hours) and China (8.1 hours) ("LexisNexis 2010 international workplace productivity survey," 2010). It is not only white collar workers who work long hours, many other South Africans have careers that are characterised by long working hours. These careers include mine workers, construction workers, police officers, and nurses (De Klerk & Mostert, 2010). These long working hours may negatively impact work-home life

resulting in work-related stress and burnout, as well as depression of the employees and their family members (De Klerk & Mostert, 2010).

1.2.1.3 Financial pressure.

Debt levels in South Africa are a major concern. In the second quarter of 2013, the ratio of household debt to disposable income was 75.8% (South African Reserve Bank, 2013). Financial pressure has been linked to marital conflict, and also to increased expression of anger in husbands and depressive behaviour in wives (Papp, Cummings, & Goeke-Morey, 2009). Children of parents who experience financial hardship are more prone to mental health problems, depression and loneliness. Girls are more likely to become depressed, while boys are more likely to engage in disruptive behaviours such as aggression (Davis & Mantler, 2004).

The developmental age of university students is associated with assuming more responsibility, especially relating to managing finances (Bojuwoye, 2002). First year South African students identified factors associated with financial difficulties as stressful. These factors included having a lack of financial support and not having enough funds to pay for tuition and other expenses (Bojuwoye, 2002). According to Stallman (2010), students with financial stress are twice as likely to report symptoms of anxiety and depression as students without financial stress.

1.2.1.4 Peer pressure.

University students often find themselves confronted by peer pressure to engage in alcohol and drug use, as well as making decisions about sexual behaviour (Bojuwoye, 2002).

Substance abuse is the second most prevalent disorder in South Africa (Herman et al., 2009). Although there are many theories discussing the risk factors leading to substance abuse, the psychodynamic, behavioural and cognitive approaches to this disorder associate it

with anxiety (Sue et al., 2006). Depression is a common personality characteristic associated with drinking problems (Kumar, Kumar, Bhatia, & Jhanjee, 2010; Sue et al., 2006). Studies have shown a high comorbidity between substance abuse and anxiety disorders in clinical samples and the general population, depending on the substance (Kumar et al., 2010). Heavy consumption of alcohol has been linked to lower anger control and increased anger expression relative to moderate drinkers and abstainers. Heavy drinkers described themselves as more hostile, with less control over their anger, and were more likely to externalise their anger than light drinkers or abstainers (Schonwetter & Janisse, 1991). Alcohol consumption is also often related to aggressive behaviour as it reduces an individual's ability to evaluate certain information (Baron, 2008). A meta-analysis of studies that investigated trends in South African alcohol use revealed that up to 80% of university students reported drinking alcohol, 6% to 43% reported binge drinking in the previous month, and 17.1% to 58% engaged in hazardous or harmful drinking (Peltzer & Ramlagan, 2009). Substance abuse amongst university students, along with the experience of anxiety and depression, is associated with HIV risk behaviour (Pengpid et al., 2013).

1.2.1.5 Trauma.

In addition to the above stressors, many South Africans live in fear of being victims of crime (Roberts, 2008). McGowen and Kagee (2013) found that 27% of the 1337 students they assessed had been threatened with a weapon and 41% had witnessed an attack on another person. Stressful life events involving perceptions of danger have been shown to contribute to the onset of anxiety disorders (Seedat et al., 2009). In comparison with available data from other countries, the incidence of violent crime in South Africa may be considered as very high (The Centre for the Study of Violence and Reconciliation, 2007). As demonstrated in the 2011 South African Crime Report, crime affects every segment of South

African society to a greater or lesser extent (South African Police Services, 2011). Incidents of excessively violent crimes that are frequently reported in the media result in public shock and alarm - particularly when these incidents are exacerbated by incidents of torture and in the absence of any apparent purpose (The Centre for the Study of Violence and Reconciliation, 2007).

Anger may contribute to the incidence of violent crime. Studies into domestic violence cases showed that 20% of victims felt that their attack was due to long-term personal anger, while 15% felt that it had developed from sudden personal anger (The Centre for the Study of Violence and Reconciliation, 2007). Victims of violent crimes often develop post-traumatic stress disorder (PTSD), which includes symptoms of anxiety and depression. Both these constructs have a strong correlation with anger (Orth, Cahill, Foa, & Maercker, 2008; The Centre for the Study of Violence and Reconciliation, 2007). The student group assessed by McGowen and Kagee (2013) were at high risk for developing PTSD as 90% of this group had experienced at least one traumatic event in their lifetime. In the absence of adequate interventions, PTSD could result in the development of major depression (Barlow, 2005).

1.2.1.6 Academic pressure.

The stressors confronting university students increase the risk for depression and anxiety, which may result in academic dropout, a serious concern in South Africa (Bojuwoye, 2002). South African university students have a relatively low success rate – 74% in 2011 (Department of Higher Education and Training, 2013). The graduation rate of 15% per annum in South Africa is one of the lowest in the world. Eisenberg, Golberstein and Hunt (2009) found that co-occurring depression and anxiety are associated with lower academic performance, and depression is a significant predictor of university drop-out.

Low academic achievement is related to increased long-term depressive trajectories in men aged between 15 and 24 (Howard, Galambos, & Krahn, 2010). A longitudinal study indicated that depressive symptoms at age 18 were associated with lower life satisfaction at 32 years of age for men and women and less career satisfaction in women (Howard et al., 2010).

South African students are constantly challenged by feelings of anxiety, anger and depression. The experience of these constructs is connected with each other as well as other major mental and physical health concerns, threatening the well-being of this group. Emotional well-being, however, is not only determined by the presence of negative emotional states. One can also determine the extent of emotional well-being by focusing on more positive constructs (Foxcroft & Roodt, 2009).

1.2.2 The benefits of curiosity.

According to Spielberger and Reheiser (2009), an excellent predictor of emotional well-being is curiosity. Curiosity is connected to the desire to find new knowledge and embrace novelty (Hulme, Green, & Ladd, 2013). It is a powerful aspect of human motivation and leads people to embrace rather than avoid uncertainty, build knowledge and expertise and acquire new abilities. It is thought that curiosity might play a role in developing wisdom, intelligence, happiness, and meaning in life (Spielberger & Reheiser, 2009). Stressful events are more likely to be seen as a challenge than a threat, and may result in a reaction of open communication to the unfamiliar rather than aggression (Kashdan et al., 2013).

Curiosity might assist people in dealing with distress. Intolerance of uncertainty, or a lack of curiosity, is also indicated to be an important risk factor in anxiety disorders (Kashdan et al., 2009).

Individuals high in curiosity possess an open attitude toward inner experiences and their social environment. When individuals discover new information, existing conceptual frameworks become outdated and require revision. These frameworks broaden relationships with self and others and contribute to discovery and personal growth (Kashdan et al., 2013). Curiosity has been linked to an increase in positive emotions during initial encounters with others and an increased satisfaction in existing relationships. It has also been found to have a negative correlation with levels of aggression in new relationships (Kashdan et al., 2013). Forming new friendships was identified as a possible source of intense psychological pressure for university students (Bojuwoye, 2002). Having a curious disposition could contribute to reducing that pressure.

Curiosity has been strongly linked to intrinsic motivation, which is related to academic engagement and success as well as high achievement and an interest in further development (Von Stumm, Hell, & Chamorro-Premuzic, 2011; Petersen, Louw, & Dumont, 2009). As a character trait, curiosity has been correlated with high levels of student satisfaction (Hulme et al., 2013). Students who measured high in trait curiosity were shown to ask twice as many questions in class in comparison with their classmates who measured low in trait curiosity (Collins, Litman, & Spielberger, 2004). These students also engage in more meaningful ways with their studies, which results in better retention of the information (Hulme et al., 2013).

Therefore, initiatives that nurture curiosity may provide some resilience to many of the stressors mentioned previously. A curious disposition may assist in coping with stressors in the social context and the academic context.

1.2.3 Considering the State-Trait Personality Inventory.

Cattell and Scheier first recognised and empirically demonstrated the distinction between thoughts and feelings that encompass internal emotional states, and individual differences in how often these states were experienced (Collins et al., 2004). Distinguishing between state-trait experiences guided the development of the STPI and related measures (Collins et al., 2004). Participants who score higher on particular personality trait scores have been found to be more prone to experiencing the emotional states associated with that trait than those who have low scores on that trait (Spielberger & Jacobs, 1982). Differentiating between the two may assist professionals who develop intervention programmes in better understanding the needs of the individual with whom they are working.

Within the South African context, measuring personality traits and emotional states such as anxiety, anger, and depression can assist professionals in understanding the effects of stressors such as high crime and high unemployment on the population and their well-being. This could provide insight into student drop-out rates at universities and a possible starting point for discussion with students who are struggling with their university careers. Being able to measure curiosity could assist professionals in understanding how South African students rate on this construct, and take appropriate steps to develop curiosity that could protect these students against anxiety disorders and depression. Developing curiosity could also assist many South African students in finding new, creative ways of coping with university life, employing study skills that assist them in overcoming academic barriers and finding interesting ways to alleviate financial stress through part-time work.

At present, only one instrument exists that measures all the constructs discussed above. This instrument is the State-Trait Personality Inventory, Form Y, hence STPI-Y (Jacobs, Latham, & Brown, 1988). The STPI-Y could assist South African professionals in

the mental health industry to measure emotional well-being. This instrument enables professionals to measure variations in the duration and intensity of anxiety, anger, depression, and curiosity. It also identifies the impact that recent events may have had on a person's mental well-being (Spielberger & Reheiser, 2009).

As discussed by Van de Vijver and Leung (1997), if items of an instrument are considered equivalent across cultures without any statistical investigations to support the claim, a threat to statistical conclusion validity is introduced. Statistical conclusion validity is described as the "appropriate use of statistics to infer whether the presumed independent and dependent variables covary" (Shadish, Cook, & Campbell, 2002, p. 37). There is currently minimal research into the applicability of this tool in the South African context. It is valuable to investigate the psychometric properties of the STPI-Y for the South African student population in order to reduce the threat to statistical conclusion validity when this instrument is used for practical purposes in this context. Therefore the aim of this study is to investigate whether the STPI-Y is applicable for administration on the South African student population.

As discussed by the Health Professions Council of South Africa (2004), psychologists must be aware of the reliability, validity and relevant standardisation scores of measures that are used. Situations where the particular assessment methods or norms may not be applicable should be identified. Psychologists are encouraged to urgently assist in the development and adaptation of culturally appropriate measures in order to meet the expected surge in test development and adaptation initiatives (Health Professions Council of South Africa, 2004). Adapting tests reduces the expense and time of developing a new measure, and allows for comparative studies across different cultural groups (Foxcroft & Roodt, 2009). As such, the primary research question of this study is: Can the State-Trait Personality Inventory (Form Y) developed by Dr. Charles Spielberger be used on the South African student population?

1.3 Aim and Objectives

1.3.1 Aim

The aim of this study is to examine the psychometric properties of the STPI-Y in the South African context when used with a student population in order to improve the usability of this measure to assist in assessing and monitoring general well-being.

1.3.2 Objectives

The following objectives were set:

1) Examine the reliability of the STPI-Y and its subscales by exploring the internal consistency reliability as well as investigating the person and item separation indices;

2) Examine the evidence for construct validity of the STPI-Y by using factor analysis and exploring fit statistics through Rasch modelling;

3) Examine the differences between ethnic and gender groups in the South African population and report the effect sizes of these differences;

4) Report on unknown words or phrases.

1.4 Rationale for the Study

Spielberger and Reheiser (2009) believe that a person's psychological well-being can be measured by determining their levels of anxiety, anger, depression, and curiosity. These authors consider these constructs as emotional vital signs. By assessing these emotional vital signs, one can provide a patient or client with timely and meaningful feedback, enabling them to better understand their emotions (Spielberger & Reheiser, 2009).

According to Forgeard et al. (2011), using a retrospective self-report measure to evaluate emotion may be biased if an individual uses their current feelings as a basis for assessing how they felt over a longer period of time. Some researchers suggest assessing the

overall situation along with momentary feelings (Forgeard et al., 2011). The State-Trait Personality Inventory measures the constructs of anxiety, anger, depression, and curiosity as they are experienced as a temporary state as well as a more permanent aspect of personality. This measure and its subscales have been used successfully in a variety of multicultural contexts around the globe. However, minimal research has been undertaken to investigate whether or not this measure is applicable in the South African context. Having access to an appropriate assessment tool that enables a professional to measure these constructs could provide a useful foundation for assessing an individual's overall well-being. For this reason it is useful to explore the applicability of the STPI-Y in the South African context.

It is vital to ensure that psychological assessment tools are appropriate for the target population in order to draw appropriate conclusions (Foxcroft & Roodt, 2009). When psychologists undertake assessment measures they must "accurately describe the purpose, norms, validity, reliability, and applications of the procedures" (Health Professions Council of South Africa, 2004, p. 15). Measures should be chosen based on their validity and reliability, as well as other appropriate considerations (Health Professions Council of South Africa, 2004).

1.5 Chapter Outline

Chapter 1 discusses the research problem and the purpose of this study. It presents the aims and objectives of the research, along with the rationale for the study and the chapter outline of the dissertation. Chapter 2 discusses the development and background of the STPI and considers the theory behind it. Chapter 2 also defines the constructs used in the STPI-Y, discusses the reliability and validity of the different scales it measures, as well as the criticisms and support and relevance of the instrument in the South African context. Chapter

3 describes the research methodology used as well as the ethical considerations of this study, and chapter 4 explains the data analysis. Chapter 5 discusses the findings along with the limitations and future recommendations.

1.6 Conclusion

This chapter discussed how the state and trait constructs of anxiety, anger, depression, and curiosity might be related to a person's well-being. Consideration was also given as to why the well-being of South African students might be at risk. The State-Trait Personality Inventory developed by Dr. Charles Spielberger measures these constructs as an enduring personality trait, as well as a temporary emotional state, but little research relating to this measure has been undertaken in the South African context. The highly stressful South African environment may place an additional burden on the South African student population when comparing this group to the American population for which this measure was originally designed. For this reason, investigating the psychometric properties of the STPI-Y with a South African student sample will contribute to psychological knowledge in South Africa. The next chapter will provide an in-depth discussion of the four constructs measured by the STPI-Y. Literature relating to the development and background of the instrument and its subscales will also be explored.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will define the constructs measured by the STPI-Y. The development and background of the STPI will be discussed, and some of the ways in which this instrument has been used will be mentioned. The criticisms and considerations relating to this instrument will also be explored.

2.2 Understanding the Constructs

The STPI-Y measures four constructs, namely, anxiety, depression, anger and curiosity. The following discussion will consider how the constructs measured by the STPI-Y have been defined.

2.2.1 Defining anxiety.

Anxiety is a negative mood that incorporates feelings of tension, worry, apprehension about the future as well as physical tension (Barlow, 2005; Kaplan & Saccuzzo, 2013; Spielberger & Reheiser, 2009). Anxiety has received much attention in psychological studies and is generally accepted as a fundamental human emotion that, when managed correctly, can serve as an adaptive function that prevents us from ignoring danger (Sue et al., 2006).

Darwin considered the emotions of fear (anxiety) and rage (anger) to be adaptive characteristics of animals and humans that have evolved over time through natural selection (Spielberger & Sydeman, 2004). Freud regarded anxiety as the basis of all psychopathology and identified three types of anxiety. Realistic anxiety (also objective anxiety) results from fear of potential danger in the external environment. The level of anxiety is proportionate to the threat; it motivates a person to take action to reduce the threat in order to overcome fear.

Moralistic anxiety is a result of behaving in a manner contrary to one's own conscience and is experienced as feelings of guilt. Neurotic anxiety is the fear that pleasure-seeking instincts will get out of hand and cause a person to do something for which he or she will be punished. Freud treated all types of anxiety but focused mainly on neurotic anxiety (Corey, 2009; Sue et al., 2006).

Freud's concept of objective anxiety as a motivator to assist individuals in coping with danger is similar to Darwin's perspective of fear (Spielberger & Sydeman, 1994). In the existential approach to psychotherapy, normal anxiety is considered as an appropriate response to a challenge and is thought to motivate change. Neurotic anxiety can immobilise an individual, and is seen as an inappropriate response to a situation (Corey, 2009).

Most people can use relaxation methods to reduce the stress that might cause anxiety, but some people struggle to control their anxiety levels. This can lead to a disruption in occupational or social functioning, resulting in distress (Sue et al., 2006). It is important to be able to measure anxiety levels in order to understand whether or not a person is able to cope with anxiety appropriately or not.

2.2.2 Defining anger.

Anger includes behavioural, cognitive, physiological, and phenomenological variables and is therefore considered to be a multidimensional construct. It is viewed as a negative state that ranges from feeling mildly annoyed or irritated to intense rage and fury (Hamdan-Mansour et al., 2012).

Anger is another emotion that Darwin considered to be a universal characteristic in humans and animals. He suggested that anger facilitates successful adaption and survival in that it motivates animals and people to react when threatened by an enemy (Spielberger & Reheiser, 2009). Definitions of aggression, hostility and anger are often ambiguous. These

three constructs are often referred to as the AHA! Syndrome (Sue et al., 2006). Spielberger and Reheiser (2009) define anger as an emotional state associated with activation of the autonomic nervous system. These feelings are known to range in intensity. Hostility is associated with a complex set of attitudes and behaviours that involve intense angry feelings as well as behaviour that is cynical, mean, vindictive and vicious. As a psychological construct, aggression is connected to destructive behaviour focused on other people or objects in the environment (Spielberger & Reheiser, 2009).

There is much literature regarding the negative impact of anger on physiological and psychological well-being (Spielberger & Reheiser, 2009). Anger and hostility are associated with hypertension and coronary heart disease (Sue et al., 2006). Anger is a focus of psychodynamic explanations of depression (Sue et al., 2006).

2.2.3 Defining depression.

Depression is a symptom of many mental disorders and can be described as a state of sadness, gloominess, and pessimistic ideation characterised by reduced interest in normally enjoyable activities (Colman, 2006). Individuals who are depressed may experience weight loss, insomnia or hypersomnia, feelings of guilt or worthlessness, decreased concentration, decreased energy, loss of motivation and recurrent thoughts of suicide (Colman, 2006; Sue et al., 2006). Depression is a complex, multifaceted syndrome with symptoms that can range in severity and duration. Psychodynamic explanations of depression emphasise the role anger and anxiety may play in causing depression (Sue et al., 2006). Other approaches also consider the relationship that low self-esteem and high self-criticism has with depression (Sue et al., 2006). As with anxiety and anger, depressive symptoms can range in severity from feeling sad and gloomy to feelings of deep despair, as well as ranging in duration from a short period of time to persistent depression as an aspect of personality (Spielberger & Reheiser, 2009).

2.2.4 Defining curiosity.

Understanding curiosity has long been of interest. Writers such as Aristotle, Cicero, and St. Augustine discussed the importance of curiosity in learning, and described it as an intrinsic motivator, and a passion that has an appetite (Loewenstein, 1994). Curiosity has been defined in ways that resemble other constructs such as interest, openness to experience, and novelty seeking behaviour, which all relate to how people direct attention to novel or valued environmental stimuli (Bowler, 2010; Kashdan et al., 2009; Olver & Mooradian, 2003). Curiosity incorporates a drive to purposefully challenge oneself (Kashdan et al., 2013) and is also associated with emotional intelligence (Hulme et al., 2013).

Litman (2005) defines curiosity as an individual's desire to see, know, or experience and which guides people to acquire new information through exploratory behaviour. It is usually viewed as a positive emotion. Kashdan et al. (2013) discuss how curiosity inspires learning for its own sake. It is recognised that curiosity plays an important role in a child's development and is a motivator behind interest in learning (Loewenstein, 1994). People who are higher in trait curiosity are more likely to encounter novelty and consider themselves capable of understanding the new information. As curious individuals become aware of their knowledge gaps, they develop a desire to close those gaps and therefore seek more knowledge (Kashdan et al., 2009).

Discovering new things when one's curiosity is peaked is pleasurable and intrinsically rewarding. Curiosity may also be rewarding in that satisfying one's curiosity might reduce an unwanted state of ignorance or uncertainty (Litman, 2005). Curiosity forms the basis for motivational constructs and it is generally agreed that it significantly influences feelings, thoughts, and behaviours (Spielberger & Reheiser, 2009).

2.3 The State-Trait Personality Inventory

State-trait theory considers both the stability and variability of human affect (Yasuda, Lawrenz, Van Whitlock, Lubin, & Lei, 2004). State-based constructs are malleable, temporal, and can fluctuate. They might result from a certain situation or a condition the person is in at that moment. A trait is a characteristic that is dispositional and distinguishes an individual in a more-or-less consistent pattern of behaviour that is presumed to be persistent, stable, and difficult to change. Trait-like emotion is the foundation of a person's emotional life (Colman, 2006; Yasuda et al., 2004; Youssef & Luthans, 2010).

The STPI (Form-Y) is cost effective and can be rapidly and easily administered through scoring procedures that are objective, yielding results that are unbiased by the test administrator (Spielberger & Sydeman, 1994). The original State-Trait Personality Inventory (STPI-X) was compiled in 1979 to assess the State and Trait constructs of Anxiety, Anger, and Curiosity (Spielberger et al., 1979). The revised STPI-Y consists of eight 10-item scales for measuring State and Trait Anxiety, Anger, Depression, and Curiosity. These constructs are considered to be emotional vital signs critical in assisting clients and patients to understand their powerful emotions and the events which led to the development of these emotions (Spielberger & Reheiser, 2009). The items are rated on a four-point Likert scale with State constructs measured in terms of how the person feels at that moment, while the Trait constructs assess how the person generally feels (Endler, Macrodimitris, & Kocovski, 2000).

This measure has been used extensively in diverse studies with adolescent and adult participants in a variety of contexts over the past four decades. These studies include assessing health conditions linked to stress in organisations (O'Roark, 1994) as well as an investigation into the anxiety, depression, and anger differences between adults who were

sexually abused as children compared to those who were not (Rojas & Kinder, 2007). The STPI was used to investigate the relationship between defensiveness and hypertension (Mann & James, 1998) and to compare the State and Trait scores of smokers and non-smokers (Pritchard & Kay, 1993; Spielberger & Jacobs, 1982). The STPI has also been extensively used in sports psychology (Gábor, 2009).

The Norwegian version of the STPI was used in a study that explored the effects of personality variables on physiological response and affect states (Vassend & Knardahl, 2005). The Hebrew version of the STPI was used in a study that investigated the impact of a relaxation programme (Paran, Amir, & Yaniv, 1996).

The Trait scales have been used in a study that investigated anger, irrational beliefs, and feelings of vengeance in prison inmates (Stuckless, Ford, & Vitelli, 1995) and to assess the correlation of this assessment with a measure of emotional control (Watson & Greer, 1983). The Trait scales of the English and German versions of the STPI were used in a correlation study to assess the psychometric properties of a Coping Inventory developed for German and American populations (Krohne, Schmukle, Burns, Egloff, & Spielberger, 2001).

The aforementioned studies are just a few of the many in which the SPTI has proven useful. It is clear that this measure has immense value in a variety of situations for a broad range of research topics.

The State and Trait measures for Anxiety and Anger were selected from the items which demonstrate the strongest psychometric properties in the State-Trait Anxiety Inventory (STAI Form-Y) and the State-Trait Anger Expression Inventory (STAXI). The measures for Depression and Curiosity were constructed and validated for the State-Trait Personality Inventory (Spielberger & Reheiser, 2009). The development of these measures will be

outlined in the following discussion, along with an explanation of the eight subscales as they are used in the scale.

2.3.1 The Anxiety subscales.

In 1963, Cattell and Scheier developed a definition and measurement of anxiety that revealed independent state and trait anxiety factors through factor analysis. Trait anxiety as an emotional state is closely aligned with the concepts of fear and objective anxiety originally defined by Darwin and Freud. People regarded as having higher levels of trait anxiety tend to respond to perceived threats more frequently and have more intense elevations in state anxiety than people low in trait anxiety (Spielberger & Sydeman, 2004)

Trait anxiety (T-Anxiety) refers to the individual's general or characteristic level of anxiety and is demonstrated by a stable tendency of a person to respond anxiously when in a stressful predicament (Spielberger & Reheiser, 2009). State anxiety (S-Anxiety) is a temporary experience of anxiety that emerges as a result of a particular condition or situation that the individual is in at the time. Most people experience S-Anxiety on occasion (Colman, 2006; Corey, 2009).

Spielberger, Gorsuch, and Lushene developed the State-Trait Anxiety Inventory (STAI) in 1970 (Spielberger & Sydeman, 2004). The STAI defines S-Anxiety as "the intensity at a particular time of subjective feelings of tension, apprehension, nervousness and worry, with the associated activation (arousal) of the autonomic nervous system" (Spielberger & Reheiser, 2009, p. 276). T-Anxiety assesses the more stable individual differences in tendencies to feel anxious. This is measured by the frequency with which anxiety states have previously developed, as well as the probability that S-Anxiety will be experienced in the future. The revised STAI (form Y) shows reasonably high test-retest stability (.73- .86) for the T-Anxiety scale; and low stability coefficients (.33) for the S-Anxiety scale. Low S-

Anxiety test-retest stability is expected and desirable as this construct should be influenced by situational factors. The internal consistency reliability measures provide a better indication of the reliability of the S-Anxiety scale and have produced an alpha reliability coefficient of 0.86 or higher. The T-Anxiety scale also had a high alpha coefficient of .90 (Spielberger & Reheiser, 2009). The distribution of scores for the STAI S-Anxiety scale were positively skewed under neutral conditions and normally distributed under stressful conditions. This indicates that under conditions of increased psychological stress, the alpha coefficients are likely to be higher (Spielberger & Reheiser, 2009).

Over 10 000 adults and adolescents from a variety of backgrounds were tested in the construction and validation of the STAI. This measure is used in a variety of different psychological contexts and has been adapted for use in at least 66 language and dialects including Turkish, Japanese, Spanish, Portuguese, Hindi, Malaysian, Dutch, and Greek (Fountoulakis et al., 2006; Gençöz & Öncül, 2012; Iwata et al., 1998; Spielberger & Reheiser, 2009; Spielberger, 2004).

The STAI T-Anxiety scale shows relatively high correlations with the Manifest Anxiety Scales (MAS) and the Attachment Style Questionnaire (ASQ), ranging from .73 to .85. This indication of concurrent validity reveals that all three inventories measure trait anxiety (Spielberger & Reheiser, 2003). The STAI T-Anxiety scale requires less than half the time to administer than the MAS and ASQ and is less contaminated with depression measures than the MAS. The correlation of the S-Anxiety measure to the MAS and ASQ was less than .50. This is comparable to its correlation with the T-Anxiety scale (Spielberger & Reheiser, 2003; Spielberger & Sydeman, 2004).

2.3.2 The Anger subscales.

State Anger (S-Anger) is considered to be a subjective experience that includes psychobiological reactions which range in intensity and vary over time. S-Anger is expected to oscillate depending on perceived affronts, levels of frustration, and experiences of injustice (Spielberger & Reheiser, 2009). Trait anger (T-Anger) may be seen as a personality trait that is made up of relatively stable thoughts and attitudes demonstrated through the experience of S-Anger over time (Spielberger & Reheiser, 2009). A person who is high in T-Anger will probably experience a broader range of circumstances as anger-provoking and resultantly experience S-Anger more frequently (Hamdan-Mansour et al., 2012; Spielberger & Sydeman, 2004).

Progress in the research of anger has revealed the importance of distinguishing between the experience and expression of anger. Anger is considered a unidimensional, bipolar construct. The expression of anger ranges from intense suppression of anger at one extreme, to frequently expressing anger towards other people or objects (aggression) at the other extreme. The suppressing anger is known as *anger in*, while the expressing anger is known as *anger out* (Spielberger & Reheiser, 2009).

The State and Trait Anger subscales were developed by using the items that demonstrated the highest psychometric properties in the State-Trait Anger Expression Inventory (Spielberger & Reheiser, 2009). The Cronbach's alpha coefficients ranged from .82 to .85 for college students for the T-Anger subscale, and from .90 to .92 for the S-Anger subscale (Spielberger et al., 1979).

The State-Trait Anger Expression Inventory (STAXI) was developed through combining two separate scales, the State-Trait Anger Scale (STAS) and the Anger

EXpression (AX) scale. These scales will be discussed briefly, followed by a discussion on the development of the STAXI.

2.3.2.1 The State-Trait Anger scale (STAS).

The State-Trait Anger Scale (STAS) was developed in a similar process to the STAI. It aims to measure anger intensity as an emotional state at a specific time (S-Anger) and also to assess anger proneness in individuals as a personality trait, known as T-Anger (Spielberger & Reheiser, 2009).

The initial STAS measure showed high internal consistency reliability for both scales. The Cronbach's alpha coefficient for the S-Anger scale was .93 and .87 for the T-Anger scale was .87. The test-retest reliability of the T-Anger scale was shown to be .70 for men and .77 for women, while the S-Anger scale showed low test-retest reliability of .27 for men and .21 for women. A lower test-retest reliability result is expected in transitory measures. This measure was reduced from 15 items to 10 items for each construct. Correlations between the longer and shorter measures on navy recruits and college students ranged from .95 to .99. This indicated that the 10-item measure provides the same information as the 15-item measure (Spielberger & Sydeman, 2004).

2.3.2.2 Anger Expression scale (AX)

The two dimensions of Anger-Out (AX/Out) and Anger-In (AX/In) were the basis for the construction of the Anger EXpression (AX) scale. Items are designed to assess AX/Out, Ax/In and a mid-range of this hypothetical continuum, and follow the same rating format as the STAS T-anger scale, although the instructions for completion are noticeably different (Spielberger & Reheiser, 2009).

Studies into the test-retest and internal consistency reliability of an 8-item AX/Out and Ax/In subscale revealed test-retest reliability of 0.64 to 0.86 over varying time periods,

and alpha coefficients ranging from .73 to .84. This indicates that the measure is empirically independent, internally consistent, factorially orthogonal, and relatively stable over time. The three factors that were included to measure the mid-range of the AX/Out, Ax/In continuum were shown to form a third factor labelled Anger Control (AX/Con). Five additional items in this category were added, completing a 24-Item AX-Scale (Spielberger & Reheiser, 2009).

2.3.2.3 The State-Trait Anger Expression Inventory (STAXI)

The State-Trait Anger Expression Inventory (STAXI) combined the 20-item STAS and the 24-item AX scales with the aim of measuring the expression, experience and control of anger (Spielberger & Sydeman, 2004). The 44 items revealed dominant salient loadings on the relevant factor and negligible loadings on other factors. Three of the ten items of S-Anger also had strong loadings on a seventh factor, which was identified as *Feel like expressing anger*. Subsequent research has revealed multiple S-Anger factors. This led to a revision and expansion of the STAXI. Forty two of the original items were kept and an additional 15 items were developed to measure three aspects of S-Anger. These are: Feeling anger (S-Anger/F); Feel like expressing anger verbally (S-Anger/V), and Feel like expressing anger physically (S-Anger/F). A few amendments have been made since - notably a new scale of eight items to measure the control of anger-in. This entails the ability to calm down to decrease the intensity of suppressed anger (Spielberger & Reheiser, 2009).

2.3.3 The Depression subscales.

Research on depression has revealed distinctions between trait and state aspects. State Depression (S-Depression) assesses how an individual feels at that moment and is an emotional state, while the Trait Depression (T-Depression) assesses how the person generally feels and is a dispositional personality trait. A person who is high in T-Depression will experience depression as mild or high depending on the negative cognitive processes that

activate when he or she is in a depressed state (Endler et al., 2000; Krohne, Schmukle, Spaderna, & Spielberger, 2002).

The State-Trait Depression Scale (STDS) aims to measure individual differences in depression as a personality trait, as well as the intensity of feelings of depression as an affective state. Four widely used measures of depression were adapted to form the 40 items used in the STDS to assess the absence or presence of depressive feelings. These measures include: the Zung Self-Rating Depression Scale (Zung); Beck's Depression Inventory (BDI); the depression scale of the Multiple Affect Adjective Check List; and the Center of Epidemiologic Studies Depression Scale (CES-D) (Spielberger & Reheiser, 2009). The STDS differs from many other measures of depression as it does not focus on somatic symptoms but focuses on cognitive-affective symptoms more useful in non-clinical work (Krohne et al., 2002). Cognitive-affective symptoms investigate feelings and thoughts associated with depression (Endler et al., 2000).

Administration and refinement resulted in a 10-item measure for each of the STPI State and Trait Depression subscales. The selected items included those with the strongest factor loadings on the State and Trait Depression-present (dysthymia) and State and Trait Depression-absent (euthymia) for both genders, with 5 items included for each factor. The Cronbach's alpha coefficients for these measures were .81 or higher for both genders, and the correlation of the STPI T-Depression subscale to the Zung, BDI and CES-D ranged from .72 to .85. Krohne et al. (2002) found that T-Depression subscale reported a Cronbach's alpha coefficient of .90, while the S-Depression subscale reported a Cronbach's alpha coefficient of 0.85. The correlation with the S-Depression subscale and these measures was lower at .66, which indicates that the Zung, BDI and CES-D measure state and trait depression but are more inclined to measure the characteristics of trait depression (Spielberger & Reheiser,

2009). The T-Depression subscale reported a Cronbach's alpha coefficient of .90, while the S-Depression subscale reported a Cronbach's alpha coefficient of 0.85 (Krohne et al., 2002).

The STPI T-Depression subscale and the Zung, BDI and CES-D measures correlate well with the STPI T-Anxiety scale, illustrating the high comorbidity of anxiety and depression. The STPI S-Depression subscale and the T-Anxiety subscale also correlated but to a lesser degree. The Zung, BDI and CES-D measures, as well as the STPI T-Depression and S-Depression subscales, also showed a significant positive correlation with the STPI T-Anger scale (Spielberger & Reheiser, 2009).

2.3.4 The Curiosity subscales.

Research supports the distinction of state and trait curiosity (Boyle, 1989; Park, Mahony, & Greenwell, 2010). Trait curiosity (T-Curiosity) is shown in individuals who tend to experience brief curiosity more frequently, easily, in more situations, and for a longer duration. Individuals high in T-curiosity tend to prefer and have a higher tolerance of arousal. State Curiosity (S-Curiosity) tends to fluctuate over time either enabling or inhibiting curiosity and is situation specific. S-Curiosity appears to be more powerful in responding to signs of pleasure, excitement, and reward (Arnone, Grabowski, & Rynd, 1994; Kashdan et al., 2009)

The Curiosity subscale of the STPI is measured using the State-Trait Curiosity Inventory (STCI). The STCI was developed to assess state and trait curiosity and consists of 10 items for each construct. The S-Curiosity subscale requires that participants report how they feel at that moment in order to assess the intensity of curiosity as an emotional state (Spielberger & Reheiser, 2009). The T-Curiosity subscale focuses on the regularity with which an individual experiences the positive emotional states linked to curiosity in order to measure curiosity as a stable personality trait (Spielberger & Sydeman, 2004). The trait items

assess a participant's general inclination to experience feelings of interest and learn new things. The same four-point Likert scale that is used to assess the other SPTI constructs is utilised. The 10-item T-Curiosity scale showed alpha coefficients of internal consistency reliability that ranged from .81 to .87, while the internal consistency reliability of the S-Curiosity scale ranged from .78 to .84 (Boyle, 1989; Litman, 2005; Spielberger & Reheiser, 2009).

Initial assessment of this measure using factor analysis resulted in relatively independent state and trait curiosity factors being identified (Spielberger & Reheiser, 2009). S-Curiosity is associated with a strong desire to explore the environment and understand its unique characteristics. People who rate highly in T-Curiosity feel curious more often than those who are low in T-Curiosity. Significant negative correlations have been found concerning curiosity and depression, suggesting that depression inhibits curiosity. Anxiety is also known to negatively correlate with curiosity (Boyle, 1989; Spielberger & Reheiser, 2009).

2.4 Considerations and criticisms relating to the STPI (Form-Y) and related measures.

The State-Trait Anxiety Inventory (Form X) was criticised for its high overlap with measures of depression. This is a common concern with many measures of anxiety. The form Y was developed to reduce this overlap (Creamer, Foran, & Bell, 1995). However, high correlations have been reported on the S-Anxiety and S-Depression subscales of the STPI-Y (Krohne et al., 2002).

The STPI (Form-Y) is a self-report measure. According to Foxcroft, Paterson, Le Roux, and Herbst (2004), when utilising a self-report measure, the fact that cultural groups vary in terms of the relative importance attached to individual needs over group needs must

be considered. In cultures which value individualism, people are taught to be aware of their personal needs and to introspect on their personal growth and development (Foxcroft et al., 2004). In a collectivistic society, community needs are prioritised over individual needs; and the good of the community is viewed as more important than personal happiness (Baron, 2008). This has implications for self-report measures which require introspection and self-reflection. Test-takers from different cultural backgrounds may respond differently to the items (Foxcroft & Roodt, 2009). Although the STPI and the related tests have been translated for use in a variety of languages as well as investigated in a variety of individualistic and collectivistic cultures[1], it is important to ensure that the STPI-Y is applicable to the South African population.

The State-Trait Anxiety Inventory has been recognised as being highly face valid which means that it is susceptible to false response (Foxcroft & Roodt, 2009). This can be generalised to the entire measure and therefore results should be interpreted with caution. The lower number of items used in the STPI in order to ensure it is a brief measure may also compromise the reliability of the measure (Boyle, 1983).

The high correlation of the Anxiety scales with the Depression scales and the Beck's Depression Inventory could indicate that the Anxiety measure is a measure of general negative affect rather than anxiety. This raises concerns over the discriminant validity of the Anxiety subscale (Bados, Gómez-Benito, & Balaguer, 2010). The Curiosity subscales may focus on positive affect in general and not only experiences that are unique to curiosity

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[1] See Fountoulakis et al. (2006); Gençöz & Öncül (2012); Hishinuma et al. (2000); Iwata et al. (1998); Kaipper, Chachamovich, Hidalgo, da Silva Torres, & Caumo (2010); Krohne, Schmukle, Spaderna, & Spielberger (2002); Vassend & Knardahl (2005)

(Kashdan, Rose, & Fincham, 2004). The Curiosity measure reported a three-factor solution, with some of the state and trait constructs loading on the same factor. This suggests that this subscale lacks adequate construct validity (Boyle, 1983). The reverse-scored Curiosity items seem to load onto a separate factor, suggesting they measure a different construct (Boyle, 1989).

It is important to be aware of the criticisms of the measure. However, the benefits and generalised applicability of the STPI-Y still suggest that it could be useful in the South African context.

2.5 Conclusion

This chapter defined the constructs of anxiety, anger, depression, and curiosity - the four state and trait constructs measured by the State-Trait Personality Inventory - and discussed the development of the different subscales of the STPI. Additional considerations and criticisms relating to this instrument were mentioned, as well as its applicability in the South African context. This discussion demonstrates that the STPI-Y has the potential to make a valuable contribution in understanding well-being in the South African context. The following chapter will discuss the research methodology used in this study.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter will discuss the methods used in investigating the psychometric properties of the State-Trait Personality Inventory in the South African context with a student population. The aims and goals of the research will be reviewed, the paradigmatic departure will be discussed and the research design will be described. The research sample will be described along with the measurement instrument and the methodology used to analyse the data. Methodologies from classical test theory and item response theory were used in this research. The following discussion will clarify these different approaches and describe how these theories were implemented in order to achieve the research objectives. This chapter concludes with a discussion of the ethical considerations of this study.

3.2 Brief Review of Aims and Goals

The well-being of South African students is at risk as a consequence of stressors in the South African environment. Decreased well-being might be related to higher levels of anxiety, anger, and depression as stable personality traits, and through the experience of these constructs as a temporary emotional state. Curiosity, as a stable personality trait and a fluctuating emotional state, can provide a buffer against these stressors. These constructs are measured by the State-Trait Personality Inventory. With this in mind, the primary aims of this research were to:

1) Examine the reliability of the STPI-Y and its subscales by exploring the internal consistency reliability as well as investigating the person and item separation indices;

2) Examine the evidence for construct validity of the STPI-Y by exploring fit statistics through Rasch modelling and using factor analysis;

3) Examine the differences between ethnic and gender groups in the South African population and report the effect sizes of these differences;

4) Report on unknown words and phrases as identified by the primary sample group.

3.3 Paradigmatic Point of Departure

This research was based on a positivist approach to knowledge. According to Terre Blanche and Durrheim (2006), a positivist approach views the world as having a stable external reality. Positivist researchers remain objective and detached from the study and use quantitative research to test hypotheses (Terre Blanche & Durrheim, 2006). Psychological instruments such as the STPI-Y are constructed from items which aim to measure the characteristics of individuals related to overt and covert behaviour (Kaplan & Saccuzzo, 2013). Valuable psychological instruments are designed through a careful process that uses a variety of statistical methods to assist in ensuring the instrument serves the purpose for which it was designed (Foxcroft & Roodt, 2009). Quantitative methods should be applied in order to assess whether the instrument is able to measure past or current behaviour, or possibly predict future behaviour (Kaplan & Saccuzzo, 2013). Statistical methods can also be used to adapt measures cross-culturally (Van de Vijver & Leung, 1997). These quantitative methods are associated with a positivist approach to research which holds that the pursuit of knowledge is best obtained through the use of empirical science (Creswell, 2003; Shadish et al., 2002). Positivism is considered to be reductionistic as this approach aims to reduce broad concepts

into discrete, testable constructs which can be measured through numeric measures (Creswell, 2003).

This paradigm is applicable for the aims of this study. The data were collected through a testing instrument and the research pursued an objective approach to analysing data through investigating the reliability and validity of the STPI-Y using quantitative methods. The hypothesis for this research is that the STPI-Y is applicable in the South African context.

3.4. Research Design

The approach that will be utilised in this research is a differential design. Differential research identifies separate groups which cannot be affected by the other groups (Gabrenva, 2003). Separate groups are created by identifying participant differences in one variable. Measurements of the second variable are made within each group and compared for differences (Gravetter, 2012). In this study the independent variables which will be compared are the gender and ethnic groups within the South African student sample. Differential research uses quantitative research methodology and is situated in a positivist paradigm. Two theories of psychological measurement were used to assess the objectives: classical test theory and item response theory.

The most broadly applied, formal theory of measurement in psychology is classical test theory, or CTT (Millsap, 2011). This approach assumes that an individual's observed score on a psychological test is equal to his or her true score of the construct being measured, plus random measurement error (Colman, 2006). It is hypothesised that if the same person took the test repeatedly, a variety of scores would result due to changes in the person's fatigue, memory, or other influences, and these changes are the sources of error (Millsap, 2011). It is assumed that the distribution of random errors for all test-takers is the same, and

therefore the standard deviation of errors is the standard error of measurement. The standard error of measurement is calculated from the standard deviation of observed scores and the test's Cronbach's alpha reliability coefficient (Kaplan & Saccuzzo, 2013).

The main alternative to this approach is item response theory (IRT) which assumes that the likelihood of responding in a particular way to a test item is a combination of the characteristics of the test item (Colman, 2006). Every item in a test is assumed to have its own item characteristic curve that describes the probability of test-takers getting an item correct given their level of ability (Kaplan & Saccuzzo, 2013). An item response function refers to the relationship of these item characteristics to the probability of a particular response, and this is measured by examining the observable responses of participants to the test item (Coleman, 1998). One profound implication of item response theory is that an individual's score can be obtained from the level of difficulty of the item that was selected (Kaplan & Saccuzzo, 2013). In personality research, item difficulty refers to the item's endorsability, or how easy or difficult it is for a person to agree with the item (Bond & Fox, 2001).

One model to assess item response theory is the Rasch model or one-parameter logistic model. This model enables the independent investigation of each test item to determine whether the items fit the model (Millsap, 2011). An important assumption of Rasch measurement is unidimensionality, which holds that an instrument is only meaningful if each question contributes a share to the overall measurement of a single attribute. Another assumption is local independence, which is the assumption that the endorsement of any item should not be dependent on the endorsement of any other item (Bond & Fox, 2007).

According to Van de Vijver and Leung (1997), IRT is desirable for cross-cultural research because item parameters are not dependent on the standing of the group on the latent

trait measured. In CTT, the difficulty of an item is dependent on the average ability of the group. IRT is also suitable for cross-cultural research as fit tests can evaluate the degree to which empirical data conform to a theoretical model. The validity of an instrument is in question if a substantial number of the items are found to be biased (Van de Vijver & Leung, 1997).

CTT and IRT offer different advantages. CTT has weak theoretical assumptions which means that it is easy to apply in many testing situations (Fan, 1998). In addition, CTT uses conceptually straightforward mathematical procedures that can be used with a smaller representative sample than IRT models (Schumacker, 2010). A limitation of CTT is that item difficulty and item discrimination are dependent on the sample. In addition, CTT is test-dependent, which implies that the difficulty of the test affect the resultant test scores. There is no basis to predict how a respondent will perform on a particular item (Schumacker, 2010).

IRT is more theory-grounded and models the probabilistic distribution of examinees success at item level. IRT models, such as the Rasch model, produce item statistics independent of the sample group, and person statistics independent of the items in the assessment (Fan, 1998). Therefore, statistical techniques from both approaches were used to assess the psychometric properties of the STPI-Y.

3.5 Sample

Non-random, convenience sampling was used to access a sufficiently large number of participants. According to Foxcroft and Roodt (2009), in order to assess the psychometric properties of a measure, it should be administered to a large sample group of at least 400.

According to Mouton (2001), primary data are collected by the principal investigator while secondary data analysis reanalyses existing data with the aim of testing hypotheses or

validating models. This investigation utilised primary data from 319 students collected from the university where the researcher is located. This group has been labelled as Group 1. In addition, two sets of secondary data were obtained. A dataset of the responses of 1393 undergraduate participants who completed the STPI-Y between 2008 and 2010 was obtained from another South African university located in the Gauteng region, and was labelled as Group 2 (Clark, 2009; De Bruyn, 2010; De Wet, 2008; Ferreira, 2010; Horn, 2008; Kempen, 2009; Naidoo, 2009; Schobermayr, 2009; Vilakazi, 2009; Von Solms, 2008). A further 808 participants completed the STPI-Y through the Department of Physiology at the University of Pretoria between 2011 and 2012 and permission was obtained to utilise this data (Group 3). The letters of permission to use these data are available in Appendix G. The total sample group, therefore, comprised 2520 undergraduate students. After data-cleaning was completed, the total sample group was 2298.

Table 3.1 provides a demographic breakdown of the primary sample group – Group 1. The information for this group includes language information that is not available for the secondary data, as well as the gender and ethnic information for these participants. Two students did not divulge their ethnicity.

Table 3.1

Demographic Profile - Group 1

Variable	N	%
Gender		
Men	74	23.2
Women	245	76.8
Ethnicity		
African	129	40.4
Indian / Asian	7	2.2
Coloured	11	3.4
White	170	53.3
Unspecified	2	0.6
Language		
Afrikaans	140	43.9
Indigenous African	113	35.4
English	61	19.1
Other	5	1.6

Table 3.2 provides the demographic breakdown of Group 2. The information was collected from a student sample at a university in the Johannesburg region and includes gender and ethnic information. Twelve students did not divulge their ethnic group.

Table 3.2

Demographic Profile - Group 2

Variable	N	%
Gender	1202	
Men	313	26.0
Women	889	73.7
Ethnicity		
African	694	57.5
Indian / Asian	105	8.7
Coloured	75	6.2
White	320	26.5
Unspecified	12	1.0

Table 3.3 provides the demographic breakdown of Group 3. The data from this group were collected through the Department of Physiology at the University of Pretoria. The data includes Ethnic and Gender information. Four students did not disclose their ethnicity.

Table 3.3

Demographic Profile - Group 3

Variable	N	%
Gender	773	
Men	185	23.9
Women	588	76.1
Ethnicity		
African	194	25.1
Indian / Asian	40	5.2
Coloured	19	2.5
White	516	66.8
Unspecified	4	0.5

Table 3.4 provides the description of the total sample group. The sample group was combined for the reliability and validity analyses, as well as the group comparisons.

Table 3.4

Demographic Profile - Total Sample Group

Variable	N	%
Gender	2298	
Men	572	24.9
Women	1722	74.9
Unspecified	4	0.2
Ethnicity	2298	
African	1017	44.3
Indian / Asian	152	6.6
Coloured	105	4.6
White	1006	43.8
Unspecified	18	0.8

Women were overrepresented in the sample at 74.9 % compared to 24.9 % men. In terms of ethnicity, 44.3% of the group identified themselves as African, and 6.6 % identified themselves as Indian. Coloured students made up 4.6 % of the sample group, while White students made up 43.8% of the group. The ethnic group breakdown that was selected is in line with the categories used by the South African National census: African; Indian/Asian; Coloured; and White (Statistics South Africa, 2013). The average age of the entire sample group was 19.77 years, with the ages ranging from 17 years to 51 years.

3.6 Measurement Instrument

The measurement instruments for this investigation included a demographic questionnaire and the STPI-Y. The two forms take between 10 and 15 minutes to complete. The demographic questionnaire and the informed consent forms for the primary sample group are available in Appendix E. The demographic questionnaire used in the primary data collection requested the participants' age, gender, ethnicity, home language, and residential situation. Home language and residential situation of the participants were not available for the secondary data. The STPI-Y was purchased from the suppliers of this test. The licence is available in Appendix F.

3.7 Data Collection Procedure

Data were collected by administering the demographic questionnaire and STPI-Y to the participants in a group setting. Participants in the primary data collection process were requested to circle words in the instrument that they did not understand in order to give insight into possible construct bias that might be present.

3.8 Data Analysis

Descriptive statistics relating to the means, standard deviations, skewness, and kurtosis were investigated using IBM SPSS Statistics 21.0 (SPSS). SPSS was used to explore internal consistency reliability and investigate the median differences between the South African student population groups. The statistics programme, R (version 3.0.2), was used for factor analysis (R Development Core Team, 2012). The psych package was used to conduct parallel analysis, investigate goodness-of-fit indices and conduct exploratory factor analysis (R Development Core Team, 2012; Revelle, 2013). The psych package offers an advantage in

that goodness-of-fit indices are reported when conducting exploratory factor analysis, enabling a comparison of different factor solutions (Revelle, 2013). Confirmatory factor analysis was conducted using the R package, lavaan (R Development Core Team, 2012; Rosseel, 2012). Rasch analysis was done using WINSTEPS version 3.70.0 (Linacre, 2013).

3.8.1 Descriptive statistics and data screening

The dataset was investigated for missing data, outliers and unexpected responses by exploring the means, medians, standard deviations, skewness, and kurtosis of the items.

3.8.2 Objective 1: Examine the reliability of the STPI-Y

The reliability of an instrument is the extent to which it consistently measures a construct (Foxcroft et al., 2004). Reliability is related to the concept of measurement error, and instruments that are relatively free of measurement error are considered to be reliable (Kaplan & Saccuzzo, 2013). The reliability of the STPI-Y will be explored using internal consistency reliability in accordance with classical test theory, and by investigating the person and item separation indices using Rasch analysis as per item response theory. Generally, reliability is overestimated by Cronbach's alpha and underestimated in Rasch analysis (Linacre, 2013).

3.8.2.1 Internal consistency reliability

Internal consistency reliability is a common method used in classical test theory to examine reliability. This method investigates the extent to which each item in a scale correlates with the other items in that scale (Durrheim & Painter, 2006). Internal consistency reliability for the STPI-Y is investigated using Cronbach's alpha. Cronbach's alpha values above .70 are considered acceptable, values above .80 are preferable or good and values above .90 are considered to be excellent (Pallant, 2011).

3.8.2.2 Person and item separation indices

When applying item response theory to assess reliability, the person separation index (PSI) is explored to estimate how well the participants on the measured variable can be differentiated (Bond & Fox, 2007). Person reliability is similar to traditional reliability tests such as Cronbach's alpha (Linacre, 2013). Person separation indices below .80 imply that the instrument may require more items to differentiate between high and low performers or that the variance in the participants is not broad enough to distinguish between more than two levels (Linacre, 2013). The item separation index (ISI) reports the number of standard errors of spread among the items (Bond & Fox, 2007). Results below .90 suggest that the person-sample is not large enough to confirm the item difficulty of the hierarchy. This can also threaten the construct validity of the instrument (Linacre, 2013).

3.8.3 Objective 2: Examine the construct validity of the STPI-Y

Construct validity is defined as "the extent to which (an instrument) measures the theoretical construct or trait it is supposed to measure" (Foxcroft et al., 2004, p. 57). In terms of item response theory, a method for assessing the construct validity of an instrument is to examine the item fit (Bond & Fox, 2007). A method of assessing construct validity in classical test theory is factorial validity (Foxcroft et al., 2004). Factor analysis provides information about how latent traits relate to each other, but it is influenced by the way the entire sample group answers items on a measure, irrespective of fatigue or guessing (Meade, 2004; Mueller, Bullock, & Leierer, 2010). Rasch analysis uses expected and observed response patterns at both the item and person level and assesses how well these work together according to probabilistic expectations (Mueller et al., 2010). These two approaches are not directly comparable but each approach has advantages and disadvantages (Meade, 2004).

3.8.3.1 Rasch model fit

To explore construct validity using item response theory, the person and item fit to the model is explored. Fit is defined as "the degree of match between the pattern of observed scores and the modelled expectations" (Bond & Fox, 2007, p. 310). Fit statistics demonstrate how well individual items meet the assumption of unidimensionality in the Rasch model (Linacre, 2013). If the scale fits the expected model it indicates that the results obtained are probably not dependent on the sample and the instrument can be considered to be stable (Chachamovich, Fleck, Trentini, & Power, 2008).

The fit statistics reported by Rasch analysis are OUTFIT and INFIT. OUTFIT is an outlier-sensitive statistic that is affected when participants make unexpected responses on items that are relatively very easy or very difficult for them, depending on their standing on the latent trait (Linacre, 2013). INFIT is sensitive when participants make unexpected patterns of responses on items that are more or less targeted to their ability level, or their standing on the latent trait (Linacre, 2013). The expected values for unstandardised INFIT and OUTFIT statistics are 1.0 (Mueller et al., 2010). Good fit statistics require that individuals answer items in a somewhat predictable manner. Participants with high levels of an attribute should have a higher probability of endorsing an item that measures that attribute than a respondent with low levels of the attribute (Mueller et al., 2010). High mean square fit statistics indicate underfit and suggest that the response patterns of the participants were erratic. This could indicate that the quality of the data is questionable. Low mean square fit statistics indicate overfit which points to a perfect Guttman-style response pattern. Overfit may result in a researcher reaching the conclusion that the data are better than they really are (Bond & Fox, 2007). Generally, unacceptable fit statistics indicate either confusion, poor wording, or guessing (Mueller et al., 2010). Setting limits for misfit is complicated. As a

general guide, Bond and Fox (2007) suggest that for a Likert scale (such as the STPI-Y), the mean square fit statistics should range from 0.6 to 1.4. For this research, slightly stricter cut-off INFIT and OUTFIT values of 1.35 and 0.70 will be used, as recommended by Wilson (2005).

3.8.3.2 Factor analysis

Factor analysis investigates the interrelationships amongst a set of variables (Foxcroft et al., 2004; Kaplan & Saccuzzo, 2013). Exploratory factor analysis (EFA) is useful to identify a smaller set of variables from a larger set of continuous variables such as those found in a questionnaire. The smaller set of variables can explain the majority of variance found in the original set of variables (Grimm & Yarnold, 1995). Confirmatory factor analysis (CFA) enables the testing of more specific hypotheses because the researcher is able to specify which items belong with certain factors (Grimm & Yarnold, 1995). EFA is best utilised for theory building while CFA is useful for theory testing, but the two techniques are complementary and are often used together (Byrant & Yarnold, 1995).

The theoretical structure of the STPI-Y suggests that the instrument should have four state factors and four trait factors, although there may be some correlation between the anxiety and depression scales as found in previous studies. It was decided that exploratory factor analysis would be an appropriate first step in assessing how the items load on the South African student context. Subsequent to obtaining the results from exploratory factor analysis, confirmatory factor analysis tested the items based on the theoretical model on which the STPI-Y was designed. The factor models used to assess the STPI-Y were selected to be appropriate for the analysis of ordered categorical data, because the STPI-Y assesses the respondent's endorsement of an item on a Likert Scale.

3.8.3.2.1 Exploratory factor analysis

When conducting the exploratory factor analysis the weighted least squares (WLS) method were used to extract the data. This extraction method is suitable for ordinal data when the sample group is large (Costello & Osborne, 2005) and is also appropriate for data that are not normally distributed (Finney & DiStenfano, 2006).

In order to test whether the data are suitable for factor analysis, the Kaiser-Meyer-Olkin measure of sampling adequacy as well as Bartlett's Test of Sphericity were considered (Pallant, 2011). To determine the number of factors, parallel analysis was conducted and the scree plot investigated. Parallel analysis entails comparing the eigenvalues obtained from the sample data to eigenvalues obtained from completely random data. The eigenvalues that are greater than those obtained in the random data are retained (Fabrigar, Wegener, MacCallum, & Strahan, 1999). The scree plot shows the eigenvalues in order of descending values (Fabrigar et al., 1999). The graph is examined in order to identify where the last substantial drop in the magnitude occurs by identifying a natural bend in the graph and retaining the factors which occur prior to this bend (Costello & Osborne, 2005; Fabrigar et al., 1999).

The size of the residuals was assessed by examining the Tucker Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the root mean square residual (RMSR). The Tucker Lexis Index (TLI) is a relative fit index which assesses how well a given factor model fits the data relative to a null model which asserts that all variables are uncorrelated. This index ranges from 0 to 1, with higher values indicating better fit (Byrant & Yarnold, 1995). Proposals for cut-off criteria for the Tucker Lewis Index have been proffered as low as .80 and as high as .95 (Hooper, Coughlan, & Mullen, 2008; Hu & Bentler, 1999).

The RMSEA provides an indication of how well the model, with unknown but optimally selected parameter estimates would fit the population's covariance matrix. This

approach is informative because it is sensitive to the number of estimated parameters in the model. The RMSEA will select the model with the lesser number of parameters. The general consensus regarding cut-off values of the RMSEA is less than .06 to .07 (Hooper et al., 2008; Hu & Bentler, 1999).

The RMSR is the square root of the average of the covariance residuals. A score of zero would represent a perfect fit between corresponding elements of the observed and predicted covariance matrix as this method calculates the difference between the residuals of the sample covariance matrix and the hypothesised covariance model (Hooper et al., 2008; Moss, 2009). Hu and Bentler (1999) recommend a root mean square residual score of less than .09 and ideally less than .06. They also emphasise the importance of the considering the combination of the TLI, RMSEA and RMSR scores in order to optimally avoid Type I and Type II errors (Hu & Bentler, 1999). This is confirmed by Kenny and McCouch (2003).

An oblique rotation (direct oblimin) was used to assist with the interpretation of the factors as this allowed the different factors to be correlated (Costello & Osborne, 2005). It was expected that there would be some correlation between the different factors. A minimum factor loading of .32, which equates to approximately 10% overlapping variance with other items in the factor, is considered to be acceptable (Costello & Osborne, 2005).

3.8.3.2.2 Confirmatory factor analysis

When conducting confirmatory factor analysis, the Diagonal Weighted Least Squares method was used (DWLS). This method is suitable for ordered categorical data (Forero, Maydeu-Olivares, & Gallardo-Pujol, 2009). The DWLS is the robust WLS method, based on the polychoric correlation matrix of the variables in the analysis (Mindrila, 2010).

The fit of the model was evaluated using the Tucker Lewis index (TLI), the comparative fit index (CFI), the standardized root mean square residual (SRMR), and the root

mean square error of approximation (RMSEA). The CFI assumes the null model that all latent variables are uncorrelated. The null model is then compared to the sample covariance (Hooper et al., 2008). CFI values range from 0 to 1, and values above .90 are considered to indicate acceptable model fit (Hu & Bentler, 1999). The SRMR is the standardised version of the root mean square residual. Well-fitting models obtain values below .05, although values of less than .08 are considered acceptable (Hooper et al., 2008).

Interpreting the factor loadings on confirmatory factor analysis is generally dependent on the theory on which it is based. Generally factor loadings above .55 are considered to be good, and above .45 are considered to be fair (Harrington, 2009).

3.8.4 Objective 3: Examine the differences between ethnic and gender groups in the South African population

In psychometric testing, there is controversy about efforts to remove biased items. Using the same norms and standards for different groups may either ignore social and statistical realities or discriminate against certain groups (Kaplan & Saccuzzo, 2013). However, irrespective of this debate, it is important as a first step to assess whether or not group differences exist. Analysing the differences between groups is frequently used to assess the cross-cultural validity of tests in order to assess whether groups differ on the dependent variable. Differences may be due to methodological bias or valid differences (Van de Vijver & Leung, 1997). There are many ways to identify possible differences in groups. For this research it was decided to compare gender and ethnic groups.

Classical test theory and item response theory were used to explore the differences between the gender and ethnic groups in the sampled South African student group. The results of these analyses will be provided in the following chapter.

3.8.4.1 Group median differences

When implementing classical test theory, nonparametric statistics are considered to be less sensitive than parametric tests (Howell, 1999). Nonparametric tests enable comparisons to be made on data that violate assumptions on normality and homogeneity of variance, however, the decrease in sensitivity can result in failure to detect differences that do exist (Howell, 1999; Pallant, 2011). Nonparametric statistics are often suggested for use with ordinal or categorical data, although scale totals on ordinal items can be interpreted as interval scales (Carifio & Perla, 2007; Knapp, 1990). Ultimately, for this research, nonparametric tests were selected because the sample sizes of the different groups are not equal. Nonparametric tests do not depend on asymptotic normality and are appropriate for different group sizes (Howell, 1999; Maris, Schoffelen, & Fries, 2007; Pallant, 2011). The Mann-Whitney U test was used to compare the gender groups and the Kruskal-Wallis test to compare the four different ethnic groups. Post-hoc Mann-Whitney U tests were used to explore any statistically significant differences found between the ethnic groups.

With large sample groups, small differences between groups may become statistically significant. Therefore it is important to explore the strength of the association between statistically significant differences by calculating the effect sizes of these differences (Pallant, 2011). As recommended by Pallant (2011), the Pearson's correlation (r) was used to calculate the effect sizes. Effect sizes of .50 and above are considered large, around .30 are considered medium, and less than .10 are considered as small (Pallant, 2011).

3.8.4.2 Differential item functioning

Differential item functioning (DIF) is also referred to as item bias. A test item is considered to be unbiased if people from different groups who have equal standings on a latent trait have the same score on the item (Van de Vijver & Leung, 1997). When

considering item bias, it is not necessary that a particular item is endorsed by the same proportion of people from different groups as there may be real group differences. However, the items should relate to other items in the instrument in a similar way for the different groups (Kanjee, 2006). Investigating item bias is important in cross-cultural research to explore anomalies such as complex word-choice, poor translation, and possible inappropriateness of item content (Van de Vijver & Leung, 1997). The presence of item bias may provide important information about differences between groups (Van de Vijver & Leung, 1997).

Approaches to assessing differential item functioning were developed to compare a base group and a comparison group (Penfield, 2001). Differential item functioning (DIF) exists when an item's difficulty estimate location varies across samples by a greater amount than the modelled error (Bond & Fox, 2007). In this study, differential item functioning was explored through item response theory using Rasch analysis. DIF can be described through uniform DIF and nonuniform DIF (Tennant & Pallant, 2007). Uniform DIF occurs when there is no interaction between ability level and group membership, while nonuniform DIF occurs when there is discrimination across different ability levels (Kyngdon, 2011). Rasch analysis assesses the presence of uniform DIF. The cancellation of DIF should also be considered. This occurs when some items favour one group and other items favour the other group (Tennant & Pallant, 2007).

When investigating the differences between the two gender groups, the hypothesis that was tested was that each item had the same difficulty for the two groups. The DIF contrast value provided by WINSTEPS is the difference between the DIF measures of each group in logits, or the difference in difficulty of the item between the two groups (Linacre,

2013). A difference of at least .50 logits is necessary in order for the differences to be noticeable (Linacre, 2013).

The sample sizes for the four categorised ethnic groups are large enough to explore through differential item functioning (Linacre, 2013). The hypothesis for this investigation was that the item has the same difficulty as the average difficulty for all groups. To assess how a particular group compares to the average, the DIF size is considered. This is the difference between the DIF measure for this group and the baseline difficulty, expressed in logits. The DIF plots were also investigated for each group. A difference of at least .50 logits between groups is necessary in order for the differences to be noticeable (Linacre, 2013, p.381). After the initial analyses, DIF contrast values between groups that demonstrate a difference of more than .50 logits were reported.

Van de Vijver and Leung (1997) suggest three different approaches to dealing with item bias. The first is to use the presence of item bias to conclude that an instrument is inadequate for cross-cultural comparisons. Because item bias is likely to occur in any study of dissimilar groups, this conclusion is possibly too restrictive (Van de Vijver & Leung, 1997). Another option is to delete the items that demonstrate bias (Van de Vijver & Leung, 1997). Because each of the subscales of the STPI-Y only include ten items, removing biased items will likely reduce the reliability, particularly the person-separation index. A third approach is to consider item bias as providing insight into clues about cross-cultural differences. Unbiased items provide evidence of culture-common aspects of a construct and biased items demonstrate culture-specific aspects of a construct (Van de Vijver & Leung, 1997).

3.8.5 Objective 4: Report on unknown words or phrases

Participants in the primary data collection process were asked to circle any unknown words or phrases in the instrument. These words are described in tabular format along with the percentage of participants that reported uncertainty with regard to that item. The scale reliability if these items were removed was reported in order to assess whether or not these items reduced the reliability of the scale.

3.9 Ethical Considerations

The following ethical considerations were considered when conducting this research, as guided by the Code of Ethics for Research (University of Pretoria; n.d.):

3.9.1 Social responsibility

It is hoped that this research will help to address the needs and problems of the student population by contributing to a valid, reliable, and fair instrument to assess the constructs of anxiety, depression, anger, and curiosity. By assessing these latent traits, professionals will be able to gain a better understanding of well-being of members of the South African student population.

3.9.2 Justice and benevolence

Permission to use the SPTI-Y was obtained by the copyright holder in the form of a purchased license. The researcher ensured that contractual justice was upheld by ensuring that the use of the instrument was limited to the agreed parameters. This licence is available in Appendix F. The research participants were treated fairly and equitably. There are no anticipated negative consequences of participating in this research.

3.9.3 Respect for participants

The nature of the research and expected findings were explained to the participants. The research was private and confidential and data were handled with utmost sensitivity. Participation was voluntary, and the participants were made aware that they could withdraw from the research project at any time. The letter of informed consent that participants were asked to read and sign is available in Appendix E. Participants in the primary data collection sample were provided with the researcher's email address should they be interested in the outcome of the research. Participants in Groups 2 and 3 agreed that their data could be used for research purposes.

3.9.4 Professionalism

The researcher endeavoured to behave in a professional manner, acting with integrity, and reporting the results of the analyses accurately. The researcher obtained written permission to use the secondary data, as per the letters in Appendix G. The researcher pursued high quality research by ensuring that all theories and methodologies employed were selected based on thorough research. The methodologies were considered to be within the researcher's academic and technical competence. The content in the research project is original.

3.10 Conclusion

This chapter discussed the methodology that was used in order to examine the psychometric properties of the STPI-Y in the South African context with a student population. A positivist paradigm was selected in accordance with psychometric theory. The research design was a differential study. Both classical test theory and item response theory were used to explore the reliability of the STPI-Y when administered to South African

students as both offer different advantages to explore psychometric properties. The sampling technique, testing instruments, and data collection procedure were described, as well as the methods used to analyse the data. This chapter also discussed the ethical considerations of this research project. The following chapter will describe the results of the data analyses.

CHAPTER 4

RESULTS

4.1 Introduction

This chapter will discuss the results of the analyses that were conducted in order to assess the psychometric properties of the STPI-Y in the South African context with a student population. The data were screened and preliminary data analysis was conducted. Following this, the reliability of the STPI-Y was investigated using methods from classical test theory and item response theory. The validity of the STPI-Y was explored by looking at the fit statistics of the items and conducting factor analysis. Comparisons between the ethnic groups and gender groups were made using classical test theory and item response theory. The words and phrases that students identified as unknown will be described along with the scale reliability.

4.2 Data Screening

The data were screened for accuracy, missing values, outliers, and the normality of the distribution. The minimum and maximum values for each item were investigated. Any errors from the primary data collection process were corrected by referring to the original test. For the secondary data, there was no access to the original test papers, so incorrectly captured items were removed from the dataset.

Table 4.1 summarises the means, standard deviations, medians, skewness, and kurtosis for the eight different subscales for the full sample group. Full item descriptive statistics for the entire sample group and the histograms to assess normality for each subscale are available in Appendix A.

Table 4.1

Descriptive Statistics of the STPI-Y Subscales

Subscale	Mean	Trimmed Mean	SD	Median	Skewness	Kurtosis
S-Anxiety	19.96	19.74	5.85	19.00	0.49	-0.24
S-Anger	13.74	12.96	5.52	12.00	2.20	5.22
S-Depression	17.53	17.10	5.53	16.00	1.12	1.03
S-Curiosity	26.05	26.08	5.28	26.00	-0.13	-0.23
T-Anxiety	20.30	20.12	5.28	20.00	0.51	0.03
T-Anger	21.60	21.37	5.82	21.00	0.56	-0.03
T-Depression	18.26	17.96	5.46	17.00	0.75	0.38
T-Curiosity	26.97	26.96	4.82	27.00	0.03	-0.04

The influence of extreme cases was assessed by comparing the mean values of the subscales with the 5% trimmed mean calculated using SPSS. Only slight differences were found and therefore it was decided that extreme cases did not have an influence on the mean. When investigating the skewness and kurtosis of the eight different subscales, Total S-Anger was found to be highly positively skewed with a score of 2.196. The kurtosis of this subscale was 5.219 indicating that it is very peaked. Investigation of the Total S-Anger subscale's histogram showed that the majority of participants obtained low scores for this subscale, suggesting that they did not feel anger at the time of testing. The remaining seven subscales were satisfactorily distributed with all values for skewness and kurtosis being less than 2. The State and Trait Anxiety, Anger, and Depression subscales were positively skewed suggesting that this sample group did not experience these emotions at the time of testing and do not generally experience these constructs as a long term personality trait. The skewness for the T-Curiosity subscale was 0.03 indicating that these scores are almost symmetrically distributed. The skewness for the S-Curiosity subscale was negatively skewed suggesting that the participants in the study may have been feeling curious at the time of completing the STPI-Y.

Table 4.2 summarises the Skewness and Kurtosis for the separate groups that were investigated. The means, standard deviations and medians for these groups are not reported.

Table 4.2

Skewness and Kurtosis for the Separate Groups

Subscale	African		Indian / Asian		Coloured		Caucasian		Male		Female	
	Skewness	Kurtosis	Skewness	Kurtosis	Skewness	Kurtosis	Skewness	Kurtosis	Skewness	Kurtosis	Skewness	Kurtosis
S-Anxiety	0.45	-0.27	0.42	-0.45	0.53	-0.34	0.53	-0.18	0.52	-0.25	0.49	-0.24
S-Anger	2.13	4.98	1.86	3.50	1.89	3.07	2.36	6.21	2.05	4.36	2.24	5.48
S-Depression	1.03	0.71	1.17	0.99	1.41	2.34	1.19	1.35	1.25	1.45	1.09	0.95
S-Curiosity	-0.24	-0.13	-0.18	-0.41	-0.10	-0.36	-0.03	-0.23	-0.29	0.06	-0.08	-0.29
T-Anxiety	0.47	-0.11	0.46	-0.24	0.48	0.10	0.54	0.18	0.50	-0.17	0.52	0.08
T-Anger	0.53	0.02	0.59	-0.09	0.58	-0.17	0.59	-0.05	0.56	-0.06	0.56	-0.02
T-Depression	0.66	0.13	0.90	0.58	0.79	0.56	0.83	0.65	0.82	0.54	0.73	0.34
T-Curiosity	0.12	-0.21	-0.07	-0.32	0.10	0.20	-0.05	0.09	-0.06	-0.06	0.05	-0.01

Note. N = 2298. African: n = 1017; Indian/Asian: n = 152; Coloured: n = 105; Caucasian: n = 1006; Male: n = 572; Female: n = 1722

As indicated in Table 4.2, the results are consistent with the findings for the entire group, with the State Anger subscales being highly positively skewed across all groups, and kurtosis values indicating that this subscale is peaked across all groups. The remaining scales have satisfactory skewness and kurtosis values of less than 2.

4.3 Reliability

The reliability of the STPI-Y was assessed using both Cronbach's alpha reliability coefficient to test internal consistency reliability and by investigating the separation indices using Rasch analysis. The results of these analyses will be discussed below.

4.3.1 Internal consistency reliability

Internal consistency reliability was assessed with Cronbach's alpha, and the results are provided in Table 4.3. The internal consistency reliability was calculated for the total sample group (n = 2298), as well as the four ethnic groups (African, n = 1017; Indian Asian, n = 152; Coloured, n = 105; and White, n = 1006). Internal consistency reliability is also provided for the two gender groups (men; n = 572, women; n = 1722). Cronbach's alpha coefficients if deleted for the entire group, as well as for the ethnic and gender groups investigated, are available in Appendix B.

Table 4.3

Cronbach's Alpha Reliability

Subscale	Total Group	African	Indian / Asian	Coloured	White	Men	Women
S-Anxiety	0.84	0.82	0.83	0.82	0.87	0.85	0.84
S-Anger	0.90	0.90	0.90	0.92	0.91	0.91	0.90
S-Depression	0.84	0.83	0.84	0.82	0.86	0.84	0.84
S-Curiosity	0.76	0.72	0.72	0.77	0.80	0.75	0.76
T-Anxiety	0.80	0.80	0.81	0.75	0.84	0.81	0.81
T-Anger	0.82	0.80	0.85	0.80	0.85	0.82	0.82
T-Depression	0.87	0.86	0.88	0.79	0.90	0.87	0.87
T-Curiosity	0.78	0.72	0.78	0.73	0.83	0.78	0.78

The alpha values for the different subscales were all satisfactory (above .70). S-Curiosity and T-Curiosity demonstrated the lowest Cronbach's alpha coefficients across all the groups. The remaining subscales all demonstrated Cronbach's alpha coefficients above .80 for the entire sample group and the separate groups assessed, with the exception of the T-Anxiety and T-Depression subscales that were .75 and .79 respectively for the Coloured

participants. Therefore the internal consistency reliabilities can be considered to range from satisfactory to good.

4.3.2 Person and Item Separation Indices

The person and item separation indices are provided in Table 4.4. These scores are given for the entire sample group and the groups investigated. The PSI and ISI were obtained through Rasch analysis.

Table 4.4

Person and Item Separation Indices

Subscale	Total Group		African		Indian / Asian		Coloured		White		Men		Women	
	PSI	ISI	PSI	ISI	PSI	ISI	PSI	ISI	PSI	ISI	PSI	ISI	PSI	ISI
S-Anxiety	0.79	1.00	0.76	0.99	0.78	0.96	0.75	0.95	0.82	1.00	0.79	0.99	0.78	1.00
S-Anger	0.64	0.99	0.62	0.98	0.67	0.84	0.69	0.76	0.68	0.98	0.67	0.96	0.64	0.99
S-Depression	0.72	1.00	0.70	0.98	0.71	0.94	0.69	0.92	0.77	1.00	0.69	0.98	0.73	0.99
S-Curiosity	0.72	1.00	0.69	0.99	0.69	0.98	0.75	0.96	0.76	1.00	0.71	0.99	0.73	1.00
T-Anxiety	0.75	1.00	0.74	0.99	0.74	0.96	0.70	0.91	0.79	0.99	0.73	0.98	0.76	1.00
T-Anger	0.78	1.00	0.76	1.00	0.79	0.97	0.76	0.97	0.81	1.00	0.77	0.99	0.78	1.00
T-Depression	0.80	1.00	0.78	0.98	0.82	0.93	0.70	0.83	0.83	0.99	0.78	0.98	0.81	0.99
T-Curiosity	0.74	1.00	0.67	0.99	0.75	0.97	0.75	0.90	0.80	1.00	0.74	0.99	0.73	1.00

Note. PSI = Person Separation Index; ISI = Item Separation Index

With the exception of T-Depression, all the PSI values for the total group were below .80. This indicates that more items need to be added to the STPI-Y to distinguish between those who have higher levels of the trait or state, and those who have lower levels of the state or trait. Alternatively, participants with more extreme amounts of the constructs are needed in the sample group. These results were generally consistent in the groups that were analysed; however, the PSI values for the African group and the men on the T-Depression scale were

below .80. For the White group, the PSI values were above .80 on the S-Anxiety, T-Anger, T-Depression and T-Curiosity scales, indicating that these scales adequately differentiate between those with high and low levels of these constructs for this group.

The ISI values for the total group were all above .99, indicating that the sample is large enough to confirm the item difficulty of the hierarchy. This suggests that if the STPI-Y were given to a different sample group the item estimates could be expected to remain stable (Bond & Fox, 2007). However, on the S-Anger scale, the ISI values for the Indian/Asian group and the Coloured group were below .90. The T-Depression scale also had a value below 0.90 for the Coloured group. This indicates that a larger sample group is needed to be certain about the stability of these findings.

4.4 Construct Validity

The construct validity of the STPI-Y was assessed by exploring fit statistics using Rasch rating scale analysis. Factorial validity (which contributes to construct validity) was explored by conducting exploratory factor analysis, after which it was decided that confirmatory factor analysis was necessary.

4.4.1 Rasch Analysis

The INFIT and OUTFIT fit statistics, item difficulties and item total correlations are shown in Table 4.5. The items are presented in order of fit.

Table 4.5

Rasch Parameters for STPI-Y

Item Name	Difficulty	S.E.	INFIT MNSQ	OUTFIT MNSQ	Item Total Correlation
Subscale: State Anxiety					
S-Anxiety 10	1.51	0.04	1.31	1.13	0.50
S-Anxiety 9 (R)	-0.90	0.03	1.17	1.29	0.51
S-Anxiety 6	0.89	0.03	1.19	1.27	0.48
S-Anxiety 4	-0.62	0.03	1.19	1.18	0.63
S-Anxiety 5	0.29	0.03	1.02	0.96	0.64
S-Anxiety 2	0.01	0.03	0.95	0.93	0.65
S-Anxiety 8	-0.25	0.03	0.93	0.88	0.71
S-Anxiety 3 (R)	-0.48	0.03	0.89	0.89	0.67
S-Anxiety 7 (R)	-0.42	0.03	0.81	0.80	0.70
S-Anxiety (R)	-0.02	0.03	0.78	0.80	0.66
Mean	.00	0.03	1.02	1.01	
SD	.69	0	0.17	0.18	
Subscale: State Anger					
S-Anger 10	-0.20	0.04	1.33	1.28	0.64
S-Anger 1	0.14	0.04	1.23	1.31	0.61
S-Anger 2	0.21	0.04	1.20	1.17	0.61
S-Anger 4	0.15	0.04	1.07	0.92	0.65
S-Anger 7	-0.89	0.03	0.94	1.04	0.76
S-Anger 5	0.40	0.05	1.02	0.78	0.63
S-Anger 8	0.50	0.05	1.00	0.75	0.62
S-Anger 6	0.37	0.05	0.96	0.90	0.64
S-Anger 9	-0.73	0.04	0.92	0.94	0.75
S-Anger 3	0.05	0.04	0.85	0.82	0.68
Mean	0.00	0.04	1.05	0.99	
SD	0.45	0	0.15	0.19	

(table continues)

Table 4.5 Continued

Item Name	Difficulty	S.E.	INFIT MNSQ	OUTFIT MNSQ	Item Total Correlation
Subscale: State Depression					
S-Depression 8	0.43	0.03	1.07	1.25	0.55
S-Depression 7 (R)	-0.47	0.03	1.17	1.23	0.53
S-Depression 10 (R)	-0.09	0.03	1.19	1.15	0.54
S-Depression 1 (R)	-0.99	0.03	1.01	1.09	0.57
S-Depression 9 (R)	-0.6	0.03	1.03	1.04	0.59
S-Depression 2	0.44	0.03	1.03	1.02	0.60
S-Depression 4	0.28	0.03	0.99	0.87	0.66
S-Depression 6	0.46	0.03	0.93	0.77	0.67
S-Depression 3	0.62	0.04	0.91	0.76	0.66
S-Depression 5 (R)	-0.1	0.03	0.90	0.84	0.67
Mean	0	0.03	1.02	1.00	
SD	0.51	0	0.09	0.17	
Subscale: State Curiosity					
S-Curiosity 8 (R)	-0.74	0.03	**1.59**	**1.71**	0.34
S-Curiosity 1	0.75	0.03	1.28	**1.36**	0.43
S-Curiosity 10 (R)	1.38	0.03	1.27	1.29	0.44
S-Curiosity 5	0.59	0.03	1.08	1.07	0.61
S-Curiosity 2	0.17	0.03	0.98	0.97	0.60
S-Curiosity 4	0.63	0.03	0.88	0.89	0.59
S-Curiosity 6	0.43	0.03	0.77	0.79	0.59
S-Curiosity 7	-0.39	0.03	0.78	0.78	0.60
S-Curiosity 9	0.22	0.03	0.74	0.76	0.63
S-Curiosity 3	-0.28	0.03	0.73	0.71	0.69
Mean	0	0.03	1.01	1.03	
SD	0.65	0	0.28	0.31	

(table continues)

Table 4.5 Continued

Item Name	Difficulty	S.E.	INFIT MNSQ	OUTFIT MNSQ	Item Total Correlation
Subscale: Trait Anxiety					
T-Anxiety 4	-0.20	0.03	1.29	1.26	0.63
T-Anxiety 10	-0.84	0.03	1.27	1.26	0.57
T-Anxiety 1 (R)	-0.02	0.03	1.00	1.03	0.50
T-Anxiety 7 (R)	-0.23	0.03	0.98	1.02	0.53
T-Anxiety 8	0.13	0.03	1.01	1.00	0.63
T-Anxiety 3	-0.64	0.03	0.96	0.98	0.59
T-Anxiety 9	0.61	0.03	0.89	0.95	0.58
T-Anxiety 5	1.07	0.04	0.92	0.82	0.63
T-Anxiety 2 (R)	-0.20	0.03	0.86	0.89	0.60
T-Anxiety 6	0.33	0.03	0.80	0.84	0.60
Mean	0	0.03	1	1	
SD	0.54	0	0.15	0.15	
Subscale: Trait Anger					
T-Anger 9	1.13	0.03	1.27	1.13	0.57
T-Anger 8	-0.94	0.03	1.10	1.20	0.58
T-Anger 6	1.24	0.03	1.05	1.07	0.55
T-Anger 10	-1.11	0.03	0.97	1.07	0.59
T-Anger 4	-0.68	0.03	1.01	1.06	0.58
T-Anger 3	0.56	0.03	1.04	1.06	0.62
T-Anger 5	-0.73	0.03	1.02	1.06	0.58
T-Anger 7	0.07	0.03	0.96	0.97	0.63
T-Anger 1	-0.01	0.03	0.86	0.85	0.68
T-Anger 2	0.48	0.03	0.84	0.81	0.70
Mean	0	0.04	1.00	1.00	
SD	0.8	0	0.13	0.15	

(table continues)

Table 4.5 Continued

Item Name	Difficulty	S.E.	INFIT MNSQ	OUTFIT MNSQ	Item Total Correlation
Trait Depression					
T-Depression 1	0.29	0.04	1.17	1.28	0.56
T-Depression 8 (R)	-0.67	0.03	1.20	1.21	0.62
T-Depression 7 (R)	-1.02	0.03	1.10	1.13	0.66
T-Depression 9 (R)	-0.85	0.03	1.06	1.07	0.66
T-Depression 5	0.82	0.04	1.04	0.95	0.64
T-Depression 3	0.27	0.04	0.97	0.90	0.70
T-Depression 10 (R)	0.41	0.04	0.91	0.88	0.68
T-Depression 4	0.31	0.04	0.86	0.89	0.68
T-Depression 6	0.52	0.04	0.86	0.86	0.68
T-Depression 2 (R)	-0.08	0.04	0.83	0.85	0.69
Mean	0	0.04	1	1	
SD	0.6	0	0.13	0.15	
Subscale: Trait Curiosity					
T-Curiosity 10 (R)	-0.69	0.03	**1.39**	**1.50**	0.30
T-Curiosity 6	1.13	0.03	1.15	1.20	0.50
T-Curiosity 8 (R)	-1.17	0.03	1.12	1.16	0.39
T-Curiosity 1	0.36	0.03	1.08	1.10	0.63
T-Curiosity 4	0.68	0.03	0.97	0.97	0.63
T-Curiosity 2	-0.08	0.03	0.95	0.94	0.64
T-Curiosity 9	-0.51	0.03	0.91	0.91	0.59
T-Curiosity 5	0.29	0.03	0.88	0.88	0.64
T-Curiosity 7	0.15	0.03	0.79	0.81	0.62
T-Curiosity 3	-0.16	0.03	0.70	0.70	0.68
Mean	0	0.03	0.99	1.02	
SD	0.64	0	0.19	0.22	

Note. Values higher than 1.35 and lower than 0.70 are indicated in boldface. (R) indicates a

reverse-scored item. S.E. = Standard Error. SD = Standard Deviation. MNSQ = Mean Square

Values.

Unidimensionality is an assumption of Rasch modelling. The separate scales of the STPI-Y were therefore assessed separately as they theoretically measure distinct psychological constructs.

The item total correlations for all of the subscales were positive, which indicates that the items were scored correctly (Linacre, 2013). The INFIT and OUTFIT mean values for all state and trait subscales of the STPI-Y were 1 or close to 1, suggesting that generally the items fit the model well.

When assessing the items in each subscale, OUTFIT was assessed first. With the exception of S-Curiosity 8 (OUTFIT = 1.71), S-Curiosity 1 (OUTFIT = 1.36) and T-Curiosity 10 (OUTFIT = 1.50), all of the OUTFIT mean square values fell within the suggested range. The high OUTFIT mean square values of these three items indicate that participants gave unexpected responses on items that should have been relatively very easy or very difficult for them to endorse.

The INFIT mean square values of S-Curiosity 8 (INFIT = 1.59) and T-Curiosity 10 (INFIT = 1.39) were also problematic. This suggests that participants produced unexpected patterns of responses on items that were more or less targeted to their standing on the latent trait. These items demonstrate poor fit to the Rasch model. Both of these items are reverse-scored and assess the extent to which the respondent feels bored, although the state item focuses on the respondent's current emotion and the trait item assesses the respondent's general level of boredom.

The remaining 77 items have OUTFIT and INFIT mean square values that fall within the parameters of 0.70 and 1.35. Therefore, with the exception of the two S-Curiosity items and T-Curiosity 10, the items fit the model well and can be considered to be unidimensional.

The eight subscales had item difficulties that ranged from between 1.39 logits (S-Anger: -.89 to .50) to 2.30 logits (T-Curiosity subscale -1.17 – 1.13). This indicates a fairly good range of item difficulties for the different subscales.

4.4.2 Exploratory factor analysis

Exploratory factor analysis was conducted on the 40 state items and the 40 trait items of the STPI-Y using the Weighted Least Squares method. The suitability of the data for factor analysis was established by using Bartlett's test of Sphericity and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (Pallant, 2011). Bartlett's Test of Sphericity was statistically significant (χ^2 (3160, N = 2298) = 84557.74; p =.00) and the Kaiser-Meyer-Olkin value was .96, exceeding the recommended value of .60 (Pallant, 2011). These figures support the factorability of the correlation matrix.

In order to determine the number of factors to be extracted, a variety of approaches were employed, as recommended by Fabrigar et al. (1999). These methods include parallel analysis, investigating the scree plot, and assessing the size of the residuals as illustrated by the root mean square error of approximation (RMSEA), the root mean square residual (RMSR), and the Tucker Lewis Index (TLI).

Figure 4.1 shows the parallel analysis and scree plot for the state items, which suggests that between four and fourteen factors be retained. The output from the R psych package provides information for principle components (PC) analysis and factor (FA) analysis. This research will consider the information for factor analysis.
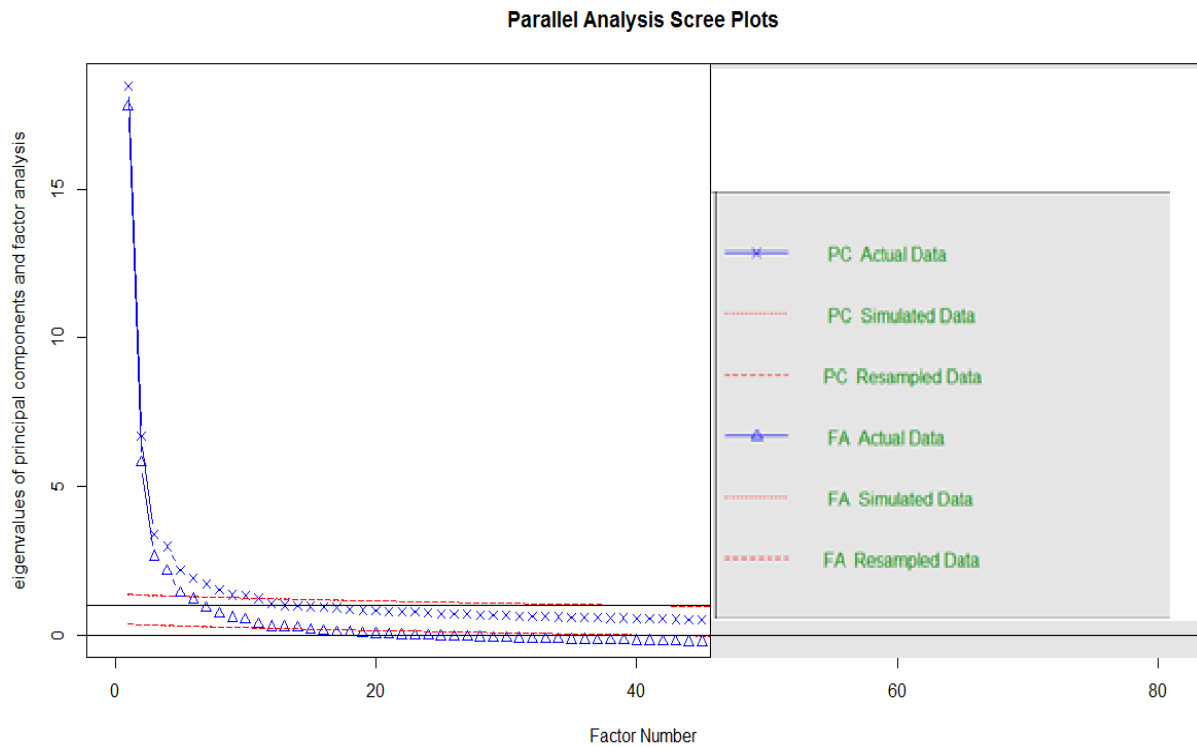
Figure 4.1 Parallel analysis and scree plots for a component model and a common factor model.

The STPI-Y aims to assess four temporary emotional states as well as four personality traits of anxiety, anger, depression, and curiosity. This suggests that extracting eight factors would fit the theory optimally. However, inspection of the scree plot indicates that four or five factors may be acceptable, while parallel analysis indicates that up to fourteen factors could be extracted. Therefore, the TLI, RMSEA and RMSR scores were calculated for four, five, eight and fourteen factors in order to assess how these different analyses fit the model. These indices are shown in Table 4.6.

Table 4.6

Criteria to determine factor retention of the STPI-Y

Factors	4	5	8	14
TLI	0.75	0.80	0.85	0.91
RMSEA	0.05	0.05	0.04	0.03
RMSR	0.04	0.04	.03	.02

From the above indices, a 14-factor solution has the most optimal fit indices, although the fit indices are acceptable for an eight-factor solution. The theory on which the STPI-Y is based suggests that eight factors should fit the data best and therefore these two options were explored further. To assist in interpreting the factors an oblimin rotation was performed.

The 14 Factor solution is shown in Appendix C. This solution mixed the state and trait items for various subscales. Some of the items had low factor loadings on the factors to which they were allocated. One of the factors only had two items, while a minimum of three items per factor is essential (Costello & Osborne, 2005). Although the 14-factor solution had the best fit statistics, the factor loadings were problematic. An eight-factor solution is psychologically appropriate and will therefore be presented further.

4.4.2.1 Eight-Factor Solution

The results of an eight Factor solution are shown in Table 4.7. An eight factor solution explained 43% of the total variance.

Table 4.7

Pattern Matrix of the exploratory eight-factor solution for the STPI

Item Name	Factor								h2
	1	2	3	4	5	6	7	8	
T-Depression 6	**0.71**	-0.02	0.04	0.04	-0.03	0.04	0.02	-0.03	**0.57**
T-Depression 4	**0.70**	0.00	0.01	0.05	0.02	0.01	0.02	-0.07	**0.57**
T-Depression 3	**0.68**	0.01	0.01	0.10	0.09	-0.01	0.04	0.00	**0.59**
T-Depression 5	**0.65**	0.03	0.01	0.06	0.06	-0.03	0.08	-0.08	**0.54**
T-Anxiety 5	**0.60**	0.05	-0.02	0.08	0.09	-0.02	0.07	-0.11	**0.49**
T-Depression 1	**0.56**	-0.04	0.09	0.10	-0.01	-0.01	-0.03	0.15	*0.38*
T-Anxiety 4	**0.48**	0.02	-0.11	0.10	0.19	0.07	0.08	0.17	**0.42**
S-Depression 8	**0.48**	-0.07	0.22	-0.06	-0.05	0.13	-0.03	0.19	**0.42**
T-Anxiety 9	**0.46**	0.09	-0.07	0.06	0.14	0.02	0.07	-0.04	*0.33*
S-Depression 4	**0.42**	-0.01	0.23	-0.08	0.03	0.28	0.06	0.14	**0.57**
S-Depression 6	**0.42**	-0.04	0.29	-0.10	0.01	0.28	0.02	0.13	**0.59**
T-Depression 10 (R)	**0.40**	-0.03	-0.06	-0.01	0.39	0.03	-0.02	-0.13	**0.50**
S-Depression 3	*0.39*	-0.01	0.32	-0.10	-0.01	0.29	0.04	0.08	**0.60**
T-Anxiety 8	*0.39*	0.07	-0.13	0.05	0.15	0.07	0.11	-0.14	*0.33*
T-Anxiety 6	*0.36*	0.07	-0.05	0.17	-0.03	0.29	0.09	-0.11	**0.43**
S-Depression 2	*0.34*	-0.03	0.27	-0.09	-0.02	0.27	0.00	0.07	**0.44**
S-Curiosity 4	0.00	**0.70**	0.04	-0.03	0.14	-0.01	0.02	-0.05	**0.45**
T-Curiosity 4	0.05	**0.68**	0.00	0.01	-0.11	0.04	-0.01	-0.21	**0.46**
S-Curiosity 2	0.00	**0.65**	0.04	-0.03	0.20	0.02	0.02	0.10	**0.44**
T-Curiosity 2	-0.01	**0.63**	-0.03	0.02	-0.12	0.10	0.04	-0.02	**0.44**
T-Curiosity 6	0.12	**0.56**	0.07	0.02	-0.04	0.04	0.00	-0.08	*0.34*
S-Curiosity 5	-0.04	**0.54**	0.10	-0.05	0.12	-0.11	0.04	0.27	**0.43**
T-Curiosity 5	-0.06	**0.54**	-0.01	0.03	-0.26	0.08	0.03	-0.09	*0.39*
S-Curiosity 9	-0.01	**0.54**	-0.02	0.02	-0.09	-0.10	-0.02	0.09	*0.39*
T-Curiosity 1	-0.07	**0.52**	0.04	-0.07	-0.09	-0.01	0.02	0.13	*0.37*
S-Curiosity 3	0.06	**0.43**	-0.12	0.01	0.03	-0.21	-0.14	0.37	**0.53**
T-Curiosity 3	-0.01	**0.43**	-0.08	0.04	-0.22	0.04	-0.12	0.24	**0.46**

(table continues)

Table 4.7 Continued

Item Name	Factor								h2
	1	2	3	4	5	6	7	8	
S-Curiosity 1	0.04	**0.42**	0.09	-0.02	0.11	0.07	-0.02	0.03	0.20
S-Curiosity 6	0.01	*0.35*	0.00	0.03	-0.15	-0.14	-0.13	0.15	*0.31*
S-Anger 8	-0.03	0.03	**0.75**	0.14	0.04	-0.09	0.03	-0.08	**0.61**
S-Anger 4	-0.04	0.02	**0.73**	0.13	0.03	-0.06	0.04	-0.04	**0.57**
S-Anger 5	0.02	0.02	**0.71**	0.09	0.01	-0.02	-0.02	-0.05	**0.56**
S-Anger 3	0.09	0.02	**0.62**	-0.01	0.03	0.19	-0.01	0.12	**0.59**
S-Anger 6	0.08	0.01	**0.62**	0.02	0.00	0.15	0.00	0.00	**0.53**
S-Anger 2	-0.02	0.02	**0.61**	0.07	0.07	0.07	-0.02	0.01	**0.43**
S-Anger 10	0.06	0.05	**0.53**	0.12	0.03	-0.07	0.16	-0.04	**0.43**
S-Anger 1	0.04	0.01	**0.53**	0.02	0.08	0.13	-0.02	0.18	**0.41**
S-Anger 9	0.07	-0.03	**0.50**	-0.02	-0.03	0.22	0.21	0.01	**0.53**
S-Anger 7	0.07	-0.04	**0.44**	0.05	-0.02	0.28	0.16	0.03	**0.51**
T-Anger 2	0.07	-0.01	0.15	**0.73**	-0.01	-0.01	-0.08	-0.02	**0.62**
T-Anger 1	0.05	-0.05	0.09	**0.69**	0.01	0.04	-0.05	0.01	**0.53**
T-Anger 3	0.08	-0.04	0.12	**0.59**	-0.01	0.01	-0.03	0.08	**0.42**
T-Anger 7	-0.03	0.02	0.07	**0.52**	0.04	-0.03	0.15	-0.07	*0.37*
T-Anger 9	0.03	0.00	0.30	**0.46**	0.04	-0.17	0.10	-0.10	**0.42**
T-Anger 6	0.14	0.07	0.19	**0.41**	-0.02	-0.05	0.07	-0.02	0.33
T-Anger 4	-0.09	0.05	-0.05	*0.35*	-0.03	0.16	*0.30*	0.09	0.28
T-Anger 8	0.04	-0.04	-0.21	*0.34*	0.09	0.18	0.29	0.17	*0.34*
T-Anxiety 3	0.22	0.05	-0.13	0.29	0.09	0.27	0.07	0.07	*0.34*
T-Anxiety 10	0.15	0.06	-0.16	0.28	-0.01	0.27	0.15	-0.11	*0.30*
T-Depression 8 (R)	0.00	0.06	0.06	0.02	**0.71**	0.00	0.04	0.02	**0.52**
T-Anxiety 7 (R)	0.03	-0.01	0.06	0.00	**0.69**	0.01	-0.01	0.05	**0.51**
S-Depression 7 (R)	-0.11	0.08	0.15	-0.01	**0.54**	0.12	0.03	-0.06	0.36
T-Depression 7 (R)	0.21	-0.08	-0.06	0.04	**0.50**	0.06	-0.02	0.02	**0.43**
T-Curiosity 7	-0.01	0.32	0.02	0.05	**-0.47**	0.00	-0.14	-0.04	**0.44**

(table continues)

Table 4.7 Continued

Item Name	Factor								h2
	1	2	3	4	5	6	7	8	
T-Anxiety 1 (R)	0.14	-0.08	-0.04	0.08	**0.42**	0.02	-0.04	0.02	0.27
T-Depression 9 (R)	0.07	-0.05	0.04	0.15	**0.42**	0.11	0.02	-0.20	**0.43**
T-Anxiety 2 (R)	0.23	0.01	-0.08	0.05	*0.38*	0.08	-0.03	-0.30	**0.45**
T-Depression 2 (R)	0.33	-0.03	0.00	-0.02	*0.38*	0.08	0.01	-0.15	**0.47**
S-Anxiety 9 (R)	0.04	-0.22	0.02	-0.01	*0.37*	0.20	-0.07	0.00	*0.33*
T-Curiosity 9	-0.06	0.22	-0.08	0.05	*-0.35*	0.04	-0.19	0.15	*0.39*
S-Anxiety 7 (R)	-0.04	-0.06	0.06	0.01	0.18	**0.60**	-0.02	-0.18	**0.55**
S-Anxiety 2	0.06	0.00	0.14	0.07	-0.05	**0.57**	-0.03	0.01	**0.44**
S-Anxiety 8	0.18	0.09	0.03	-0.01	0.04	**0.57**	0.13	0.04	**0.56**
S-Anxiety 5	0.08	0.11	0.03	0.02	0.05	**0.51**	0.07	0.02	*0.38*
S-Anxiety 1 (R)	-0.03	-0.04	0.11	0.08	0.16	**0.50**	-0.03	-0.15	**0.44**
S-Anxiety 3 (R)	0.03	-0.17	0.09	0.04	0.16	**0.50**	-0.05	-0.04	**0.45**
S-Anxiety 4	0.15	0.11	-0.02	0.09	0.10	**0.41**	0.15	0.06	*0.39*
S-Anxiety 6	0.15	0.06	0.11	0.07	-0.05	*0.31*	-0.03	0.02	0.21
S-Anxiety 10	0.17	0.11	0.23	-0.05	0.11	0.25	0.07	0.14	*0.34*
S-Curiosity 8 (R)	-0.04	0.00	-0.23	0.13	-0.06	0.10	**-0.49**	0.02	*0.33*
T-Curiosity 10 (R)	-0.22	-0.05	-0.13	0.05	-0.04	0.17	**-0.45**	0.08	*0.35*
S-Curiosity 10 (R)	-0.16	0.11	-0.28	0.12	0.04	0.01	**-0.43**	0.09	**0.41**
T-Anger 10	-0.08	0.03	-0.14	*0.31*	0.01	0.16	**0.42**	0.14	*0.35*
T-Anger 5	-0.06	0.06	-0.07	*0.31*	-0.02	0.11	**0.40**	0.14	*0.32*
T-Curiosity 8 (R)	*-0.33*	0.05	-0.07	-0.01	-0.01	0.12	*-0.38*	0.12	*0.38*
S-Depression 1 (R)	0.11	-0.15	-0.03	-0.08	0.08	0.25	0.06	*-0.34*	*0.35*
S-Depression 10 (R)	0.19	-0.08	0.00	0.00	0.19	0.10	-0.01	*-0.33*	*0.34*
S-Depression 5 (R)	0.20	-0.13	0.12	-0.07	0.15	0.25	-0.02	*-0.32*	**0.47**
S-Depression 9 (R)	0.09	0.04	0.04	0.00	0.26	0.18	0.01	-0.29	*0.32*
S-Curiosity 7	-0.03	0.26	-0.10	0.08	-0.15	-0.16	-0.19	0.29	**0.43**

Note: Facets with factor loadings above 0.40 are printed in boldface, and facets with loadings of above 0.30 are printed in italics. R = Reverse-scored item. h2 = Communalities

The final column in the Pattern Matrix (Table 4.7) shows the communalities. These numbers indicate how much of the variance of each item is explained. S-Curiosity 1 had a low communality value of .20, which suggests that this item may not fit with the other items. This item asks participants to endorse if they are in a questioning mood. T-Anxiety 1 had a low communality value of .27. This is a reverse-scored anxiety item and assesses the degree to which a respondent feels steady. S-Anxiety 6 also had a low communality value of .21. The remaining communality values are above .30, which indicates that these items fit well with the other items in the factor (Pallant, 2011).

The first factor contained five S-Depression items, six T-Depression items and five T-Anxiety items. The majority of these items assess feeling unhappy, sad, inadequate, and a lack of enjoyment in life. All 16 items had primary salient loadings on this factor and no secondary loadings. With the exception of T-Depression 10, all the State and Trait Depression items that load onto this factor are part of the State and Trait Depression-present (dysthymia) subscales.

The second factor contained seven S-Curiosity items and six T-Curiosity items. Several of the S-Curiosity and T-Curiosity items were very similar such as *I feel Curious* versus *I am Curious*. The state item is designed to assess a current feeling and the trait item aims to assess a long-term personality trait. All items had primary salient loadings on this factor, and no secondary loadings.

The Factor 3 contained all ten of the S-Anger Items. These 10 items had primary salient loadings on this factor and no secondary loadings.

The fourth factor contained eight T-Anger items and two T-Anxiety items, although the T-Anxiety items had factor loadings of below .30. These two T-Anxiety items seem to assess a long-term state of worry or turmoil, while the T-Anger items generally assess temper

and the respondent's ability to control his or her temper. The remainder of the items had salient loadings and none of the items reported loadings on any of the other factors.

The fifth factor contained reverse-scored T-Depression and T-Anxiety items, a reverse-scored S-Depression and a reverse-scored S-Anxiety item. This is consistent with other studies that demonstrate difficulties with reverse-scored items as they tend to load differently from straightforward items (Hooper, Arora, Martin, & Mullis, 2013). Two T-Curiosity items had negative loadings on this factor. These items assess the extent to which the respondent feels safe, secure, happy, and stimulated. T-Curiosity 7 had a secondary loading (.32) on Factor 2, which contained many of the other T-Curiosity Items. The remainder of the items contained salient primary loadings on this factor. The State and Trait Depression items that load on this factor form part of the Trait and State Depression-absent (euthymia) subscales.

Factor 6 contained nine S-Anxiety items, although S-Anxiety 10 had a low factor loading of .25, and S-Anxiety 6 had a factor loading of .31. The remaining items had primary salient factor loadings above .41

Factor 7 contained the two reverse-scored S-Curiosity and T-Curiosity items and two T-Anger items. The two T-Anger items relate to frustration for not receiving recognition for work, while the two S-Curiosity and T-Curiosity items are identical and assess feelings of boredom and disinterest. The items had salient, primary factor loadings. T-Anger 10 and T-Anger 5 had low secondary loadings of .31 on Factor 4. This factor contains the other eight T-Anger items. T-Curiosity 8 had a secondary loading of -.33 on Factor 1.

The final factor contained the four reverse-scored S-Depression items and one S-Curiosity item. The S-Depression items appear to assess the opposite of feelings of liveliness, health, and hopefulness, and are items from the S-Depression-absent (euthymia) subscale.

The S-Curiosity item that loaded onto this factor assesses the degree of feeling mentally active. The factor loadings were quite low in this factor (below .34).

The Factor Correlation Matrix for the eight-factor solution is given in Table 4.8 This table shows how the different factors correlate with one another.

Table 4.8

Factor Correlations for the STPI-Y (EFA)

Factor	Factor							
	1	2	3	4	5	6	7	8
Factor 1	1.00	-0.02	0.40	0.24	0.44	0.50	0.34	-0.12
Factor 2	-0.02	1.00	-0.01	0.09	-0.24	-0.10	-0.04	0.27
Factor 3	0.40	-0.01	1.00	0.24	0.20	0.34	0.25	-0.04
Factor 4	0.24	0.09	0.24	1.00	0.12	0.15	0.26	-0.02
Factor 5	0.44	-0.24	0.20	0.12	1.00	0.31	0.21	-0.24
Factor 6	0.50	-0.10	0.34	0.15	0.31	1.00	0.23	-0.08
Factor 7	0.34	-0.04	0.25	0.26	0.21	0.23	1.00	-0.10
Factor 8	-0.12	0.27	-0.04	-0.02	-0.24	-0.08	-0.10	1.00

Table 4.8 shows that Factor 1 (T-Anxiety, T-Depression and S-Depression items) correlated with Factor 5 (the reverse-scored T-Anxiety and T-Depression items). Factor 1 also correlated with Factor 6, the factor which contained almost all of the S-Anxiety items. Factor 1 also correlated with Factor 3 (the S-Anger items), and moderately negatively correlated with Factor 7 (reverse-scored S- Curiosity and T-Curiosity items). Factor 3, the S-Anger items, showed a correlation of .34 with Factor 6 (the S-Anxiety items).

The items that should load together theoretically are found in factors that are correlated with each other. It was therefore decided that confirmatory factor analysis was necessary to explore how well the data fit with the theoretical model.

4.4.3 Confirmatory Factor Analysis

Confirmatory Factor Analysis was performed using Diagonal Weighted Least Squares (DWLS) as a method of estimation, as this method is suitable for ordered categorical data (Forero et al., 2009). The fit statistics for the Eight-Factor model of the STPI-Y are summarised in Table 4.9.

Table 4.9

Fit Statistics for CFA

Fit Statistic	Eight-factor model
χ^2	37 536.896
df	3052
RMSEA point estimate	0.07
RMSEA 90% CI	0.069, 0.071
SRMR	0.08
TLI	0.88
CFI	0.89

Note: χ^2 = chi-squared statistic. *df* = Degrees of Freedom

The chi-squared result was statistically significant (p = 0.00), which indicates that the fit is not perfect. The RMSEA score of .07 and the SRMR score of .08 fall at the high end of acceptable limits of model fit. The Tucker Lewis Index score of .88 is also considered to be acceptable, while the CFI result of .89 falls just below the acceptable cut-off of .90.

Table 4.10 lists the standardised factor loadings for the eight different subscales in the STPI-Y. Factor loadings above .45 are considered to be fair (Harrington, 2009).

Table 4.10

Standardised Factor Loadings for the STPI-Y

Standardised Factor Loadings for the State subscales							
State Anxiety		State Anger		State Depression		State Curiosity	
Item	Std. Loading	Item	Std. Loading	Item	Std. Loading	Item	Std. Loading
S-Anxiety 1 (R)	**0.65**	S-Anger 1	**0.59**	S-Depression 1 (R)	**0.45**	S-Curiosity 1	0.00
S-Anxiety 2	**0.59**	S-Anger 2	**0.60**	S-Depression 2	**0.6**	S-Curiosity 2	0.12
S-Anxiety 3 (R)	**0.65**	S-Anger 3	**0.74**	S-Depression 3	**0.70**	S-Curiosity 3	**0.64**
S-Anxiety 4	**0.61**	S-Anger 4	**0.61**	S-Depression 4	**0.69**	S-Curiosity 4	0.15
S-Anxiety 5	**0.56**	S-Anger 5	**0.63**	S-Depression 5 (R)	**0.64**	S-Curiosity 5	*0.32*
S-Anxiety 6	*0.41*	S-Anger 6	**0.72**	S-Depression 6	**0.70**	S-Curiosity 6	**0.55**
S-Anxiety 7 (R)	**0.69**	S-Anger 7	**0.82**	S-Depression 7 (R)	**0.48**	S-Curiosity 7	**0.74**
S-Anxiety 8	**0.72**	S-Anger 8	**0.61**	S-Depression 8	**0.53**	S-Curiosity 8 (R)	**0.45**
S-Anxiety 9 (R)	**0.47**	S-Anger 9	**0.80**	S-Depression 9 (R)	**0.51**	S-Curiosity 9	**0.48**
S-Anxiety 10	**0.53**	S-Anger 10	**0.62**	S-Depression 10 (R)	**0.49**	S-Curiosity 10 (R)	**0.64**

(table continues)

Table 4.10 Continued

| Standardised Factor Loadings for the Trait Subscales | | | | | | | |
| Trait Anxiety | | Trait Anger | | Trait Depression | | Trait Curiosity | |
Item	Std. Loading	Item	Std. Loading	Item	Std. Loading	Item	Std. Loading
T-Anxiety 1 (R)	*0.44*	T-Anger 1	**0.68**	T-Depression 1	**0.52**	T-Curiosity 1	**0.44**
T-Anxiety 2 (R)	**0.58**	T-Anger 2	**0.70**	T-Depression 2 (R)	**0.67**	T-Curiosity 2	0.28
T-Anxiety 3	**0.52**	T-Anger 3	**0.60**	T-Depression 3	**0.71**	T-Curiosity 3	**0.59**
T-Anxiety 4	**0.59**	T-Anger 4	*0.43*	T-Depression 4	**0.69**	T-Curiosity 4	0.20
T-Anxiety 5	**0.66**	T-Anger 5	*0.43*	T-Depression 5	**0.68**	T-Curiosity 5	*0.40*
T-Anxiety 6	**0.63**	T-Anger 6	**0.61**	T-Depression 6	**0.69**	T-Curiosity 6	0.03
T-Anxiety 7 (R)	**0.55**	T-Anger 7	**0.57**	T-Depression 7(R)	**0.57**	T-Curiosity 7	**0.62**
T-Anxiety 8	**0.54**	T-Anger 8	**0.53**	T-Depression 8 (R)	**0.55**	T-Curiosity 8 (R)	**0.62**
T-Anxiety 9	**0.54**	T-Anger 9	**0.63**	T-Depression 9 (R)	**0.62**	T-Curiosity 9	**0.69**
T-Anxiety 10 (R)	**0.45**	T-Anger 10	*0.44*	T-Depression 10 (R)	**0.66**	T-Curiosity 10	**0.49**

Note. Facets with factor loadings above .45 are printed in boldface, and facets with loadings of above .30 are printed in italics; R = Reverse-scored item

With the exception of S-Anxiety 6, which had a factor loading of .41, the items in the S-Anxiety subscale all had factor loadings above .45. This indicates that these items had fair to good factor loadings on the S-Anxiety subscale, and these items measure a similar latent trait.

The S-Anger items demonstrated factor loadings which ranged from .59 to .82. These factor loadings are good, which suggests that these items measure a similar latent trait.

The S-Depression items also demonstrated fair to good fit. The factor loadings for this subscale ranged from .45 to .70.

Four of the S-Curiosity items demonstrated poor factor loadings. S-Curiosity 1 had a factor loading of .00 with the other S-Curiosity items. This item asks participants the degree to which they feel they are in a questioning mood. S-Curiosity 2 and 4 also demonstrated low factor loadings of .12 and .15 respectively. S-Curiosity 2 has high face validity as it asks participants to rate how curious they feel. S-Curiosity 4 asks participants how inquisitive they feel. S-Curiosity 5 had a factor loading of .32. This item assessed the extent to which participants feel like exploring their environment. The remaining items have factor loadings that range from .45 to .70.

The items in the T-Anxiety subscale had factor loadings that ranged from .44 to .63. T-Anxiety 1, which assesses if the respondent feels steady, demonstrated the lowest factor loading.

The factor loadings for the items in the T-Anger subscale ranged from .43 to .70. Three items had factor loadings below .45. These three items assess frustration for not receiving recognition for good work, receiving poor feedback, or being delayed by others.

The factor loadings for the T-Depression subscale were good and ranged from .52 to .71. This indicates that these items measure a similar latent trait.

Five items demonstrated low factor loadings on the T-Curiosity subscale. Four of these items are almost identical to the four S-Curiosity items with the lowest factor loadings, except the participants need to indicate whether or not they generally feel curious (T-Curiosity 2), inquisitive (T-Curiosity 4), questioning (T-Curiosity 6), or interested in exploring (T-Curiosity 1). In addition, T-Curiosity 5 had a factor loading of .41. This item assesses a respondent's eagerness.

Table 4.11 provides the standardised factor loadings for the eight subscales of the STPI-Y. This table indicates the correlation of each of the subscales with one another.

Table 4.11

CFA Factor Covariance

Subscale	Correlated Subscale	Factor Covariance
S-Anxiety	S-Anger	0.65
	S-Depression	0.87
	S-Curiosity	-0.52
	T-Anxiety	0.80
	T-Anger	0.42
	T-Depression	0.75
	T-Curiosity	-0.45
S-Anger	S-Depression	0.70
	S-Curiosity	-0.37
	T-Anxiety	0.52
	T-Anger	0.52
	T-Depression	0.56
	T-Curiosity	-0.31
S-Depression	S-Curiosity	-0.64
	T-Anxiety	0.81
	T-Anger	0.38
	T-Curiosity	-0.56
	T-Depression	0.89
S-Curiosity	T-Anxiety	-0.46
	T-Anger	-0.20
	T-Depression	-0.52
	T-Curiosity	0.91
T-Anxiety	T-Depression	0.96
	T-Anger	0.54
	T-Curiosity	-0.58
T-Anger	T-Depression	0.46
	T-Curiosity	-0.20
T-Depression	T-Curiosity	-0.63

As demonstrated in Table 4.11, the covariance between the eight factors indicates that the different subscales are generally highly correlated with each other. The S-Anxiety subscale has a correlation of .87 with the S-Depression subscale, a correlation of .80 with the T-Anxiety subscale, and a correlation with T-Depression of .75. The S-Anger and S-Depression subscales are also highly correlated with a covariance of .70. The S-Depression and T-Depression subscales demonstrated a correlation of .89, and the S-Curiosity and T-Curiosity subscales had a correlation of .91. The T-Anxiety and T-Depression demonstrated a correlation of .96.

4.5 South African Group Differences

When assessing the differences between the identified ethnic and gender groups, nonparametric tests were used in accordance with classical test theory. Differential item functioning was assessed through Rasch analysis in accordance with item response theory.

4.5.1 Group Median Differences

The differences between the South African groups were assessed using nonparametric statistics because the sample sizes are different. In order to compare the differences between gender groups, a Mann-Whitney U Test was conducted.

Table 4.12 demonstrates the results from the Mann-Whitney U tests conducted to compare gender groups. The effect sizes (r) of these differences are also presented.

Table 4.12

Mann-Whitney U Gender Group Comparison

Subscale	Mann-Whitney U	Z	*p*	Md Men	Md Women	Md Group	r
S-Anxiety	442965.00	-3.61	*0.00	19.00	19.50	19.00	-0.08
S-Anger	459095.00	-2.51	*0.01	12.00	11.00	11.00	-0.05
S-Depression	437717.50	-4.00	*0.00	15.00	16.00	16.00	0.08
S-Curiosity	437579.00	-4.01	*0.00	27.00	26.00	26.00	0.08
T-Anxiety	432289.00	-4.39	*0.00	19.00	20.00	20.00	0.09
T-Anger	468893.00	-1.72	0.09	20.00	21.00	21.00	0.04
T-Depression	450350.00	-3.08	*0.00	17.00	18.00	17.00	0.06
T-Curiosity	447425.00	-3.29	*0.00	28.00	27.00	27.00	0.07

Note. N = 2294, men = 572, women = 1722. r = effect size. * Statistically significant values at $p <$ 0.05.

As shown in Table 4.12, statistically significant differences between the gender groups were reported on each of the subscales of the STPI-Y except for the T-Anger subscale. In terms of State and Trait Anxiety and Depression subscales, women reported higher scores than the men, while men reported higher scores on the S-Anger and S-Curiosity and T-Curiosity subscales than the women. However, the effect sizes of these differences are less than .10, and therefore are considered to be small (Pallant, 2011).

To compare ethnic groups, a Kruskal-Wallis Test was conducted. The results of this analysis are provided in Table 4.13.

Table 4.13

Kruskal-Wallis Ethnic Group Comparison

Subscale	Ethnicity	n	Median	χ^2	df	Asymp. Sig. (α)
S-Anxiety	African	1017	20.00			
	Indian/Asian	152	19.00			
	Coloured	105	18.00			
	White	1006	19.00			
	Total	2280	19.00	13.997	3	*.003
S-Anger	African	1017	12.00			
	Indian/Asian	152	12.00			
	Coloured	105	11.00			
	White	1006	11.00			
	Total	2280	11.00	10.806	3	*.013
S-Depression	African	1017	16.00			
	Indian/Asian	152	16.00			
	Coloured	105	16.00			
	White	1006	16.00			
	Total	2280	16.00	.248	3	.969
S-Curiosity	African	1017	27.00			
	Indian/Asian	152	26.00			
	Coloured	105	26.00			
	White	1006	26.00			
	Total	2280	26.00	20.640	3	*.000
T-Anxiety	African	1017	20.00			
	Indian/Asian	152	19.00			
	Coloured	105	19.00			
	White	1006	20.00			
	Total	2280	20.00	8.547	3	*.036

(table continues)

Table 4.13 Continued

Subscale	Ethnicity	n	Median	χ²	df	Asymp. Sig. (α)
T-Anger	African	1017	21.00			
	Indian/Asian	152	21.00			
	Coloured	105	21.00			
	White	1006	21.00			
	Total	2280	21.00	4.188	3	.242
T-Depression	African	1017	18.00			
	Indian/Asian	152	17.00			
	Coloured	105	17.00			
	White	1006	17.00			
	Total	2280	17.00	14.147	3	*.003
T-Curiosity	African	1017	27.00			
	Indian/Asian	152	26.00			
	Coloured	105	27.00			
	White	1006	27.00			
	Total	2280	27.00	3.135	3	.371

Note. χ² = chi-squared statistic. *df* = Degrees of Freedom. ** Statistically significant values at α < 0.05.

Statistically significant differences were found for each of the subscales, except the S-Depression, T-Anger, and T-Curiosity subscales. The Kruskal-Wallis test does not indicate which groups are statistically different from one another, therefore post-hoc analysis is required (Pallant, 2011). This analysis was conducted using Mann-Whitney U tests with alpha set at 0.0125 as per the Bonferroni adjustment (Pallant, 2011). The post-hoc analysis did not reveal statistically significant group differences on the Trait Anxiety subscale.

Statistically significant differences with a small effect size were reported between the scores on the S-Anxiety subscales of the African participants (*Md* = 20.00, *n* = 1017) and the Coloured participants (*Md* = 18.00, *n* = 105): U = 45445.00; z = -2.52; p = 0.01; r = 0.08. The

S-Anger subscale reported statistically significant differences with a small effect size between the Indian/Asian participants (*Md* = 12.00, *n* = 152) and the White participants (*Md* = 11.00, *n* = 1006): U = 65386.500; z = -2.98; p = 0.003; r = 0.09. Statistically significant differences with small effect sizes were reported on the S-Curiosity subscales between the African participants (*Md* = 27.00, *n* = 1017) and the White participants (*Md* = 26.00, *n* = 1006): U = 45446.00; z = -4.36; p = 0.000; r = 0.10.

For the T-Depression Subscale, statistically significant differences were reported between the African participants (*Md* = 18.00, *n* = 1017) and the White participants (*Md* = 17.00, *n* = 1006): U = 463166.00; z = -3.69; p = 0.000; r = 0.08. Statistically significant differences were also reported between the Indian/Asian participants (*Md* = 12.00, *n* = 152) and the White participants (*Md* = 11.00, *n* = 1006): U = 65386.50; z = -2.975; p = 0.003; r = 0.09 on the T-Depression subscale. The effect sizes are considered as small.

In summary, the African participants rated themselves as higher in S-Anxiety than the Coloured participants. African participants obtained higher scores in S-Curiosity and T-Depression than the White participants. The Indian/Asian participants scored higher than the White participants in S-Anger. However, the effect sizes of these differences are negligible and are unlikely to impact the interpretation of the scores across the groups.

4.5.2 Differential Item Functioning (DIF)

In order to investigate DIF across different gender and ethnic groups, Rasch analysis was conducted. For the gender groups, item difficulty parameters were calculated and compared against each other, while for the ethnic groups item difficulty parameters were compared against the group averages. For gender and ethnic groups, the plots of the item difficulties were investigated. Differences greater than .50 logits are considered to be noticeable (Linacre, 2013).

The tables in Appendix D show the differential item functioning for gender and ethnic groups for each of eight subscales of the STPI-Y. The figures in Appendix D show a graphical plot of the item difficulties parameters for each of the items in the different State and Trait subscales for the gender and ethnic groups.

For the gender groups, the DIF contrast values were less than .50 logits in magnitude. This indicates that there is little evidence of DIF in the different state and trait subscales of the STPI-Y. The graphs in Appendix D1 (Figure D1 to Figure D8) show the plot of item difficulties for each of the gender groups on the eight subscales of the STPI-Y. The pattern of item difficulties was very similar for the gender groups, indicating that the item functioning was also likely to be similar.

When assessing differential item functioning for the ethnic groups, the DIF size was considered. This is the difference between the DIF measure for the group and the baseline difficulty, expressed in logits. For the ethnic groups, the DIF Sizes were less than .50 logits in magnitude. However, when assessing the DIF plots for these analyses (Appendix D2, Figure D9 to Figure D16), it was noticed that the pattern of item difficulties showed some variation. Therefore the DIF Contrast values for these scales were investigated further for differences greater than 0.50 between each of the groups. The statistically significant differences are reported in Table 4.14. The analyses for each subscale were conducted separately, but are reported below for each combination of ethnic group, ($p < 0.0125$ due to Bonferroni adjustment). There was no evidence of item bias for the items on the State and Trait Curiosity subscales.

Table 4.14

Differential item functioning across Ethnic Groups for the STPI-Y

Item	Difficulty	S.E.	Difficulty	S.E.	DIF Contrast	χ^2	*df*	*p*
	African		Indian / Asian					
S-Anger 4	0.26	0.07	-0.33	0.13	0.59	21.3512*	3	0
T-Anger 7	0.29	0.04	-0.34	0.11	0.63	51.8835*	3	0
T-Anger 9	1.3	0.05	0.72	0.12	0.58	25.9371*	3	0
T-Depression 9	-0.48	0.05	-1.02	0.13	0.54	40.2963*	3	0
	African		Coloured					
S-Anger 1	-0.17	0.06	0.49	0.22	-0.67	89.1093*	3	0
S-Anger 4	0.26	0.07	-0.33	0.18	0.59	21.3512*	3	0
S-Anger 10	0.3	0.06	-0.49	0.18	0.52	29.1590*	3	0
T-Anxiety 4	-0.53	0.04	0.01	0.14	-0.54	111.178*	3	0
	African		White					
S-Anxiety 10	1.17	0.05	2	0.07	-0.83	89.1093*	3	0
State Anger 1	-0.17	0.06	0.54	0.08	-0.71	58.0632*	3	0
S-Depression 4	0.04	0.05	0.56	0.05	-0.53	53.5881	3	0
S-Depression 10	0.31	0.05	-0.43	0.04	0.75	125.118	3	0
S-Depression 8	0.2	0.05	0.71	0.06	-0.51	49.0233	3	0
T-Anxiety 4	-0.53	0.04	0.14	0.05	-0.67	111.178*	3	0
	Coloured		White					
S-Anger 4	-0.33	0.18	0.18	0.07	-0.51	21.3512*	3	0
	Indian / Asian		White					
S-Anxiety 10	1.41	0.16	2	0.07	-0.6	89.1093*	3	0
S-Anger 4	-0.33	0.13	0.18	0.07	-0.5	21.3512*	3	0
S-Depression 3	0.37	0.13	0.88	0.06	-0.52	37.8023*	3	0
	Indian / Asian		Coloured					
T-Anger 4	-0.27	0.11	-0.83	0.12	0.56	16.6217*	3	0

Note. *Statistically significant at p < 0.0125. χ^2 = chi-squared statistic. *df* = Degrees of Freedom. S.E. =

Standard Error

Table 4.14 demonstrates the statistically significant DIF between the ethnic groups. The African participants found it easier than the White and Coloured participants to endorse S-Anger 1. This item asks participants to rate how furious they are currently feeling.

The Coloured participants and the Indian/Asian participants found S-Anger 4 easier to endorse than the African participants and the White participants. This item assesses the desire to express anger physically by kicking.

The Indian/Asian participants also found it easier than the African participants to endorse T-Anger 7, T-Anger 9 and T-Depression 9. T-Anger 7 described verbally expressing anger. T-Anger 9 assesses the physical expression of hitting. T-Depression 9 considers a lack of feeling peaceful.

The African participants found it easier to endorse T-Anxiety 4 than the Coloured and White participants. T-Anxiety 4 asks the participants if they feel that they are less happy than other people seem to be. The Coloured participants found S-Anger 10 easier to endorse than the African participants. This item assesses verbally expressing anger through swearing.

The African participants and the Indian/Asian participants found it easier to endorse S-Anxiety 10 than the White participants. This item assesses feeling frightened. The Indian/Asian participants found it easier to endorse S-Depression 3 than the White participants. This item assesses feeling miserable.

The African participants found it easier than the White participants to endorse S-Depression 4 and S-Depression 8. These items assess feeling downhearted and gloomy.

The White participants found it easier to endorse S-Depression 10 than the African participants. This item assesses feelings of hopelessness about the future.

The Coloured participants found T-Anger 4 easier to endorse than the Indian/Asian participants. This item assesses frustration at being slowed down by other people's mistakes.

In summary, out of the 80 items in the State Trait Personality Inventory, 13 items demonstrated significant DIF between two or more ethnic groups. In the State subscales, one item in the S-Anxiety subscale was shown to have DIF, three in the S-Anger subscale and four in the S-Depression subscale. For the Trait subscales, one item in the T-Anxiety subscale was shown to have some DIF, three T-Anger items and one T-Depression item. There was no evidence of DIF for the items on the S-Curiosity and T-Curiosity subscales.

4.5 Unknown words or items.

When completing the STPI-Y, participants in the primary data group were asked to identify words or phrases in the items that were unknown or ambiguous. Table 4.15 lists these items and the words or phrases that were circled. The scale Cronbach's alpha reliability for each item is listed as well as the Cronbach's alpha of this subscale if the item were to be deleted. The number of students that circled the words on this item are also provided. This will give an indication as to whether or not this item reduces the overall reliability of the subscale.

Table 4.15

Items identified as containing unknown words or phrases

Item name	Problematic word/ phrase	*n*	Group 1 Cronbach's Alpha	Group 1 Alpha if item deleted
S-Anxiety 9	steady	1	0.84	0.84
S-Anxiety 6	jittery	13	0.84	0.84
S-Depression 2	feel blue	1	0.87	0.85
S-Depression 4	downhearted	1	0.87	0.84
S-Depression 8	gloomy	6	0.87	086
S-Curiosity 4	inquisitive	20	0.78	0.74
S-Curiosity 6	stimulated	2	0.78	0.79
T-Anxiety 1	steady	1	0.81	0.81
T-Anxiety 3	turmoil	4	0.81	0.81
T-Anxiety 9	inadequate	2	0.81	0.80
T-Anger 2	fiery	4	0.82	0.78
T-Anger 3	hot-headed	4	0.80	0.80
T-Anger 6	fly off the handle	20	0.80	0.81
T-Depression 1	gloomy	5	0.88	0.88
T-Anger 10	infuriated	1	0.80	0.81
T-Curiosity 4	inquisitive	21	0.80	0.78
T-Curiosity 7	stimulated	1	0.80	0.78

Note. n = number of students that circled the word on this item. Only the primary sample group (n = 319) identified unknown items.

Out of the 319 students in this sample group, 43 students circled one or more items. Seven of these students listed English as their home language (16.3%), one listed other (Portuguese) as her home language (2.3%). Sixteen students (37.2%) listed an African language as their home language, and nineteen (44.1%) of these students stated their home language was Afrikaans.

Two items in the S-Anxiety subscale contained words that were identified by the participants as being unfamiliar. The removal of these items would not impact the scale reliability.

The participants identified three different items in the S-Depression subscale as containing unknown words or phrases. Two of these items contained idiomatic language and it is likely that other students may struggle with them.

Two items in the S-Curiosity subscale were identified by the participants as having words that were unknown. One of these items increases the scale reliability and the other decreases the scale reliability.

In the T-Anxiety subscale, three items were identified by students as having an unknown word. The removal of these items would not increase the scale reliability.

Four items on the T-Anger subscale were identified as having unknown words. Two of these items increase the scale reliability, and two decrease the scale reliability. Of concern is T-Anger 6 which was identified by 20 students as being problematic.

One item from the T-Depression subscale and two items in the T-Curiosity Subscale were identified as having problematic words. The removal of these items would not increase the scale reliability.

The participants in the primary sample group identified 17 out of the 80 STPI-Y items as having unknown words. Four of these items, S-Curiosity 6, T-Anxiety 9, and T-Anger 6

and 10, reduce the reliabilities of their subscales. The remaining items do not reduce the overall subscale reliabilities. This could indicate that the majority of the participants understood these items, or that, because the subscales consist of only ten items each, removing any of the items would negatively influence the overall reliability. Some of these items are constructed using idiomatic language. When writing items for a psychometric test, precise, clear language should be used (Foxcroft & Roodt, 2009; Kaplan & Saccuzzo, 2013).

4.6 Conclusion

This chapter provides the results of the statistical analyses that were used to assess the psychometric properties of the STPI-Y when applied to a student population. Methodologies from classical test theory and item response theory were employed to assess this instrument in accordance with meeting the objectives of this study. The results of these analyses will be discussed in Chapter 5.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter will discuss the major findings presented in Chapter 4. The findings are related to the aim of this study which was to examine the psychometric properties of the STPI-Y in the South African context when used with a student sample. It is proposed that the STPI-Y may be useful in assessing and monitoring general well-being. To meet this aim, objectives were set and empirical analyses were conducted to meet these objectives. The following discussion will explore the findings from the analyses. Each subscale of the STPI-Y will be discussed separately, with areas of concern identified. Where possible, comparisons to previous research findings will be made. Although the STPI in various forms has been used in many research projects, an extensive literature search yielded no studies that explored gender differences between the State and Trait Anxiety, Anger and Curiosity subscales of the STPI-Y. No existing studies have explored South African ethnic group differences using the STPI-Y. Existing research using the Rasch model to investigate the psychometric properties of the STPI-Y was not found, therefore comparisons with previous studies using this approach was not possible. The limitations of the study will be discussed and recommendations will be made for further research.

5.2 State Anxiety Subscale

The internal consistency reliabilities for the S-Anxiety subscale were good (above .82), which indicates that the items on the test measure a similar latent trait. This result is consistent with previous research by Spielberger and Reheiser (2009), which reported Cronbach's alpha for this subscale of .86. The person separation index for this scale was low,

which suggests that the subscale does not have enough items that differentiate between those with high levels of state anxiety and those with lower levels. The item separation index suggests that if the analysis was to be repeated with a different sample, the order of the item difficulties should remain the same.

When the S-Anxiety subscale was assessed for fit to the Rasch model, the items demonstrated good fit. This suggests that participants endorsed the items that were targeted to their standing on the latent construct as measured by the items on this subscale. It also suggests that the responses were not too predictable and the items were unidimensional.

Exploratory factor analysis resulted in nine out of ten items loading as expected onto one factor. However, S-Anxiety 6 had a low communality value with these items which suggests that it does not fit well in this scale. This item uses the word *jittery* which was identified as being unknown. This item might measure a different latent trait from the other items on this scale. Confirmatory factor analysis also resulted in a lower factor loading of this item on the S-Anxiety factor. S-Anxiety 7 loaded on a different factor when exploratory factor analysis was conducted, which suggests that the sample group may not experience the lack of relaxation as anxiety. However, this item had a salient factor loading on the S-Anxiety factor when confirmatory factor analysis was conducted. Generally the items had fair to good factor loadings on the S-Anxiety subscale, which suggests that these items measure a similar latent trait, as measured by feeling tense, worried, nervous, and not at ease, not calm and not relaxed. These items seem to assess current feelings of anxiety.

This subscale demonstrated correlations above .42 with each of the other subscales. The highest correlations were found with T-Anxiety ($r = .80$), S-Depression ($r = .87$) and T-Depression ($r = .75$). In researching the STPI-Y and the German version of the STPI, Krohne

et al. (2002) found the S-Anxiety and S-Depression subscales were highly correlated (American sample, r = 0.71; German sample, r = 0.73).

An assessment of group median differences found that women rated themselves higher on S-Anxiety than men, although the effect size was negligible. The preliminary manual of the STPI-X indicated that college women had higher scores on S-Anxiety than college men (women = 19.06; men = 17.95), although the significance of this difference was not reported (Spielberger et al., 1979). Hasida and Mosche (1988) found no significant gender differences between Israeli men and women on the S-Anxiety subscale when using the Hebrew version of the STPI. These research studies are dated, however, and comparisons to the South African student sample should be made with caution.

The African participants reported higher scores than Coloured participants on this subscale, although the effect size of this difference was negligible. There was minimal evidence of DIF between the gender groups. The African participants and the Indian/Asian participants found it easier to endorse S-Anxiety 10 than the White participants. This item assesses feeling frightened. Although DIF on one item is unlikely to result in bias at the scale level, this finding is worth noting.

The two items that were identified as problematic by the participants in the primary sample group do not demonstrate DIF or impact the reliability of the scale. These items are S-Anxiety 6 (jittery) and S-Anxiety 9 (steady).

The results suggest that the S-Anxiety subscale could be a useful screening tool to assess the experience of anxiety as a current emotion. Generally the statistics support the reliability, construct validity, and fairness between groups that were assessed on the S-Anxiety subscale.

5.3 State Anger Subscale

The distribution of the scores on the S-Anger subscale was positively skewed. This is consistent with the distribution of the S-Anger scores as found with the original norm group (Spielberger & Sydeman, 1994). This may prevent this scale from effectively discriminating among respondents with low scores (Spielberger & Sydeman, 1994).

The internal consistency reliability for the S-Anger subscale was excellent for all groups, ranging from .90 to .91. This is similar to the Cronbach's alpha coefficients for the college student sample group reported in the STPI preliminary manual, where coeffiecients ranged from .90 to .92 for women and men, respectively (Spielberger, 1979). These results suggest that the items have a high correspondence with each other. The person separation index for this scale was low, which indicates that the subscale does not have enough items to differentiate between participants with high levels and low levels of the latent trait. The item separation index suggests that the order of the item difficulties would likely remain stable with a different sample.

The investigation of fit to the Rasch model showed that none of the items on this subscale demonstrated misfit. The responses were not too predictable, and items were answered as expected. The items appear to measure a unidimensional construct.

The exploratory factor analysis for this subscale revealed that the S-Anger items loaded as expected into one factor. The factor loadings were salient, and the communality values indicate that these items fit together well. The confirmatory factor analysis supported these findings with salient factor loadings. These ten items appear to measure a similar latent trait. Previous research recognized two separate S-Anger factors (Forgays, Forgays & Spielberger, 1997). As a result, the S-Anger items can be used to identify two separate constructs of *Feeling angry* and *Feeling like expressing anger* (Spielberger & Reheiser,

2009). This distinction does not seem to be present in the South African sample group that participated in this research, although future research could be conducted to explore whether group differences exist between these two different S-Anger subscales.

Confirmatory factor analysis also indicated that the S-Anger items had a correlation of .51 with the T-Anger subscale. The S-Anger subscale was highly correlated with the S-Depression subscale (r = .70). This correlation was higher than previous findings by Krohne et al. (2002) where a correlation of .64 was found between these subscales.

An assessment of group differences of the S-Anger subscale showed that men rated themselves higher on S-Anger than women, although the effect size was negligible. The preliminary manual of the STPI-X noted that college women had higher scores on S-Anger than college men (women = 14.24; men = 13.42) although the significance of this difference was not reported (Spielberger et al., 1979). Hasida and Mosche (1988) found no significant gender differences between Israeli men and women on the S-Anger subscale when using the Hebrew version of the STPI. These studies were both completed over two decades ago and comparisons to the South African student group should be made with caution. Indian/Asian participants rated themselves as higher on State Anger than White students. The effect size was negligible.

Three items on this subscale reflected DIF. S-Anger 1, which assesses feeling furious, was easier for the African participants to endorse than for the White and Coloured participants. S-Anger 4 was easier for the Coloured participants and the Indian/Asian participants to endorse than for the African participants and the White participants. This item assesses wanting to express current anger by kicking. S-Anger 10 was easier for the Coloured participants to endorse than the African participants. This item assesses verbally expressing anger through swearing.

DIF occurred between different groups and in different directions. It is likely that the overall effect of this DIF on the subscale is minimal due to DIF cancellation. However, the items that were endorsed by the different groups could be an interesting point of departure for subsequent research projects.

There is evidence for the reliability and construct validity of the S-Anger subscale. The participants did not select any item in this subscale when circling confusing words. Given the presence of DIF on three of the items, there may be differences in the scores between these groups. Further research is necessary to investigate whether these differences are due to cultural interpretation or appropriateness, or real differences between the groups. In general, the results support the reliability, construct validity and fairness of the S-Anger subscale.

5.4 State Depression Subscale

The S-Depression subscale demonstrated good internal consistency reliability across the different groups, ranging from .82 to .86. This suggests that the items measure a similar latent trait. This is similar to the Cronbach's alpha coefficient of .85 for this subscale reported by Krohne et al. (2002).

As with the previous two subscales, the person separation index was low which suggests that more items are needed to differentiate between high levels of depressive emotions and low levels of this construct. The item separation index indicates that if the analysis was to be repeated with a different sample, the order of the item difficulties should remain the same.

Fit statistics through Rasch analysis indicated that none of the items on the S-Depression subscale demonstrated misfit. Therefore all the items contributed to the

measurement of the latent construct. The responses were not too predictable, and participants endorsed items that were generally targeted to their standing on the latent trait.

Exploratory factor analysis resulted in the S-Depression items loading onto three different factors. The 5 items that measure the presence of depression (dysthymia) loaded onto one factor, while the 5 items that indicated and absence of depression (euthymia) loaded onto two separate factors. When confirmatory factor analysis was performed, the items in the S-Depression subscale demonstrated salient factor loadings. This indicates that the items measure a similar latent trait. This is consistent with previous research by Krohne et al. (2002) which found factor loadings that ranged from .47 to .92 on this subscale.

The investigation into differences in group medians showed that women reported higher scores for S-Depression. However, the effect sizes of these differences were negligible. This is consistent with research by Krohne et al. (2002) which found that both German and American women obtained higher scores on the S-Depression subscale than men. There were no statistically significant differences in the median scores between ethnic groups on this subscale.

The assessment of DIF on this subscale indicated no statistically significant differences between men and women. Four items had DIF contrast values of more than .50 between ethnic groups. S-Depression 3 was easier for the Indian/Asian participants to endorse than for the White students. This item assesses feeling miserable. S-Depression 4 and S-Depression 9 were easier for the African participants to endorse than for the White participants. These items assess feeling downhearted and gloomy. The White participants found it easier to endorse S-Depression 10 than the African students. This item assesses feelings of hopelessness about the future.

The DIF values were found in different directions and with different ethnic groups, therefore these findings are unlikely to result in bias at the scale level. However, these DIF values may indicate differences between these groups worth exploring further in later research.

The participants noted that three different items on this subscale contained unknown words or phrases. These items include S-Depression 4 and S-Depression 9 which demonstrated DIF and were easier for the African participants to endorse. The third item assesses whether a respondent *feels blue.* This expression uses idiomatic language that may result in issues in cross-cultural research. However, the internal consistency reliability of this subscale would decrease if these items were removed.

The S-Depression subscale appears to be reliable and to demonstrate construct validity. Four items demonstrate DIF. Further research is therefore recommended to investigate whether these differences are due to real group differences or differences in understanding. The S-Depression subscale should prove useful as a screening for depressive feelings, but more items would improve this scale.

5.5 State Curiosity Subscale

The S-Curiosity internal consistency reliabilities ranged from .71 to .80 across the different groups, which are considered as satisfactory to good. This is slightly lower than the Cronbach's alpha coefficients for college students, reported in the STPI preliminary manual, where the Cronbach's alpha coefficients were .78 for women and to .84 for men (Spielberger, 1979). The item separation index was high, but the person separation index was low. This suggests that there is high correspondence between the items on the subscale, the order of the

item difficulties should remain the same with a different sample group, but the subscale is not long enough to differentiate between high and low performers.

Two items on this scale demonstrated misfit to the Rasch model. S-Curiosity 8 assesses the participants' feelings of boredom, and S-Curiosity 1 asks participants to endorse whether they are in a questioning mood. As the wording of these items is straightforward and neither was identified as being unknown by the participants, it is unlikely that the underfit is a result of confusion or poor understanding. It is more probable that the underfit of these items indicates that they measure a different dimension to the remaining items in the scale. These results suggest that feelings of boredom cannot be considered to be an absence of feeling curious. Being in a questioning mood might be more related to critical thinking than curiosity. The remaining seven items had acceptable fit statistics which indicates that they demonstrate unidimensionality.

Exploratory factor analysis resulted in seven S-Curiosity items loading with six T-Curiosity items in one factor. S-Curiosity 1 had a low communality value in this factor, suggesting that it does not fit well with the other items. This item assesses if the respondent feels they are in a questioning mood. In a separate factor, two reverse-scored S-Curiosity items loaded with two reverse-scored T-Curiosity items and two T-Anger items. The final S-Curiosity item loaded with the reverse-scored S-Depression items. These factors were not correlated with one another. Many of the S-Curiosity and T-Curiosity items that loaded together in the same factor are similar or identical, although the test instructions ask the participants to distinguish between their long term feelings and their current state. It is possible that the participants did not distinguish between their current feelings and their long-term experience of this construct.

When confirmatory factor analysis was conducted, four of the S-Curiosity items demonstrated poor factor loadings. S-Curiosity 1 did not load on this subscale. S-Curiosity 2, 4, and 5 had poor factor loadings on this scale. These three items loaded together in the exploratory factor analysis. They assess curiosity, inquisitiveness, and interest in exploring the environment.

The results indicate that three separate constructs are being assessed in this scale. This is consistent with previous research findings where the State and Trait Curiosity subscales reported a three-factor solution, with some of the state and trait items loading on the same factor (Boyle, 1983). The remaining items had salient factor loadings. Confirmatory factor analysis also showed that S-Curiosity subscale demonstrated a very high correlation of .91 with the T-Curiosity subscale. This subscale correlated negatively with the Depression subscales.

When group medians were compared, the results showed that men reported higher scores on the S-Curiosity subscale, although the effect size was negligible. The college sample used for the preliminary manual of the STPI-X indicated that men had slightly higher scores on S-Anxiety than women (men = 26.85; women = 26.17), although the significance of this difference was not reported (Spielberger et al., 1979). Hasida and Mosche (1988) found significant gender differences between Israeli men and women on the S-Curiosity subscale when using the Hebrew version of the STPI. Israeli men reported significantly higher scores on the S-Curiosity scale than Israeli women (Hasida & Mosche, 1988). These studies were completed over 25 years ago, and comparison to the South African student sample group should be made with caution.

African participants reported higher scores on this subscale than the White students, although the effect size was negligible. There was no evidence for DIF on this subscale when comparing gender and ethnic groups.

Two items in this subscale were identified by the participants as having words that were unknown. These items are S-Curiosity 4 (inquisitive) and S-Curiosity 6 (stimulated). The removal of S-Curiosity 6 would increase the scale reliability.

The results indicate that this scale has acceptable reliability, and assesses participants fairly. The factorial validity of this scale is questionable.

5.6 Trait Anxiety Subscale

The internal consistency reliability for the T-Anxiety subscale was satisfactory to good across the different groups and ranged from .75 to .81. These results are slightly lower than found by Spielberger and Reheiser (2009) where a Cronbach's alpha of .90 was reported. The person separation index for this scale was low, but the item separation index was good. This suggests that the items have a high correspondence with one another, the difficulty parameters of the items are well separated, and the order of the item difficulties should remain the same with a different sample group. However, the scale does not have enough items to distinguish between high and low performers.

The investigation of fit to the Rasch model showed that none of the items on the T-Anxiety subscale demonstrated misfit. The items all contributed to measuring the latent trait. The participants' responses were not too predictable and were answered as expected by their standing on the latent trait.

Exploratory factor analysis resulted in the T-Anxiety items loading on three different factors. However, through confirmatory factor analysis it seems that the items in this subscale

measure a similar latent trait. Confirmatory factor analysis also indicated a high correlation (r = .96) between the T-Anxiety subscale and the T-Depression subscale, and a high correlation (r = .81) between the T-Anxiety subscale and the S-Depression subscale. Similar correlations have been found in previous research with both the STPI-Y and the German version of the STPI (Spielberger & Reheiser, 2009; Krohne et al., 2002). Spielberger and Reheiser (2009) suggest that this is as a result of high comorbidity between depression and anxiety.

Confirmatory factor analysis also indicated that the T-Anxiety and T-Anger subscales were correlated (r = .54). Pritchard and Kay (1992) obtained similar correlations (r = .49) between these subscales. The correlation between the T-Anxiety subscale and the T-Curiosity subscale was -.58. This is a higher correlation than was found by Pritchard and Kay (1992), who reported a correlation of -.36.

The investigation into group medians indicated that women reported higher scores for T-Anxiety, although the effect size was negligible. The preliminary manual of the STPI-X indicated that women had higher scores on T-Anxiety than men (women = 19.38; men = 17.88), although the significance of this difference was not reported (Spielberger et al., 1979). Hasida and Mosche (1988) found significant gender differences between Israeli men and women on the T-Anxiety scale when using the Hebrew version of the STPI. Israeli women reported significantly higher scores on the T-Anxiety subscale scale than Israeli men (Hasida & Mosche, 1988). These studies were completed several decades ago, and comparisons to the South African student sample group should be made with caution. There were no significant differences to report between ethnic groups in terms of their median scores.

One item on this subscale, T-Anxiety 4, demonstrated some DIF. The African participants reported feeling more frightened than the White and Coloured students. It is unlikely that this finding will impact the total functioning on the scale.

The participants in the primary sample group identified three items in the T-Anxiety subscale as having unknown words. T-Anxiety 1 assesses if the respondent feels *steady*, T-Anxiety 3 uses the word *turmoil*, and T-Anxiety 9 uses the word *inadequate*. These items do not decrease the scale reliability and do not demonstrate DIF.

The results suggest evidence for the reliability and construct validity of the T-Anxiety subscale. Generally, the items in this subscale seem to function similarly across the groups that were assessed.

5.7 Trait Anger Subscale

The internal consistency reliabilities for the T-Anger subscale for the groups assessed were good, ranging from .80 to .85. This is similar to the Cronbach's alpha coefficients for college students, reported in the STPI preliminary manual, where Cronbach's alpha coefficients that ranged from .82 to .85 for women and men respectively (Spielberger, 1979). This indicates that there is high correspondence between the items on the subscale. The person and the item separation indices were good, which indicates that if the analysis was repeated with a different sample it is likely that the order of the item difficulties would remain the same. The person separation index for this subscale was low which suggests that the different subscales are not long enough to differentiate between high and low performers.

When using Rasch analysis to assess the fit statistics of the T-Anger subscale, none of the items demonstrated misfit. This indicates that the responses were not too predictable and the scale is unidimensional.

Exploratory factor analysis resulted in the T-Anger items loading on two different factors. Forgays, et al. (1997) note that the T-Anger subscale consistently loads onto two correlated factors. These factors seem to measure Anger-Temperament which identifies

"individual differences in the disposition to feel angry without provocation" (Forgays, et al., 1997, p. 498), and Anger-Reaction which measures how often a person "feels angry when unfairly criticised or otherwise treated unfairly or badly" (Forgays, et al. 1997, p. 498).

In this research, eight T-Anger items loaded with two T-Anxiety items. This factor seems to asses worry and inner turmoil, as well as the ability to control temper, feelings of irritation and annoyance, and impulsion to kick, hit or swear. This factor may assess a latent trait similar to Neuroticism, which is characterised by low impulse control, poor coping ability in times of stress and negative affect such as fear (Taylor, 2008). This factor might also be comparable to the Anger-Temperament factor identified in previous research where two separate S-Anger factors of Anger-Temperament and Anger-Reaction (Forgays, et al. 1997).

The remaining two T-Anger items (5 and 10) loaded onto a factor with S-Curiosity and T-Curiosity items. The T-Anger items relate to frustration in not receiving recognition for work and being delayed by others. These items had secondary loadings with the other T-Anger items. T-Anger 4 had secondary loadings on this Curiosity/Anger factor. This factor seems to be consistent with the Anger-Reaction factor identified in previous research (Forgays, et al., 1997).

When conducting confirmatory factor analysis, three of the T-Anger items had low factor loadings. These include the two items that loaded separately in the exploratory factor analysis of T-Anger (5 and 10), as well as of T-Anger 4, which had secondary loadings with these items. This supports the previous findings that this subscale measures two distinct constructs, identified as Anger-Temperament and Anger-Reaction (Forgays, et al., 1997).

An investigation of the differences between the gender and ethnic group medians revealed no statistically significant differences between the groups. The preliminary manual

of the STPI-X indicated that women had higher scores on T-Anger than men (women = 19.14; men = 18.65), although the significance of this difference was not reported (Spielberger et al., 1979). Hasida and Mosche (1988) found significant gender differences between Israeli men and women on the T-Anger scale when using the Hebrew version of the STPI. Israeli women reported significantly higher scores on the T-Anger subscale scale than Israeli men. The studies were both concluded over two decades ago, however, and comparisons to the South African student sample should be made with caution. More recent research by Collins, et al. (2004) using the STPI-Y indicated that women reported higher scores on the T-Anger subscale, however these differences were not significant. An assessment of DIF suggested there were no statistically significant differences between gender groups.

Three items demonstrated DIF between ethnic groups. T-Anger 7 and T-Anger 9 were more easily endorsed by the Indian/Asian participants than by the African participants. These items described verbally expressing anger and the physical expression of anger by hitting. Because T-Anger is designed to assess a long term aspect of personality, this suggests that African participants are less inclined to verbally and physically express anger. T-Anger 4 demonstrated DIF between Coloured and Indian/Asian students. This item assesses frustration at being slowed down by other people's mistakes.

Four items on this subscale were identified as having unknown words. T-Anger 2 (fiery) and T-Anger 3 (hot-headed), but this did not influence the reliability of the subscale. If T-Anger 6 (fly off the handle) and T-Anger 10 (infuriated) were removed from the subscale, the reliability would improve. Of concern is T-Anger 6, which was identified by 20 participants as being problematic.

Generally, the results support the reliability of the T-Anger subscale. The construct validity of this subscale is questionable and will need to be interpreted with caution. At least one item is problematic in terms of containing an unknown phrase. There may be differences in the scores between groups on the items that demonstrate DIF, but generally the items in the T-Anger subscale seem to function similarly across the groups that were assessed.

5.8 Trait Depression Subscale

The internal consistency reliabilities for the T-Depression subscale ranged from .79 to .90 across the different groups investigated which indicates that there is high correspondence between the items on the subscale. The study by Krohne et al. (2002) reported Cronbach's alpha coefficient of .90 for this subscale. The person separation index and item separation index on this subscale were good, which indicates that the items differentiate between those with high levels of the latent trait and those with low levels of the trait. The order of the item difficulties should remain the same if used with a different sample group, and the items were well separated in terms of their difficulty parameters.

None of the items in the T-Depression subscale demonstrated misfit to the Rasch model. This suggests that the scale is unidimensional.

When conducting exploratory factor analysis, the T-Depression items loaded on two different factors that were correlated with each other. The 5 trait items that measure the presence of depression (dysthymia) loaded onto one factor, while the 5 items that indicated and absence of depression (euthymia) loaded onto a different factor. Confirmatory factor analysis indicated that all items on this scale have good factor loadings above .52. This suggests that the items in these factors measure a similar latent trait. These findings are

consistent with previous research which found salient factor loadings on the T-Depression subscale (Krohne et al., 2002).

The women reported higher scores for T-Depression than men. Krohne et al. (2002) found that German women reported higher T-Depression scores than German men, while American men reported slightly higher T-Depression scores than American women. Collins, et al. (2004) found that women reported higher scores on the T-Depression subscale than men. These differences were not significant. A comparison of ethnic groups illustrated that African and Indian/Asian participants obtained higher ratings on the T-Depression subscale than the White students. However, the effect sizes of these differences were negligible.

One item on this subscale demonstrated DIF. The Indian/Asian participants found it easier than the African participants to endorse T-Depression 9. This item assesses a lack of feeling peaceful. This result is unlikely to have an impact of the overall functioning of the scale across groups. One item was identified as having an unknown word. T-Depression 1 uses the word *gloomy*. The removal of this item would not increase the scale reliability.

Generally this scale demonstrates good reliability and construct validity, and minimal evidence of DIF. This scale could be used to screen students for T-Depression.

5.9 Trait Curiosity Subscale

The internal consistency reliability for the T-Curiosity subscale ranged from .72 to .83 for the different groups, which is considered to be satisfactory to good. This indicates that there is an acceptable to high correspondence between the items on the subscale. These results are slightly lower than the Cronbach's alpha coefficients for college students, reported in the STPI preliminary manual, where Cronbach's alpha coefficients were .81 for women and .87 for men (Spielberger, 1979).

The person separation index for this scale was low, suggesting that the subscale is not long enough to differentiate between high and low performers. The item separation index was good which suggests that if the analysis were to be repeated with a different sample, the order of the item difficulties should remain the same. The items were well separated in terms of their difficulty parameters.

T-Curiosity 10 demonstrated underfit to the Rasch model. This item assesses the respondent's level of boredom as an aspect of personality. As the wording of this item is straight-forward and the word *bored* was not identified as being unknown by the participants, it is unlikely that the underfit was a result of confusion or lack of understanding. It is more probable that this item measures a different dimension to the remaining items in the scale. Boredom does not seem to be the opposite of curiosity. The same result was demonstrated in the analysis of the S-Curiosity item which also assessed boredom.

The ten items on this scale loaded onto four different factors when conducting exploratory factor analysis. Six T-Curiosity items loaded with similar S-Curiosity items in one factor. Two T-Curiosity items loaded with reverse-scored S-Depression, T-Depression, and T-Anxiety items. These items seem to be related to positive affect, or the opposite of positive affect. Two T-Curiosity items also loaded with S-Curiosity and T-Anger items. The S-Curiosity and T-Curiosity items attempt to measure a lack of boredom or a lack of interest, and the T-Anger items assess frustration regarding not receiving recognition for work. The final T-Curiosity item loaded with reverse-scored S-Depression items and one S-Curiosity item. These items seem to assess hope and liveliness.

Confirmatory factor analysis indicated that five of the items in the T-Curiosity subscale had low factor loadings. Four of these items were similar to the S-Curiosity items that had low factor loadings. These State and Trait items had loaded together in exploratory

factor analysis. It appears that these items measure a different construct to the other six items on this subscale.

Consistent with previous research (Spielberger & Reheiser, 2009), the T-Curiosity subscale was negatively correlated with the two Depression subscales. Spielberger and Reheiser (2009) suggested that this indicates that feelings of depression inhibit curiosity (Spielberger & Reheiser, 2009). However, as noted by Kashdan, et al. (2004), the curiosity subscales may measure a more general experience of positive affect. This would also account for the negative correlation with depression.

The investigation into differences in group medians showed that men reported higher scores for T-Curiosity. However, the effect sizes of these differences were negligible. The preliminary manual of the STPI-X indicated that college men had higher scores on T-Curiosity than college women (men = 29.67; women = 29.30), although the significance of this difference was not reported (Spielberger et al., 1979). Hasida and Mosche (1988) found no significant gender differences between Israeli men and women on the T-Curiosity subscale when using the Hebrew version of the STPI. These studies were completed several decades ago, and comparisons to the South African student sample should be made with caution.

There were no statistically significant differences in the median scores between ethnic groups on this subscale. In addition, there was minimal evidence of DIF between gender and ethnic groups.

Two items on this subscale were identified by participants as containing unknown words. T-Curiosity 4 contains the word *inquisitive*, and T-Curiosity 7 uses the word *stimulated*. The removal of these items would reduce the overall scale reliability.

The results indicate that there is some evidence for the reliability and fairness of the T-Curiosity subscale. However, the construct validity of this subscale is questionable. It

appears that two separate latent traits are being measured, one which assesses positive affect, and another that is highly face-valid for curiosity.

5.10 Summary

The subscales of the STPI-Y demonstrate satisfactory to good internal consistency reliability, but more items would assist in discriminating between those with high levels of the latent trait and those with lower levels. The high internal consistency reliability was consistent with previous research findings for the eight subscales (Krohne et al, 2002; Spielberger & Reheiser, 2009, Spielberger et al., 1979).

The evidence supports the factorial validity of the State and Trait Anxiety and Depression subscales, and the factorial validity of the State Anger subscale. Although, as discussed by Bados, et al. (2010), the high correlations between these scales raise some concerns about their discriminant validity. The factorial validity of the Trait Anger subscale is a concern. It is possible that the items in this subscale measures two separate constructs of Anger-Temperament and Anger-Reaction. The factorial validity of the State and Trait Curiosity subscales are also questionable and it is possible that these scales measure two or more latent traits. Factor analysis of these two subscales by Boyle (1989) resulted in separate state and trait curiosity items and reverse-scored curiosity items that seem to assess boredom rather than the opposite of curiosity. This research found an overlap between the State and Trait Curiosity subscales when conducting exploratory factor analysis. Confirmatory factor analysis also indicated that a few items in each of these scales do not fit with the other items. Evidence supported a separate construct of boredom, as identified by Boyle (1989). The correlations found between the different subscales were consistent with previous research findings, suggesting that the STPI-Y functions in a similar manner with this sample group.

These correlations may indicate dimensionality concerns, or may be due to high comorbidity across the subscales.

There were some statistically significant differences between the ethnic and gender group medians, but the effect sizes were small. Thirteen out of the eighty items demonstrated DIF between ethnic groups. Further research is recommended to assess if these differences were due to real group differences or different interpretation. Some hypotheses that could be investigated from these findings include whether African students generally feel more frightened and less safe than White students, and whether White students feel less hopeful about the future than African students. The African students also seem to endorse items that point to increased feelings of depression – such as *gloomy*, *downhearted*, and *feeling less happy than others*. These hypotheses are generated from findings on one or two items only, and therefore may not indicate real differences. To remove DIF, new items could be developed to replace the items that demonstrate statistically significant differences between groups.

5.11 Limitations

The focus of this study was on the psychometric properties of the STPI-Y when applied to a student population. Many of the issues discussed relate to the South African population at large. Extending the scope of this study beyond a student sample would have been beneficial in order for this study to be applicable to other population groups, such as working adults.

When selecting methodology to evaluate the psychometric properties of an instrument, a multitude of options are available. For this research, a variety of options were implemented, each with its own advantages and disadvantages. Using a variety of methods resulted in a broad assessment of the instrument, but the methodology employed could have

been implemented more thoroughly. For example, investigations of validity were applied to the entire sample group and not to the individual groups identified. Analyses were not conducted for the two State and Trait Depression subscales (Euthymia and Dysthymia), or for two S-Anger subscales, *Feeling angry* and *Feeling like expressing anger*. In addition, the reliabilities for the subscales that have items that demonstrate DIF should be reassessed without these items in order to empirically assess whether or not the scales are adequate without these items. When investigating the different groups, only gender and ethnicity was investigated. It would have been useful to investigate differences between language groups and age groups. Investigating DIF through Rasch analysis does not allow for the assessment of non-uniform DIF. The response style differences between the different groups were not assessed. This should be investigated further, as previous research in the South African context has shown that there are differences between the response styles of African and White South Africans (Taylor, 2008). In addition, the sample size differences between the African and White groups, and the Indian and Coloured groups could impact the results. The researcher was not able to find other studies that assessed the STPI-Y using Rasch analysis. Therefore, comparisons with international findings could not be made.

5.12 Recommendations for Future Research

Further research is needed in assessing the validity for ethnic, gender and language groups separately. The factor structure of the STPI-Y State and Trait Curiosity subscales need further assessment. It is possible that these items will load onto three different scales.

Future research could allow for investigations of non-uniform DIF as the present study only examines uniform DIF due to the use of the Rasch model approach.

It is not clear whether the participants clearly distinguished between the State and Trait items. Many of the items for the different scales are similar or identical. The

instructions stipulate that the first 40 items relate to a current feeling, while the next 40 relate to a general feeling. This distinction may not have been realised by the participants. A study into the test-retest reliability of the different subscales would highlight these issues.

5.13 Conclusion

This research aimed to investigate the psychometric properties of the State Trait Personality Inventory (Form Y), developed by Dr Charles Spielberger, in order to assist in the measurement of these constructs. This instrument aims to measure the constructs of anxiety, anger, depression and curiosity as a temporary emotional state, and a long-term personality trait. Due to the challenges South Africans face, including high crime and unemployment rates, stressful working environments, financial strains, and academic pressures, South African students are at risk for experiencing anxiety, anger, and depression. The experience of curiosity can assist students in building positive relationships (Kashdan et al., 2013), engaging more fully with their studies (Petersen, Louw, & Dumont, 2009; Von Stumm, et al., 2011) and embracing novelty (Hulme et al., 2013). Curiosity also provides a buffer to many of the aforementioned stressors (Kashdan et al., 2013). To understand how South African students experience these constructs, a reliable, valid and fair assessment is required.

In order to explore the psychometric properties of the STPI-Y, four objectives were set. The objectives aimed to assess the instrument's reliability, construct validity and fairness in the South African context with a student sample. Methodology from classical test theory and item response theory was used to achieve these objectives.

The results suggest the subscales are reliable and demonstrate factorial validity, a component of construct validity. There may be high comorbidity between the latent traits measured, or dimensionality may be a concern with this instrument. DIF was found on some

of the items, although as it was across different ethnic groups, and the direction of the difference varied, these findings are unlikely to result in bias at the scale level.

The data indicate that the STPI-Y subscales have acceptable psychometric properties for the South African student population, although results from State and Trait Curiosity subscales need to be interpreted with caution. For research purposes and for initial screening of students who are struggling with stressors related to their home, academic, and work environment, the STPI-Y would be an appropriate instrument to use.

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APPENDIX A

DESCRIPTIVE STATISTICS

Table A.1

Descriptive Statistics of STPI-Y Items

Item Name	N	Minimum	Maximum	Mean	Median	Mode	SD	Skewness	S.E.	Kurtosis	S.E.
S-Anxiety 1 (R)	2298	1	4	1.98	2	2	0.84	0.49	0.05	-0.48	0.10
S-Curiosity 1	2298	1	4	2.14	2	2	0.98	0.38	0.05	-0.94	0.10
S-Anger 1	2298	1	4	1.34	1	1	0.72	2.23	0.05	4.30	0.10
S-Depression 1 (R)	2298	1	4	2.23	2	2	0.89	0.25	0.05	-0.70	0.10
S-Anxiety 2	2298	1	4	1.97	2	1	0.93	-0.62	0.05	-0.59	0.10
S-Curiosity 2	2298	1	4	2.51	3	3	1.01	-0.02	0.05	-1.09	0.10
S-Anger 2	2298	1	4	1.32	1	1	0.74	2.37	0.05	4.99	0.10
S-Depression 2	2298	1	4	1.56	1	1	0.84	1.39	0.05	1.03	0.10
S-Anxiety 3 (R)	2298	1	4	2.22	2	2	0.95	0.28	0.05	-0.86	0.10
S-Curiosity 3	2298	1	4	2.80	3	3	0.95	-0.37	0.05	-0.80	0.10
S-Anger 3	2298	1	4	1.36	1	1	0.74	2.12	0.05	3.80	0.10
S-Depression 3	2298	1	4	1.51	1	1	0.84	1.62	0.05	1.70	0.10

(table continues)

Table A1 Continued

Item Name	N	Minimum	Maximum	Mean	Median	Mode	SD	Skewness		Kurtosis	
									S.E.		S.E.
S-Anxiety 4	2298	1	4	2.30	2	2	1.05	0.27	0.05	-1.11	0.10
S-Curiosity 4	2298	1	4	2.20	2	2	0.94	0.30	0.05	-0.84	0.10
S-Anger 4	2298	1	4	1.34	1	1	0.78	2.39	0.05	4.70	0.10
S-Depression 4	2298	1	4	1.64	1	1	0.92	1.31	0.05	0.64	0.10
S-Anxiety 5	2298	1	4	1.83	2	1	0.94	0.83	0.05	-0.36	0.10
S-Curiosity 5	2298	1	4	2.24	2	1	1.06	0.29	0.05	-1.17	0.10
S-Anger 5	2298	1	4	1.28	1	1	0.71	2.66	0.05	6.27	0.10
S-Depression 5 (R)	2298	1	4	1.78	2	1	0.91	0.91	0.05	-0.20	0.10
S-Anxiety 6	2298	1	4	1.58	1	1	0.77	1.27	0.05	1.10	0.10
S-Curiosity 6	2298	1	4	2.34	2	2	0.88	0.10	0.05	-0.72	0.10
S-Anger 6	2298	1	4	1.29	1	1	0.69	2.58	0.05	6.10	0.10
S-Depression 6	2298	1	4	1.55	1	1	0.87	1.53	0.05	1.36	0.10
S-Anxiety 7 (R)	2298	1	4	2.19	2	2	0.95	0.31	0.05	-0.87	0.10
S-Curiosity 7	2298	1	4	2.87	3	3	0.89	-0.40	0.05	-0.59	0.10

(table continues)

Table A1 Continued

Item Name	N	Minimum	Maximum	Mean	Median	Mode	SD	Skewness	S.E.	Kurtosis	S.E.
S-Anger 7	2298	1	4	1.65	1	1	0.89	1.24	0.05	0.57	0.10
S-Depression 7 (R)	2298	1	4	1.97	2	2	0.90	0.61	0.05	-0.49	0.10
S-Anxiety 8	2298	1	4	2.10	2	1	1.04	0.51	0.05	-0.97	0.10
S-Curiosity 8 (R)	2298	1	4	3.06	3	4	1.00	-0.75	0.05	-0.57	0.10
S-Anger 8	2298	1	4	1.26	1	1	0.70	2.86	0.05	7.38	0.10
S-Depression 8	2298	1	4	1.57	1	1	0.80	1.32	0.05	1.00	0.10
S-Anxiety 9 (R)	2298	1	4	2.45	2	2	0.88	0.07	0.05	-0.71	0.10
S-Curiosity 9	2298	1	4	2.47	3	3	0.92	-0.07	0.05	-0.84	0.10
S-Anger 9	2298	1	4	1.59	1	1	0.87	1.38	0.05	0.93	0.10
S-Depression 9 (R)	2298	1	4	2.01	2	2	0.91	0.58	0.05	-0.48	0.10
S-Anxiety 10	2298	1	4	1.40	1	1	0.75	1.92	0.05	2.96	0.10
S-Curiosity 10 (R)	2298	1	4	3.38	4	4	0.84	-1.28	0.05	0.85	0.10
S-Anger 10	2298	1	4	1.43	1	1	0.86	1.95	0.05	2.63	0.10
S-Depression 10 (R)	2298	1	4	1.78	2	1	0.89	0.92	0.05	-0.07	0.10
T-Anxiety 1 (R)	2298	1	4	2.03	2	2	0.79	0.33	0.05	-0.47	0.10
T-Curiosity 1	2298	1	4	2.54	3	2	0.95	0.00	0.05	-0.92	0.10

(table continues)

Table A1 Continued

Item Name	N	Minimum	Maximum	Mean	Median	Mode	SD	Skewness	S.E.	Kurtosis	S.E.
T-Anger 1	2298	1	4	2.13	2	2	0.98	0.54	0.05	-0.68	0.10
T-Depression 1	2298	1	4	1.72	2	1	0.74	0.78	0.05	0.15	0.10
T-Anxiety 2 (R)	2298	1	4	2.11	2	2	0.85	0.32	0.05	-0.58	0.10
T-Curiosity 2	2298	1	4	2.75	3	3	0.89	-0.21	0.05	-0.75	0.10
T-Anger 2	2298	1	4	1.87	2	1	0.93	0.85	0.05	-0.20	0.10
T-Depression 2 (R)	2298	1	4	1.84	2	2	0.77	0.55	0.05	-0.32	0.10
T-Anxiety 3	2298	1	4	2.35	2	2	0.91	0.26	0.05	-0.70	0.10
T-Curiosity 3	2298	1	4	2.79	3	3	0.81	-0.18	0.05	-0.53	0.10
T-Anger 3	2298	1	4	1.84	2	1	0.94	0.87	0.05	-0.25	0.10
T-Depression 3	2298	1	4	1.74	2	1	0.85	1.04	0.05	0.40	0.10
T-Anxiety 4	2298	1	4	2.13	2	1	1.08	0.55	0.05	-0.97	0.10
T-Curiosity 4	2298	1	4	2.35	2	2	0.89	0.23	0.05	-0.67	0.10
T-Anger 4	2298	1	4	2.52	2	2	0.96	0.07	0.05	-0.95	0.10
T-Depression 4	2298	1	4	1.72	2	1	0.77	1.00	0.05	0.76	0.10

(table continues)

Table A1 Continued

Item Name	N	Minimum	Maximum	Mean	Median	Mode	SD	Skewness	S.E.	Kurtosis	S.E.
T-Anxiety 5	2298	1	4	1.58	1	1	0.78	1.37	0.05	1.48	0.10
T-Curiosity 5	2298	1	4	2.56	3	3	0.87	-0.11	0.05	-0.66	0.10
T-Anger 5	2298	1	4	2.56	2	2	0.97	0.03	0.05	-1.01	0.10
T-Depression 5	2298	1	4	1.57	1	1	0.77	1.35	0.05	1.42	0.10
T-Anxiety 6	2298	1	4	1.87	2	2	0.77	0.67	0.05	0.15	0.10
T-Curiosity 6	2298	1	4	2.15	2	2	0.86	0.38	0.05	-0.47	0.10
T-Anger 6	2298	1	4	1.55	1	1	0.75	1.33	0.05	1.33	0.10
T-Depression 6	2298	1	4	1.65	2	1	0.75	1.04	0.05	0.75	0.10
T-Anxiety 7 (R)	2298	1	4	2.14	2	2	0.82	0.31	0.05	-0.47	0.10
T-Curiosity 7	2298	1	4	2.63	3	3	0.80	-0.14	0.05	-0.44	0.10
T-Anger 7	2298	1	4	2.08	2	2	0.96	0.55	0.05	-0.65	0.10
T-Depression 7 (R)	2298	1	4	2.20	2	2	0.89	0.24	0.05	-0.76	0.10
T-Anxiety 8	2298	1	4	1.95	2	2	0.92	0.75	0.05	-0.24	0.10
T-Curiosity 8 (R)	2298	1	4	3.22	3	3	0.72	-0.76	0.05	0.64	0.10
T-Anger 8	2298	1	4	2.68	3	2	1.02	-0.10	0.05	-1.15	0.10
T-Depression 8 (R)	2298	1	4	2.07	2	2	0.88	0.36	0.05	-0.70	0.10

(table continues)

Table A1 Continued

Item Name	N	Minimum	Maximum	Mean	Median	Mode	SD	Skewness	S.E.	Kurtosis	S.E.
T-Anxiety 9	2298	1	4	1.74	2	2	0.76	0.84	0.05	0.37	0.10
T-Curiosity 9	2298	1	4	2.94	3	3	0.81	-0.36	0.05	-0.45	0.10
T-Anger 9	2298	1	4	1.59	1	1	0.89	1.42	0.05	1.02	0.10
T-Depression 9 (R)	2298	1	4	2.12	2	2	0.86	0.29	0.05	-0.69	0.10
T-Anxiety 10	2298	1	4	2.47	2	2	1.03	0.13	0.05	-1.13	0.10
T-Curiosity 10 (R)	2298	1	4	3.02	3	3	0.80	-0.64	0.05	0.16	0.10
T-Anger 10	2298	1	4	2.79	3	3	0.96	-0.19	0.05	-1.01	0.10
T-Depression 10 (R)	2298	1	4	1.68	2	1	0.79	0.90	0.05	-0.03	0.10

Note. S.E. = Standard Error. SD = Standard Deviation.
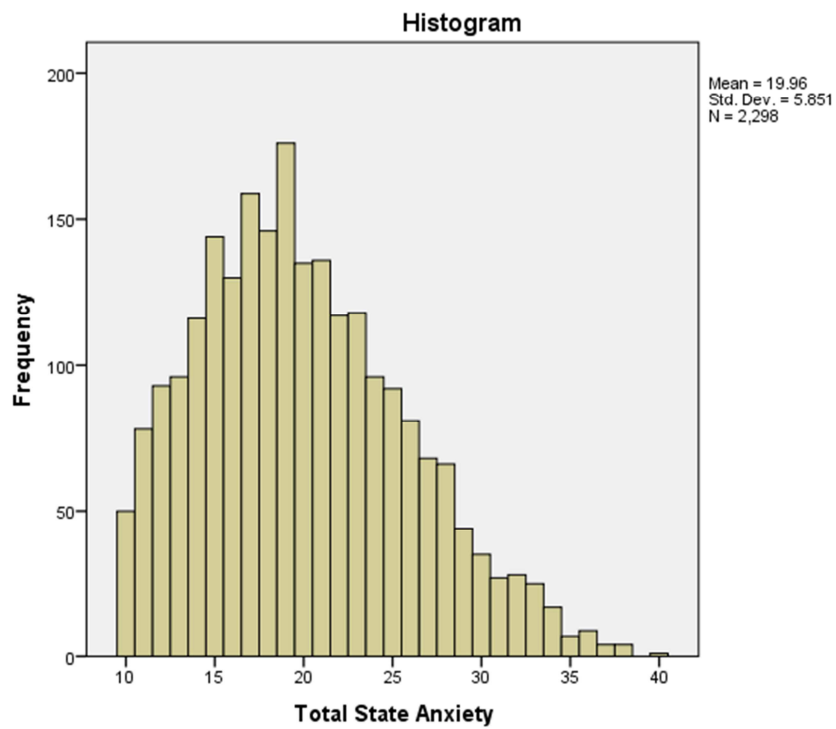
Figure A.2 Histogram to Assess Normality of State Anxiety
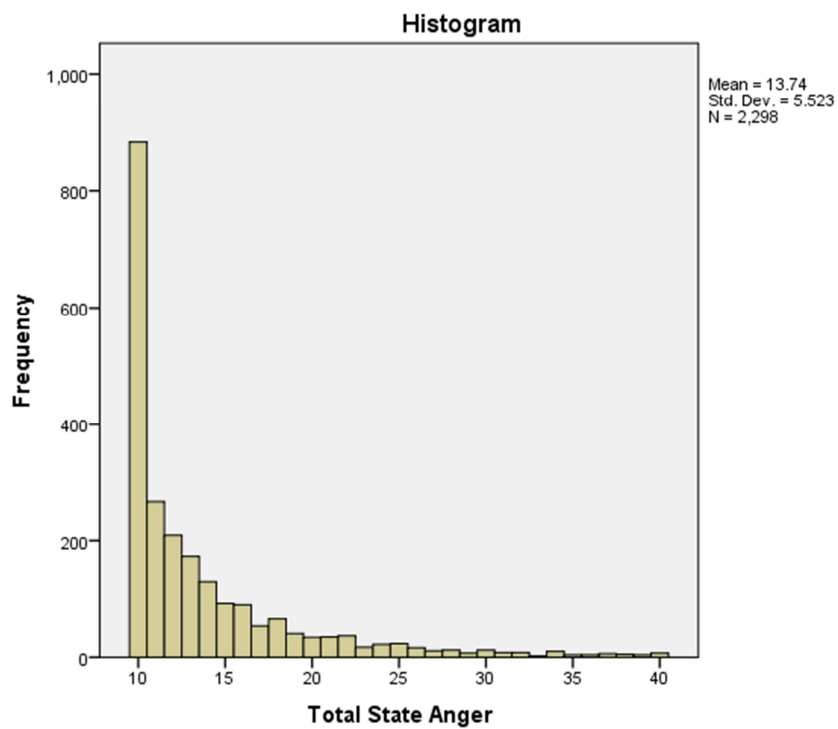
Figure A.3 Histogram to assess Normality of the State Anger Subscale
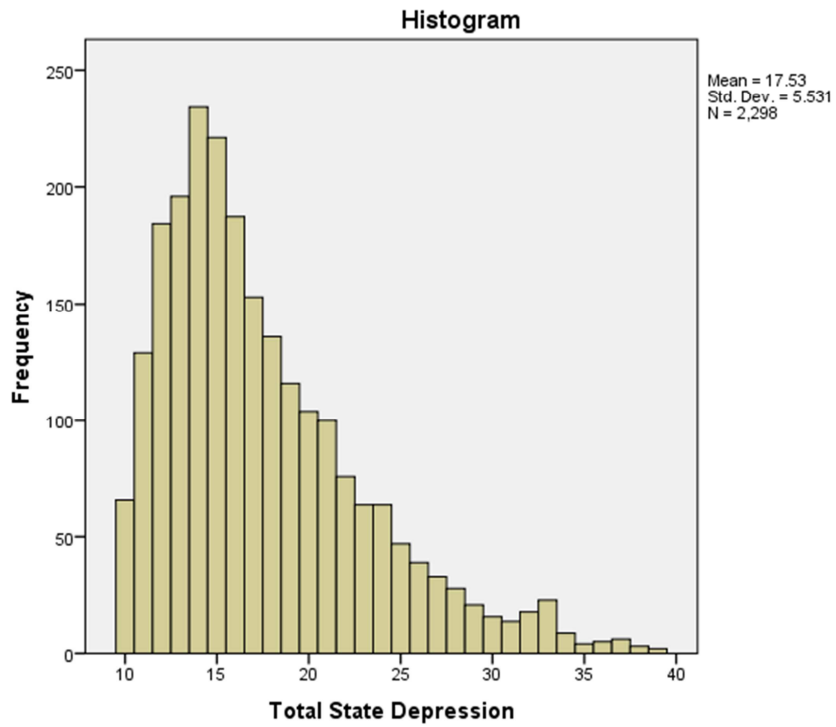
Figure A.4 Histogram to Assess Normality of the State Depression Subscale
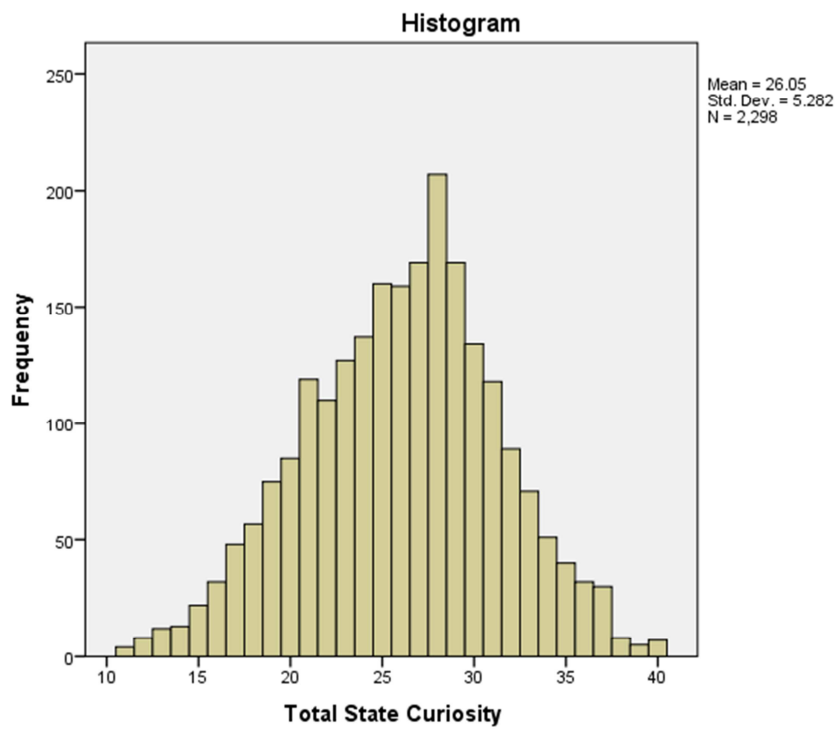
Figure A.5 Histogram to Assess Normality of the State Curiosity Subscale
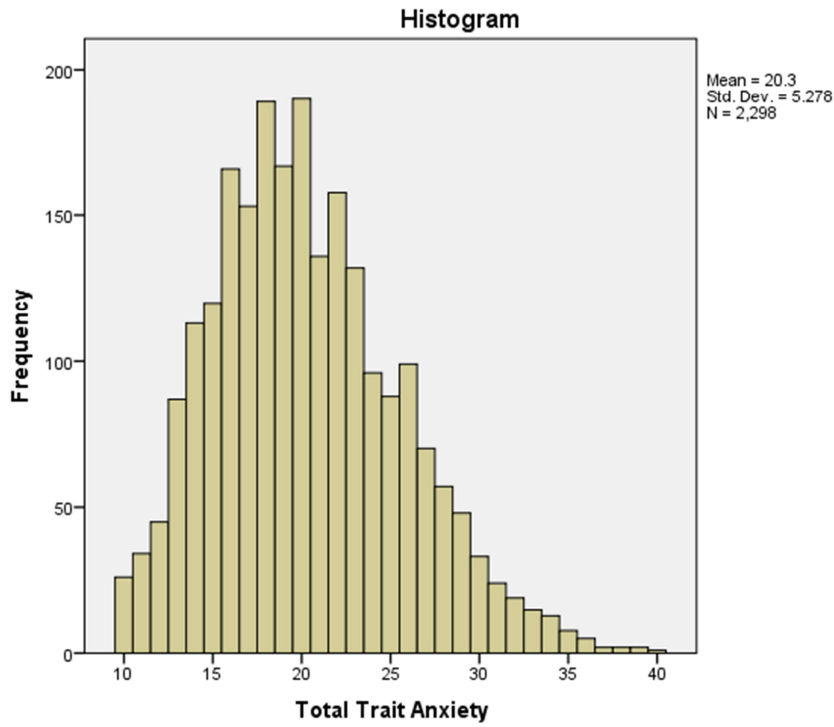
Figure A.6 Histogram to Assess Normality of the Trait Anxiety Subscale
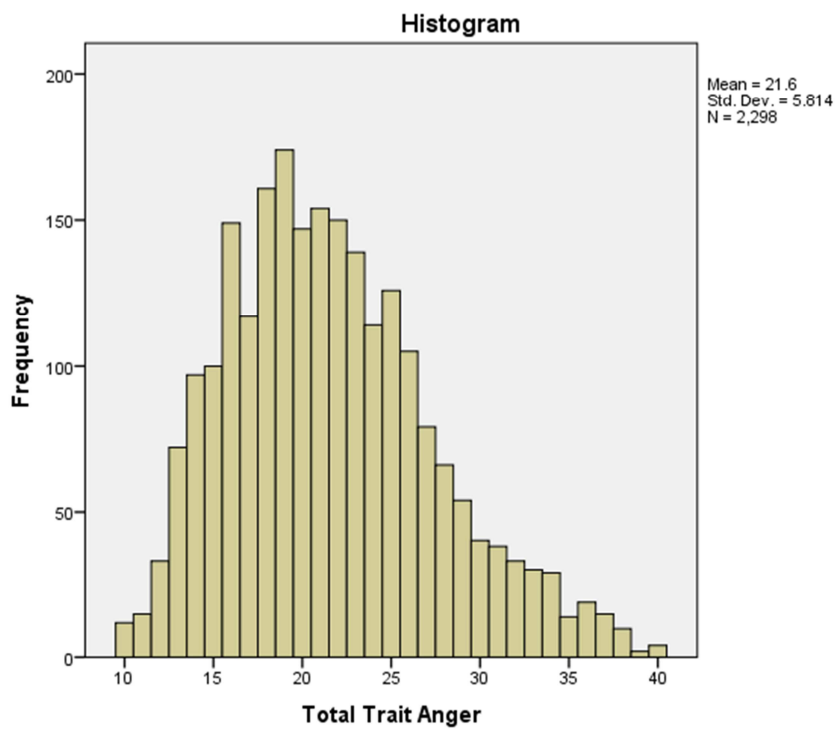
Figure A.7 Histogram to Assess Normality of the Trait Anger Subscale
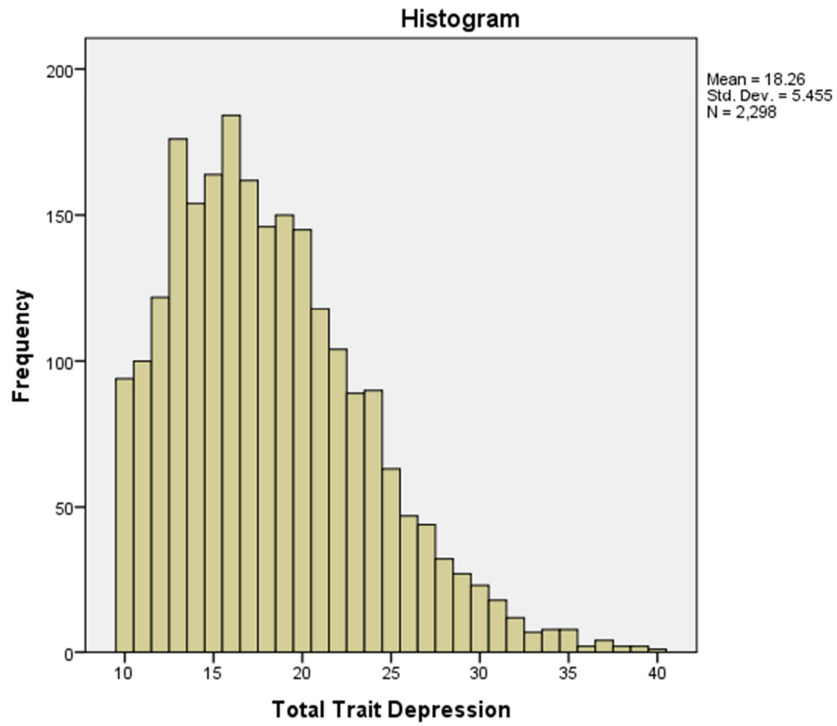
Figure A.8 Histogram to Assess Normality of the Trait Depression Subscale
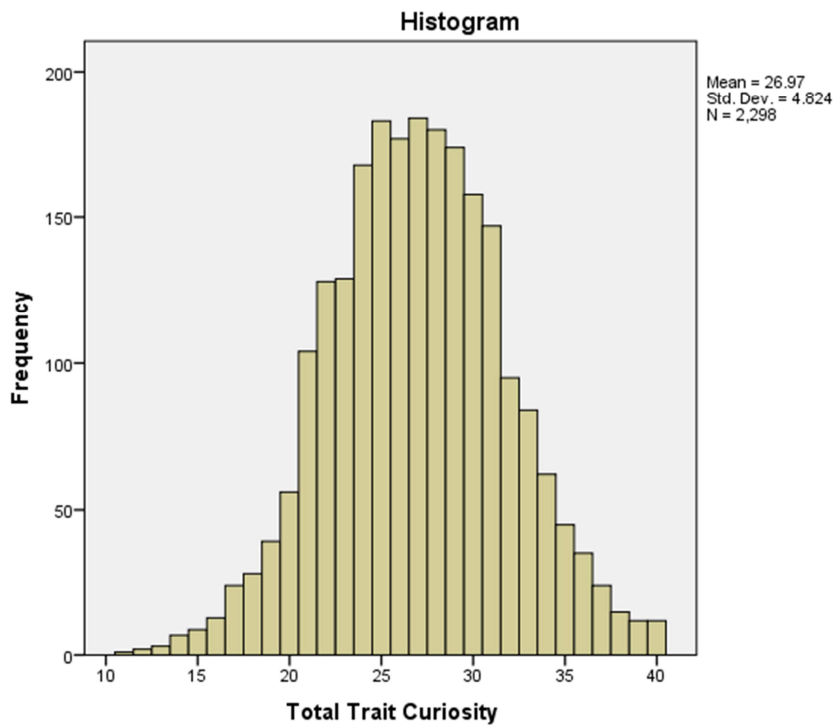
Figure A.9 Histogram to Assess Normality of the Trait Curiosity Subscale

APPENDIX B

Cronbach's Alpha if Deleted

Table B1

Cronbach's Alpha if Item Deleted

Item Name	Total Group	African	Indian/ Asian	Coloured	Caucasian	Male	Female
State Anxiety							
S-Anxiety 1	.82	.84	.82	.80	.81	.80	.85
S-Anxiety 2	.82	.84	.82	.80	.82	.78	.85
S-Anxiety 3 (R)	.82	.84	.82	.81	.81	.79	.85
S-Anxiety 4	.83	.84	.83	.81	.82	.81	.86
S-Anxiety 5	.82	.84	.82	.80	.81	.81	.85
S-Anxiety 6	.84	.83	.81	.82	.83	.83	.86
S-Anxiety 8	.81	.83	.81	.79	.81	.78	.85
S-Anxiety 7 (R)	.82	.85	.84	.79	.81	.79	.85
S-Anxiety 9 (R)	.84	.85	.83	.83	.83	.82	.87
S-Anxiety 10	.83	.85	.83	.81	.83	.80	.87
State Anger							
S-Anger 1	.90	.90	.89	.89	.89	.90	.90
S- Anger 2	.89	.90	.89	.89	.89	.90	.90
S-Anger 3	.89	.90	.88	.88	.88	.90	.89
S-Anger 4	.89	.90	.88	.88	.89	.91	.89
S-Anger 5	.89	.89	.89	.88	.88	.90	.89
S-Anger 6	.89	.90	.89	.88	.89	.92	.89
S-Anger 7	.89	.90	.89	.89	.88	.91	.90
S-Anger 8	.89	.90	.88	.88	.88	.90	.89
S-Anger 9	.89	.90	.89	.88	.88	.91	.90
S-Anger 10	.90	.90	.89	.89	.88	.91	.90

(table continues)

Table B1 Continued

Item Name	Total Group	African	Indian/ Asian	Coloured	Caucasian	Male	Female
State Depression							
S-Depression 1 (R)	.83	.84	.83	.82	.84	.81	.85
S-Depression 2	.82	.82	.82	.81	.82	.79	.84
S-Depression 3	.81	.81	.81	.80	.82	.78	.83
S-Depression 4	.81	.81	.81	.80	.82	.78	.83
S-Depression 5 (R)	.81	.82	.81	.80	.83	.79	.84
S-Depression 6	.81	.81	.81	.80	.81	.78	.83
S-Depression 7 (R)	.84	.84	.83	.82	.84	.82	.86
S-Depression 8	.83	.82	.83	.83	.82	.81	.84
S-Depression 9 (R)	.83	.83	.83	.82	.85	.81	.85
S-Depression 10 (R)	.83	.83	.83	.82	.84	.80	.85
State Curiosity							
S-Curiosity 1	.76	.75	.76	.73	.69	.79	.80
S-Curiosity 2	.73	.72	.73	.70	.68	.75	.77
S-Curiosity 3	.71	.70	.71	.67	.66	.72	.76
S-Curiosity 4	.73	.72	.73	.70	.68	.75	.77
S-Curiosity 5	.73	.72	.73	.69	.70	.74	.77
S-Curiosity 6	.73	.72	.73	.69	.68	.74	.78
S-Curiosity 7	.73	.72	.73	.68	.70	.75	.77
S-Curiosity 8 (R)	.77	.77	.77	.73	.75	.79	.82
S-Curiosity 9	.72	.71	.73	.68	.69	.74	.77
S-Curiosity 10 (R)	.75	.74	.75	.71	.74	.77	.79
Trait Anxiety							
T-Anxiety 1 (R)	.80	.80	.80	.80	.81	.74	.82
T-Anxiety 2 (R)	.79	.79	.79	.78	.79	.71	.81
T-Anxiety 3	.79	.79	.79	.79	.79	.73	.81
T-Anxiety 4	.79	.79	.79	.78	.77	.72	.81
T-Anxiety 5	.78	.78	.78	.77	.77	.70	.81

(table continues)

Table B1 Continued

Item Name	Total Group	African	Indian/ Asian	Coloured	Caucasian	Male	Female
Trait Anxiety							
T-Anxiety 6	.79	.79	.79	.77	.80	.73	.82
T-Anxiety 7 (R)	.80	.80	.80	.79	.80	.74	.82
T-Anxiety 8	.78	.79	.78	.77	.77	.70	.81
T-Anxiety 9	.79	.79	.79	.78	.78	.70	.82
T-Anxiety 10	.80	.80	.80	.79	.80	.75	.83
Trait Anger							
T-Anger 1	.80	.79	.80	.78	.83	.77	.82
T-Anger 2	.79	.79	.80	.77	.83	.77	.81
T-Anger 3	.80	.80	.80	.79	.83	.78	.82
T-Anger 4	.81	.81	.82	.79	.85	.78	.84
T-Anger 5	.81	.81	.81	.79	.84	.79	.84
T-Anger 6	.81	.80	.81	.79	.84	.78	.83
T-Anger 7	.80	.80	.81	.78	.83	.76	.83
T-Anger 8	.82	.81	.82	.79	.85	.79	.84
T-Anger 9	.81	.80	.81	.78	.83	.78	.84
T-Anger 10	.81	.81	.81	.79	.84	.78	.84
Trait Depression							
T-Depression 1	.87	.86	.87	.86	.87	.78	.88
T-Depression 2 (R)	.86	.85	.86	.84	.87	.76	.88
T-Depression 3	.85	.84	.85	.83	.86	.75	.88
T-Depression 4	.85	.85	.86	.84	.87	.77	.88
T-Depression 5	.86	.85	.86	.84	.87	.75	.88
T-Depression 6	.85	.85	.86	.84	.87	.76	.88
T-Depression 7 (R)	.86	.86	.86	.85	.87	.77	.88
T-Depression 8 (R)	.87	.86	.87	.85	.87	.79	.89
T-Depression 9 (R)	.86	.86	.86	.84	.88	.76	.89
T-Depression 10 (R)	.85	.85	.86	.84	.87	.76	.88

(table continues)

Item Name	Total Group	African	Indian/ Asian	Coloured	Caucasian	Male	Female
Table B1 Continued							
			Trait Curiosity				
T-Curiosity 1	.75	.75	.75	.69	.76	.68	.81
T-Curiosity 2	.74	.74	.75	.69	.75	.70	.80
T-Curiosity 3	.74	.74	.74	.67	.75	.69	.80
T-Curiosity 4	.75	.75	.75	.70	.75	.69	.81
T-Curiosity 5	.75	.74	.75	.69	.74	.71	.80
T-Curiosity 6	.77	.77	.77	.72	.77	.72	.82
T-Curiosity 7	.75	.75	.75	.69	.76	.69	.81
T-Curiosity 8 (R)	.78	.78	.78	.72	.78	.73	.83
T-Curiosity 9	.75	.76	.75	.69	.76	.70	.81
T-Curiosity 10 (R)	.79	.79	.79	.74	.81	.78	.84

Note. N = 2298. African: n = 1017; Indian/Asian n = 152; Coloured: n = 105; Caucasian: n = 1006; Male: n = 572;

Female: n = 1722

APPENDIX C

FOURTEEN FACTOR SOLUTION

Table C.1

Pattern Matrix of the exploratory eight factor solution for the STPI-Y

Item	Factor														h2
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
S-Depression 8	**0.63**	-0.02	0.15	0.03	0.01	0.07	-0.03	-0.02	0.04	-0.01	0.11	0.07	-0.07	-0.06	0.53
S-Depression 6	**0.52**	0	0.03	0	0.07	0.08	-0.03	0.08	0.02	0.03	-0.07	-0.04	0.26	0.1	0.67
T-Depression 1	**0.48**	0	0.08	0.16	0.07	0.02	-0.03	-0.03	0.21	-0.04	0.07	0.03	-0.13	-0.12	0.45
S-Depression 4	**0.47**	0.04	0.04	-0.01	0.04	0.13	-0.06	0.09	0.05	-0.01	0.01	-0.01	0.18	0.08	0.60
S-Depression 3	**0.40**	0.03	0.04	0.02	0.03	0.14	-0.09	0.03	0.06	0.04	-0.05	-0.04	0.3	0.08	0.64
S-Depression 2	*0.39*	0.03	0.13	-0.04	0.00	0.12	-0.02	0.04	0.06	0.08	0.08	0.00	0.14	0.02	0.46
S-Curiosity 4	-0.03	**0.70**	0.07	-0.02	0.01	0.04	-0.02	-0.01	-0.06	-0.14	-0.08	-0.02	-0.02	0.12	0.54
T-Curiosity 4	0.03	**0.64**	-0.01	0.03	-0.01	-0.07	0.01	0.00	0.03	0.23	-0.15	0.03	-0.04	-0.01	0.53
S-Curiosity 2	-0.02	**0.60**	0.00	0.01	0.06	0.08	-0.03	-0.01	-0.05	-0.19	0.05	0.11	0.03	0.01	0.49
T-Curiosity 6	0.00	**0.60**	0.03	0.03	-0.08	-0.01	-0.04	0.00	0.11	0.09	0.10	0.03	0.03	-0.08	0.41
T-Curiosity 2	0.04	**0.50**	-0.09	0.04	-0.04	0.01	-0.01	0.07	-0.03	0.13	-0.08	0.19	0.00	-0.09	0.47
S-Curiosity 1	0.01	**0.50**	0.05	-0.02	-0.03	0.04	0.01	0.00	0.01	-0.06	0.18	0.00	0.07	-0.03	0.27
S-Anger 8	0.00	0.03	**0.82**	0.00	0.01	-0.02	0.00	0.01	0.01	0.01	0.01	-0.02	0.02	0.00	0.70

(table continues)

Table C1 Continues

Item	Factor														h2
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
S-Anger 4	0.05	0.02	**0.80**	0.00	-0.01	0.03	0.00	0.02	-0.05	-0.04	0.00	-0.02	0.00	0.03	0.68
S-Anger 5	0.03	-0.03	**0.66**	0.01	0.03	0.02	0.01	-0.02	0.05	0.05	-0.02	0.04	0.13	-0.01	0.59
S-Anger 10	0.01	0.00	**0.49**	0.05	0.05	0.00	-0.15	0.07	0.06	0.00	-0.04	0.03	0.05	-0.02	0.44
S-Anger 2	-0.02	0.00	**0.49**	0.02	0.04	0.06	0.01	0.00	0.02	-0.01	0.03	0.02	0.23	0.00	0.45
T-Anger 9	-0.07	0.00	**0.42**	0.31	0.07	-0.11	-0.02	0.13	0.11	0.05	0.00	-0.01	-0.13	-0.04	0.44
T-Anger 2	-0.01	0.02	0.02	**0.84**	-0.01	-0.02	0.02	0.00	-0.01	0.01	-0.01	-0.01	0.03	0.01	0.71
T-Anger 1	0.01	-0.04	-0.06	**0.83**	0.01	0.05	-0.01	0.00	-0.06	-0.02	-0.04	0.01	0.02	0.04	0.66
T-Anger 3	0.04	0.01	0.01	**0.65**	-0.02	0.00	-0.01	0.03	-0.01	-0.02	0.07	0.02	0.03	-0.07	0.47
T-Anger 7	-0.09	0.04	0.13	**0.41**	0.03	-0.06	-0.03	0.24	0.01	0.03	-0.04	-0.05	-0.06	0.05	0.37
T-Anger 6	-0.02	0.10	0.16	**0.38**	-0.01	0.00	-0.10	0.05	0.14	0.04	0.10	0.02	-0.04	-0.15	0.36
T-Depression 8 (R)	-0.01	-0.02	0.00	0.00	**0.86**	-0.02	-0.02	0.02	0.01	-0.01	-0.05	0.01	-0.02	-0.03	0.68
T-Anxiety 7 (R)	0.02	-0.02	-0.01	0.01	**0.70**	-0.02	0.00	-0.02	0.02	-0.04	0.09	0.00	0.02	0.01	0.56
S-Depression 7 (R)	-0.01	0.03	0.08	-0.03	**0.65**	0.06	-0.01	0.00	-0.08	0.10	-0.03	0.00	0.00	-0.01	0.43
T-Depression 9 (R)	-0.08	-0.01	0.02	0.15	0.29	0.05	-0.02	0.03	0.09	0.05	0.03	-0.08	0.06	0.28	0.45
T-Depression 7 (R)	0.07	0.02	-0.03	0.02	0.28	-0.02	0.05	0.07	0.14	-0.07	0.26	-0.02	0.04	0.20	0.43
S-Anxiety 5	0.00	0.04	0.03	0.01	0.03	**0.64**	-0.05	0.00	0.04	-0.05	0.00	-0.01	-0.01	-0.02	0.47
S-Anxiety 8	0.19	0.04	0.01	-0.02	0.06	**0.59**	-0.06	0.11	0.00	-0.01	-0.07	-0.04	0.01	0.06	0.61
S-Anxiety 2	0.02	-0.03	0.01	0.09	-0.03	**0.55**	0.02	-0.01	0.03	0.07	0.02	-0.03	0.18	-0.04	0.47

(table continues)

Table C1 Continues

Item	Factor														h2
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
S-Anxiety 6	0.05	-0.02	0.15	0.05	-0.01	**0.43**	0.01	-0.06	0.12	0.00	0.03	0.06	-0.06	-0.09	0.27
T-Anxiety 6	-0.02	0.01	0.03	0.12	-0.01	**0.43**	-0.09	0.02	0.34	0.04	0.00	-0.02	-0.08	-0.01	0.49
S-Anxiety 4	0.16	0.08	0.02	0.04	0.03	**0.42**	-0.04	0.18	-0.02	-0.09	-0.03	-0.02	-0.03	0.13	0.43
S-Anxiety 7 (R)	0.02	-0.01	-0.03	0.03	0.17	*0.39*	0.03	0.02	-0.04	0.29	0.15	-0.03	0.11	0.11	0.56
S-Anxiety 1 (R)	-0.06	-0.01	0.03	0.06	0.14	*0.34*	0.05	0.03	0.04	0.24	0.16	-0.03	0.15	0.05	0.46
S-Anxiety 10	0.14	0.04	0.09	0.00	0.12	*0.32*	-0.11	-0.02	0.03	-0.10	0.00	0.05	0.12	-0.06	0.36
T-Anxiety 3	0.11	0.02	0.02	0.16	0.04	0.28	0.08	0.22	0.13	-0.06	0.04	-0.01	-0.11	0.05	0.36
T-Anxiety 10	-0.08	0.03	0	0.14	-0.11	0.27	0.02	0.24	0.17	0.01	-0.01	-0.04	-0.06	0.18	0.32
S-Curiosity 8 (R)	0.00	-0.06	0.02	-0.01	-0.04	0.00	**0.65**	-0.03	0.09	0.05	0.00	-0.04	-0.04	0.02	0.42
S-Curiosity 10 (R)	-0.08	0.05	-0.08	0.00	0.04	-0.06	**0.57**	-0.02	0.00	-0.04	0.02	-0.01	-0.04	-0.03	0.46
T-Curiosity 10 (R)	0.04	-0.11	0.01	-0.01	-0.06	0.05	**0.57**	-0.05	-0.16	0.00	0.00	0.03	0.00	0.09	0.40
T-Curiosity 8 (R)	0.05	0.03	0.00	-0.04	-0.02	-0.03	**0.47**	-0.04	-0.28	0.01	0.04	0.04	0.02	0.02	0.41
S-Curiosity 7	-0.08	0.08	-0.04	-0.02	-0.01	-0.03	0.29	0.01	0.08	-0.23	-0.19	0.06	0.05	-0.28	0.47
S-Anger 9	0.08	0.00	0.21	0.04	0.00	0.16	-0.28	0.04	-0.01	0.08	0.04	0.01	0.27	-0.07	0.54
T-Anger 10	-0.02	-0.01	0.00	-0.03	-0.01	-0.02	-0.02	**0.73**	-0.04	-0.01	-0.01	0.01	0.01	0.01	0.48
T-Anger 5	-0.01	0.01	0.05	-0.02	-0.01	-0.06	-0.03	**0.65**	0.00	0.01	-0.01	0.03	0.00	-0.05	0.42
T-Anger 8	0.03	-0.04	-0.07	0.07	0.03	0.05	0.05	**0.56**	0.04	-0.07	0.06	-0.04	-0.02	0.00	0.39
T-Anger 4	-0.05	-0.02	0.03	0.10	0.02	0.02	-0.01	**0.50**	-0.02	0.05	-0.05	0.03	0.01	-0.06	0.32

(table continues)

Table C1 Continues

Item	Factor														h2
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
T-Anxiety 5	-0.01	-0.03	0.10	-0.05	0.06	0.07	-0.02	0.08	**0.62**	0.00	-0.01	0.00	0.04	0.06	0.57
T-Depression 5	0.08	-0.01	0.05	0.01	0.05	0.05	-0.10	0.03	**0.57**	0.00	0.00	-0.01	0.05	0.04	0.57
T-Depression 6	0.22	0.03	0.00	0.05	0.05	0.02	-0.07	0.01	**0.51**	0.04	0.01	-0.06	0.05	0.02	0.57
T-Anxiety 9	0.00	0.02	0.04	-0.04	0.07	0.07	-0.02	0.09	**0.48**	-0.01	0.09	0.06	0.01	0.04	0.38
T-Anxiety 8	-0.08	0.03	0.00	-0.03	0.01	0.16	-0.08	0.07	**0.42**	-0.02	0.06	0.01	-0.02	0.18	0.37
T-Depression 4	0.33	0.02	-0.06	0.09	0.04	-0.02	-0.08	0.02	**0.42**	0.05	-0.07	-0.07	0.12	0.07	0.59
T-Depression 3	0.28	0.03	-0.03	0.14	0.09	0.01	-0.09	0.02	**0.41**	-0.03	-0.02	-0.03	0.05	0.08	0.59
T-Anxiety 4	0.18	0.05	-0.06	0.02	0.07	0.08	0.01	0.19	*0.32*	-0.17	0.11	-0.02	0.05	0.05	0.43
S-Curiosity 3	0.04	0.28	-0.10	-0.01	-0.02	-0.09	0.19	0.01	0.04	*-0.35*	-0.03	0.17	0.03	-0.15	0.54
S-Depression 1 (R)	0.06	-0.01	0.02	-0.07	0.01	0.09	-0.08	0.01	0.06	*0.30*	0.13	-0.10	-0.06	0.24	0.36
S-Anxiety 9 (R)	0.06	0.02	-0.01	-0.01	0.20	0.05	0.03	-0.01	0.00	0.07	**0.45**	-0.09	0.04	0.01	0.40
S-Curiosity 9	-0.07	0.21	-0.04	0.03	0.07	0.05	0.07	-0.02	0.03	-0.15	**-0.43**	0.17	0.03	-0.04	0.48
T-Curiosity 5	-0.02	0.28	-0.04	0.01	-0.01	0.04	0.05	0.06	-0.01	0.18	**-0.40**	0.15	0.00	-0.07	0.46
T-Anxiety 1 (R)	0.00	0.09	0.02	0.07	0.17	0.03	0.00	-0.02	0.10	-0.13	*0.33*	-0.09	-0.04	0.11	0.32
T-Curiosity 7	-0.04	0.14	0.04	0.01	-0.23	0.02	0.16	-0.04	0.07	0.11	*-0.30*	0.08	0.02	-0.18	0.45
S-Anxiety 3 (R)	0.01	-0.04	-0.06	0.02	0.13	0.28	0.05	0.05	0.06	0.23	*0.30*	-0.07	0.22	-0.06	0.51
S-Curiosity 6	-0.11	0.07	0.04	0.00	-0.01	0.06	0.15	-0.09	0.11	-0.18	-0.29	0.15	0.01	-0.15	0.37

(table continues)

Table C1 Continued

Item	Factor														h2
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
T-Curiosity 1	0.02	-0.02	-0.03	-0.01	-0.02	-0.02	0.00	0.01	0.01	0.15	-0.02	**0.86**	0.00	0.01	0.71
S-Curiosity 5	0.00	0.05	0.04	0.01	0.04	0.02	-0.02	0.00	0.00	-0.19	0.03	**0.76**	0.02	0.06	0.64
S-Anger 3	0.04	-0.01	0.16	0.08	0.01	0.02	-0.05	0.02	0.04	0.00	-0.04	0.03	**0.69**	0.04	0.73
S-Anger 1	-0.01	0.04	0.13	0.08	0.04	0.00	-0.04	0.01	0.04	-0.06	0.10	0.01	**0.57**	-0.09	0.50
S-Anger 6	0.11	0.03	0.34	0.05	0.00	0.02	-0.04	0.01	0.00	0.06	-0.02	-0.03	*0.39*	0.04	0.56
S-Anger 7	0.09	-0.03	0.2	0.08	0.01	0.22	-0.18	0.07	-0.01	0.06	0.01	-0.01	0.25	-0.04	0.51
T-Anxiety 2 (R)	-0.09	0.02	0.05	0.04	0.10	0.06	0.03	-0.02	0.24	0.04	0.10	0.01	-0.01	**0.50**	0.50
T-Depression 2 (R)	0.13	0.03	-0.02	0.05	0.18	0.02	-0.05	-0.01	0.16	-0.02	0.05	-0.05	0.06	*0.39*	0.51
T-Depression 10 (R)	0.10	0.03	-0.06	0.03	0.18	-0.02	0.00	0.01	0.26	-0.05	0.07	-0.07	0.09	*0.37*	0.53
T-Curiosity 9	0.02	0.12	-0.03	-0.05	-0.12	0.03	0.27	0.02	0.01	0.02	-0.16	0.00	0.00	*-0.33*	0.42
S-Depression 5 (R)	0.20	-0.02	0.06	0.01	0.12	0.02	-0.02	-0.03	0.04	0.31	0.02	-0.09	0.05	*0.32*	0.53
S-Depression 10 (R)	0.00	0.01	0.12	-0.03	0.07	0.02	0.01	0.00	0.18	0.17	0.06	-0.11	-0.05	*0.31*	0.35
T-Curiosity 3	0.10	0.28	-0.07	-0.03	-0.10	-0.02	0.22	0.09	0.01	0.00	-0.01	0.20	0.02	-0.29	0.50
S-Depression 9 (R)	0.04	0.05	0.11	0.00	0.21	0.11	-0.02	-0.01	0.07	0.20	0.02	-0.02	-0.10	0.25	0.33

Note. Facets with factor loadings above 0.40 are printed in boldface, and facets with loadings of above 0.30 are printed in italics. R = Reverse-scored item. h2 =

Communalities

APPENDIX D

DIFFERENTIAL ITEM FUNCTIONING

D.1 Differential Item Functioning Gender Comparison Tables and Plots

Table D.1

Differential Item Functioning across Gender Groups for State Anxiety

Item	Men		Women		DIF Contrast	χ^2	*df*	p
	Difficulty	S.E.	Difficulty	S.E.				
S-Anxiety (R) 1	0	-0.02	0.03	0.03	0.07	0.1706	1	0.68
S-Anxiety 2	-0.07	0.03	0.03	-0.10	0.07	2.1811	1	0.14
S-Anxiety (R) 3	-0.48	-0.48	0.03	0.00	0.07	0	1	1
S-Anxiety 4	-0.62	-0.62	0.03	0.00	0.07	0	1	1
S-Anxiety 5	0.3	0.3	0.04	0.00	0.07	0	1	1
S-Anxiety 6	0.72	0.95	0.04	-0.22	0.08	7.8019*	1	0.01
S-Anxiety (R) 7	-0.31	-0.45	0.03	0.14	0.07	4.4333*	1	0.04
S-Anxiety 8	-0.13	-0.29	0.03	0.16	0.07	5.2519*	1	0.02
S-Anxiety (R) 9	-0.9	-0.9	0.03	0.00	0.07	0	1	1
S-Anxiety 10	1.42	1.55	0.05	-0.13	0.09	1.7865	1	0.18

Note. S.E. = Standard Error. * Statistically significant values at $p < 0.05$.

Figure D.1 Differential Item Functioning Across Gender Groups for State Anxiety

Table D.2

Differential Item Functioning Across Gender Groups for State Anger

Items	Men		Women		DIF Contrast	χ^2	*df*	*p*
	Difficulty	S.E.	Difficulty	S.E.				
S-Anger 1	0.09	0.15	0.05	-0.06	0.10	0.501	1	0.48
S-Anger 2	0.13	0.25	0.05	-0.12	0.10	1.5124	1	0.22
S-Anger 3	0.18	0.00	0.05	0.19	0.10	3.7008	1	0.05
S-Anger 4	0.00	0.20	0.05	-0.20	0.10	4.2736*	1	0.04
S-Anger 5	0.12	0.53	0.06	-0.40	0.10	16.2033*	1	0.00
S-Anger 6	0.6	0.28	0.05	0.32	0.11	8.5177*	1	0.00
S-Anger 7	-0.66	-0.98	0.04	0.32	0.08	15.7761*	1	0.00
S-Anger 8	0.46	0.51	0.06	-0.05	0.11	0.2615	1	0.61
S-Anger 9	-0.6	-0.77	0.04	0.17	0.08	4.333*	1	0.04
S-Anger 10	-0.43	-0.12	0.05	-0.31	0.09	12.4494*	1	0.00

Note. S.E. = Standard Error. * Statistically significant values at $p < 0.05$.

Figure D.10 Differential Item Functioning Across Gender Groups for State Anger

Table D.3

Differential Item Functioning Across Gender Groups for State Depression

Item	Men		Women		DIF Contrast	χ^2	*df*	*p*
	Difficulty	S.E.	Difficulty	S.E.				
S-Depression (R) 1	-0.9	0.06	-1.02	0.03	0.12	3.2019	1	0.07
S-Depression 2	0.39	0.07	0.44	0.04	-0.05	0.4156	1	0.52
S-Depression 3	0.6	0.07	0.62	0.04	-0.02	0.0871	1	0.77
S-Depression 4	0.2	0.07	0.31	0.04	-0.11	1.8736	1	0.17
S-Depression (R) 5	-0.06	0.06	-0.11	0.04	0.05	0.5044	1	0.48
S-Depression 6	0.57	0.07	0.44	0.04	0.13	2.3036	1	0.13
S-Depression (R) 7	-0.51	0.06	-0.46	0.03	-0.05	0.6189	1	0.43
S-Depression 8	0.26	0.07	0.5	0.04	-0.23	8.6795*	1	0
S-Depression (R) 9	-0.42	0.06	-0.65	0.03	0.23	11.5206*	1	0
S-Depression (R) 10	-0.19	0.06	-0.05	0.04	-0.14	3.5855	1	0.06

Note. S.E. = Standard Error. * Statistically significant values at $p < 0.05$.
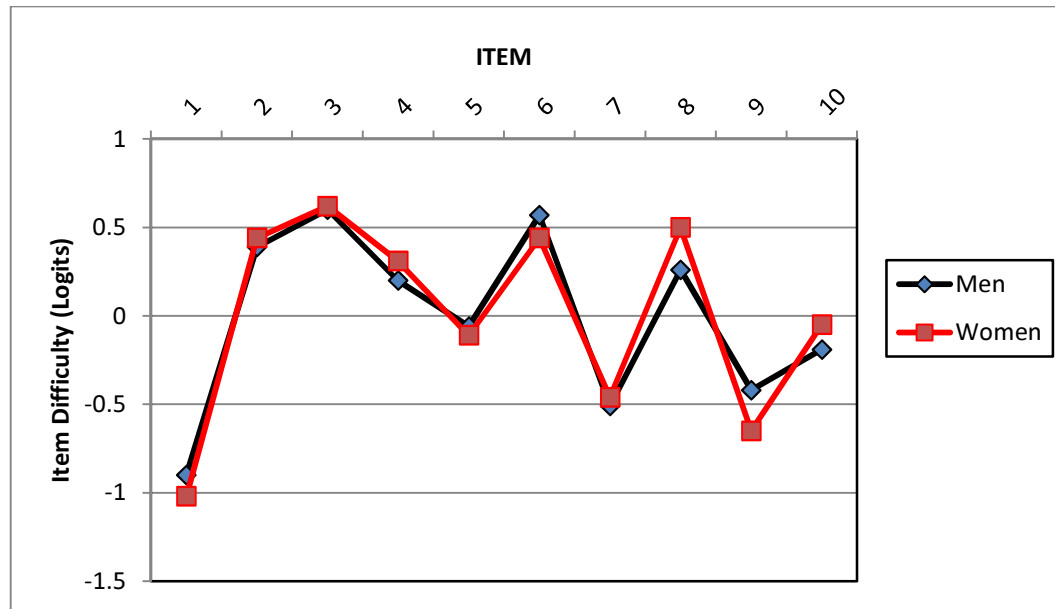
Figure D.11 Differential Item Functioning Across Gender Groups for State Depression

Table D.4

Differential Item Functioning Across Gender Groups for State Curiosity

Item	Men		Women		DIF Contrast	χ^2	*df*	*p*
	Difficulty	S.E.	Difficulty	S.E.				
S-Curiosity 1	0.7	0.05	0.75	0.03	-0.05	0.9128	1	0.34
S- Curiosity 2	0.1	0.05	0.20	0.03	-0.1	2.8746*	1	0
S-Curiosity 3	-0.28	0.05	-0.28	0.03	0	0	1	1
S-Curiosity 4	0.63	0.05	0.63	0.03	0	0	1	1
S-Curiosity 5	0.42	0.05	0.65	0.03	-0.23	14.0629*	1	0
S-Curiosity 6	0.44	0.05	0.44	0.03	0	0	1	1
S-Curiosity 7	-0.52	0.06	-0.36	0.03	-0.16	6.6763*	1	0.01
S-Curiosity (R) 8	-0.51	0.06	-0.83	0.03	0.31	23.3485*	1	0
S-Curiosity 9	0.23	0.05	0.23	0.03	0	0	1	1
S-Curiosity (R) 10	-1.11	0.06	-1.49	0.04	0.38	27.1194*	1	0

Note. S.E. = Standard Error. * Statistically significant values at $p < 0.05$.
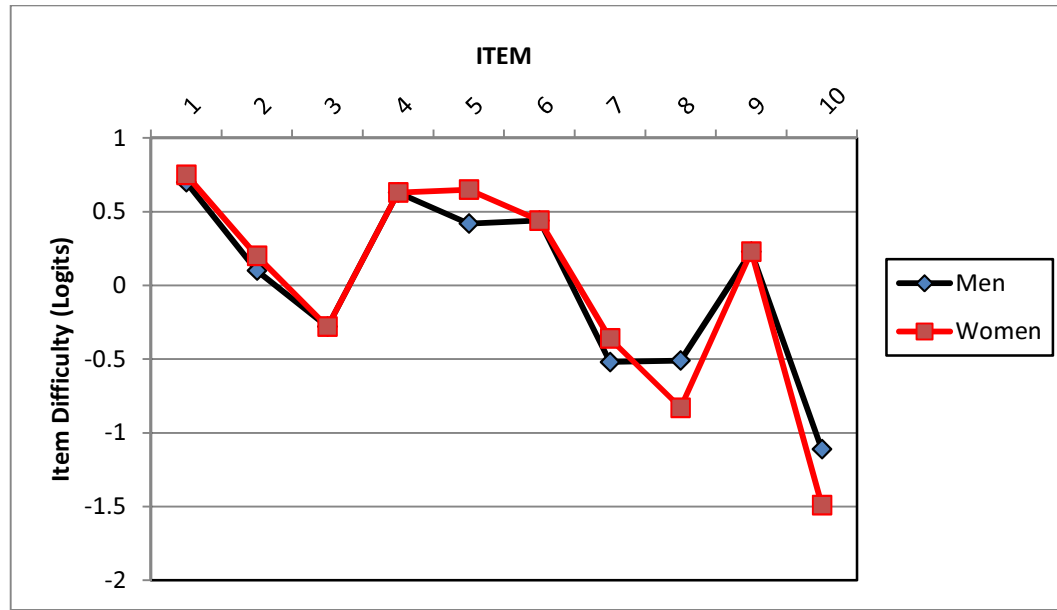
Figure D.12 Differential item functioning across gender groups for State Curiosity

Table D.5

Differential Item Functioning Across Gender Groups for Trait Anxiety

Item	Men		Women		DIF Contrast	χ^2	*df*	*p*
	Difficulty	S.E.	Difficulty	S.E.				
T-Anxiety (R) 1	-0.02	0.06	-0.02	0.03	0.00	0	1	1.00
T-Anxiety (R) 2	-0.28	0.06	-0.17	0.03	-0.11	2.3426	1	0.13
T-Anxiety 3	-0.62	0.06	-0.65	0.03	0.03	0.2218	1	0.64
T-Anxiety 4	-0.28	0.06	-0.18	0.03	-0.10	2.1932	1	0.14
T-Anxiety 5	1.12	0.08	1.07	0.04	0.04	0.35	1	0.55
T-Anxiety 6	0.29	0.06	0.33	0.04	-0.04	0.4558	1	0.50
T-Anxiety (R) 7	-0.35	0.06	-0.2	0.03	-0.16	5.2066*	1	0.02
T-Anxiety 8	0.12	0.06	0.12	0.04	0.00	0.00	1	1.00
T-Anxiety 9	0.59	0.07	0.62	0.04	-0.03	0.2229	1	0.64
T-Anxiety 10	-0.56	0.06	-0.94	0.03	0.38	32.2928*	1	0

Note. S.E. = Standard Error. * Statistically significant values at p < 0.05.
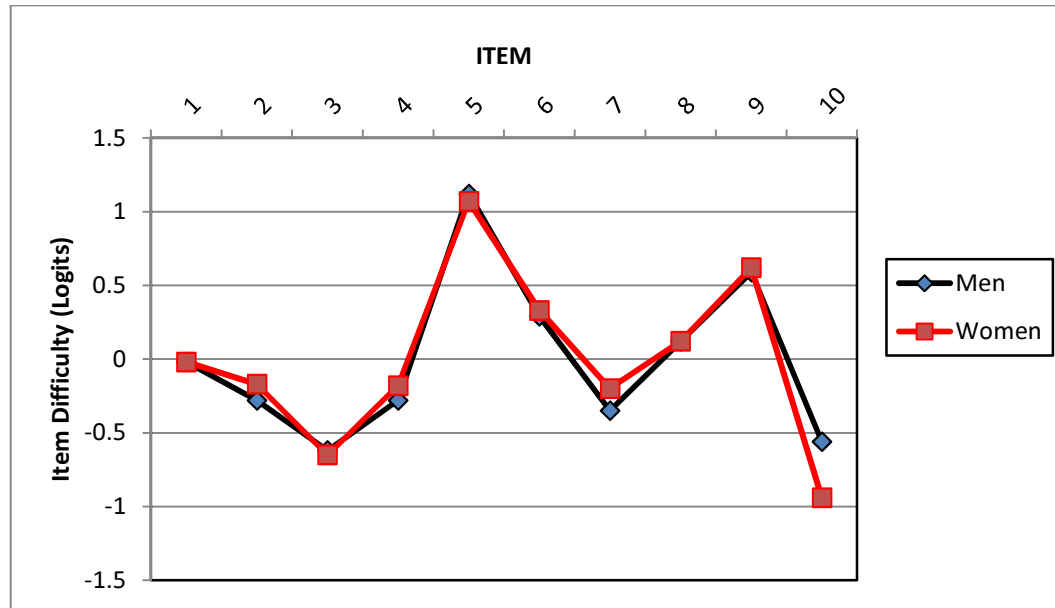
Figure D.5 Differential Item Functioning Across Gender Groups for Trait Anxiety

Table D.6

Differential Item Functioning Across Gender Groups for Trait Anger

Item	Men		Women		DIF Contrast	χ^2	*df*	*p*
	Difficulty	S.E.	Difficulty	S.E.				
T-Anger 1	0.02	0.06	-0.01	0.03	0.03	0.2735	1	0.60
T-Anger 2	0.45	0.06	0.48	0.03	-0.03	0.2234	1	0.64
T-Anger 3	0.6	0.06	0.56	0.03	0.04	0.455	1	0.50
T-Anger 4	-0.73	0.05	-0.68	0.03	-0.04	0.6879	1	0.41
T-Anger 5	-0.73	0.05	-0.73	0.03	0.00	0.00	1	1
T-Anger 6	1.03	0.07	1.31	0.04	-0.27	11.7477	1	0.00
T-Anger 7	0.07	0.06	0.07	0.03	0.00	0.00	1	1
T-Anger 8	-0.76	0.05	-1	0.03	0.24	14.4811*	1	0.00
T-Anger 9	0.97	0.07	1.19	0.04	-0.22	8.0857*	1	0.00
T-Anger 10	-1.05	0.05	-1.1	0.03	0.05	0.9365	1	0.33

Note. S.E. = Standard Error. * Statistically significant values at $p < 0.05$.
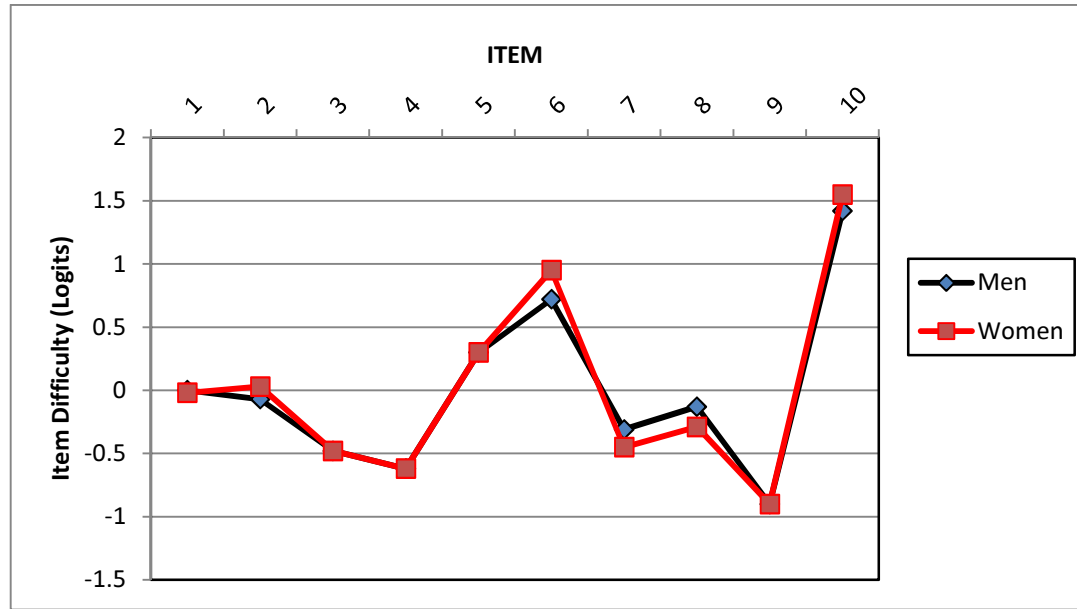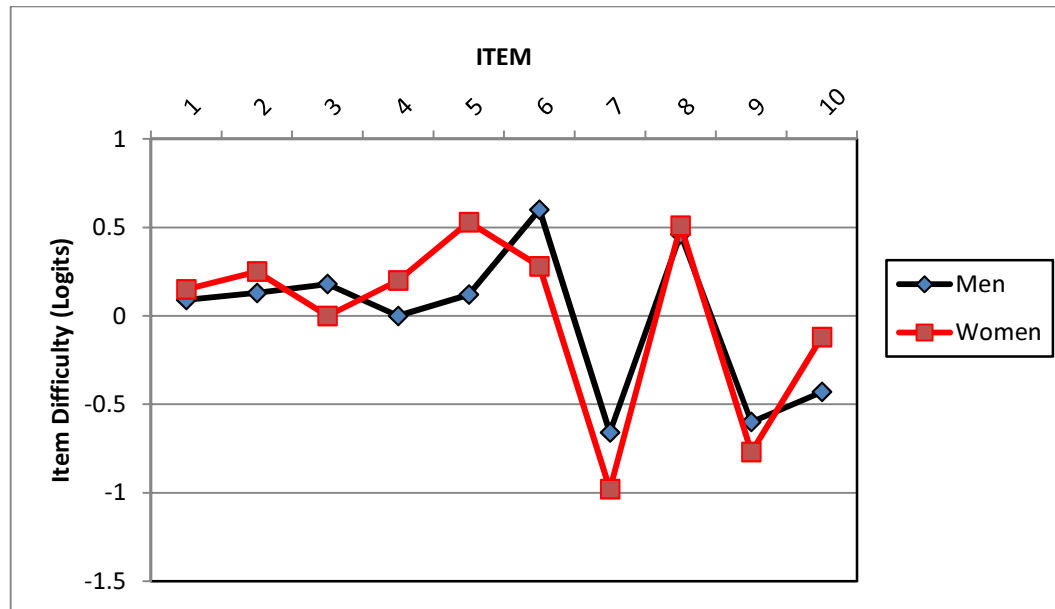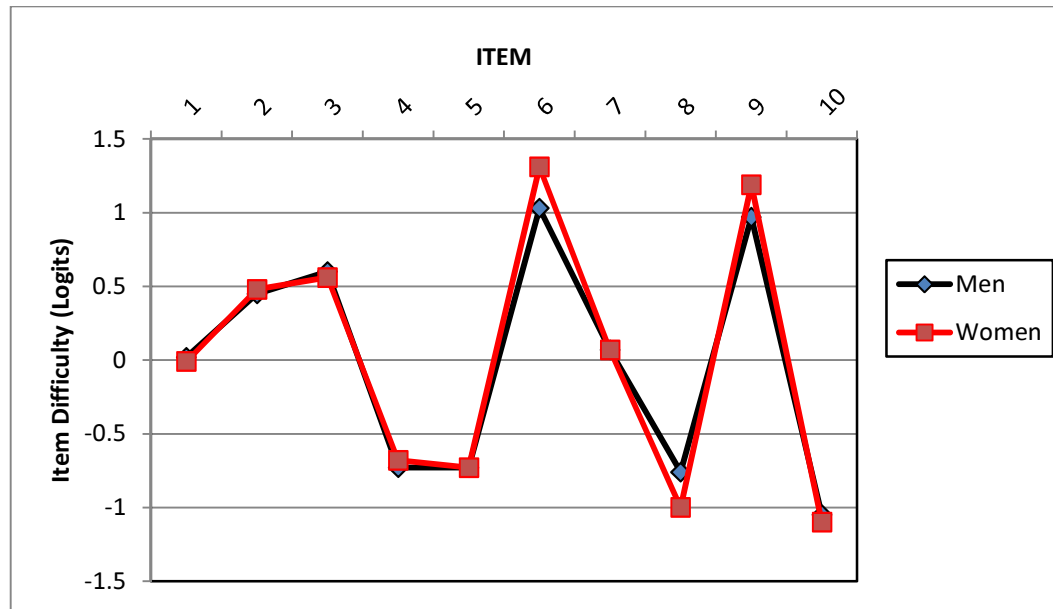
Figure D.6 Differential Item Functioning Across Gender Groups for Trait Anger

Table D.7

Differential Item Functioning Across Gender Groups for Trait Depression

Item	Men		Women		DIF Contrast	χ^2	*df*	*p*
	Difficulty	S.E.	Difficulty	S.E.				
T-Depression 1	0.34	0.08	0.44	0.04	-0.1	1.2417	1	0.27
T-Depression (R) 2	-0.06	0.07	0.24	0.04	-0.31	12.7439*	1	0.00
T-Depression 3	0.15	0.07	-0.01	0.04	0.17	4.1038*	1	0.04
T-Depression 4	0.41	0.08	0.13	0.04	0.27	9.4643*	1	0.00
T-Depression 5	0.58	0.08	0.51	0.04	0.08	0.9486	1	0.33
T-Depression 6	0.43	0.08	0.43	0.04	0.00	0.00	1	1.00
T-Depression (R) 7	-1.03	0.07	-0.88	0.04	-0.14	3.3658	1	0.07
T-Depression (R) 8	-0.56	0.07	-0.56	0.04	0.00	0.00	1	1.00
T-Depression (R) 9	-0.64	0.07	-0.73	0.04	0.10	1.4202	1	0.23
T-Depression (R) 10	0.42	0.07	0.46	0.04	-0.03	0.2134	1	0.64

*Note*. S.E. = Standard Error. * Statistically significant values at $p < 0.05$.
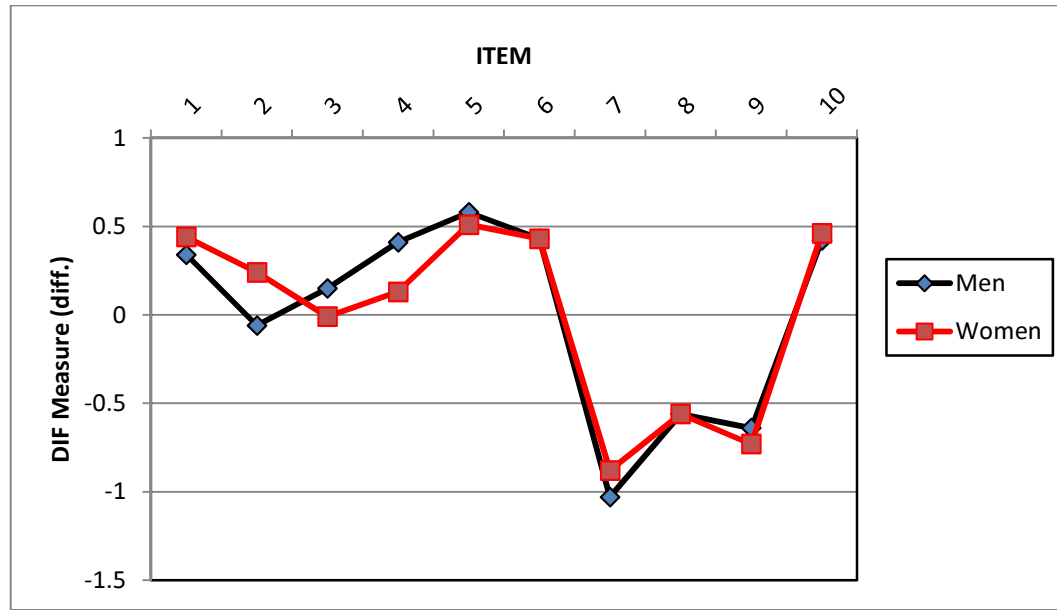
Figure D.7 Differential Item Functioning Across Gender Groups for Trait Depression

Table D.8

Differential Item Functioning Across Gender Groups for Trait Curiosity

Item	Men Difficulty	S.E.	Women Difficulty	S.E.	DIF Contrast	χ^2	*df*	*p*
T-Curiosity 1	0.11	0.06	0.44	0.03	-0.33	21.5212*	1	0.00
T-Curiosity 2	0.03	0.06	-0.11	0.03	0.14	4.0194	1	0.05
T-Curiosity 3	-0.11	0.06	-0.17	0.04	0.05	0.7659	1	0.38
T-Curiosity 4	0.75	0.06	0.68	0.03	0.06	1.0703	1	0.30
T-Curiosity 5	0.37	0.06	0.27	0.03	0.10	2.1394	1	0.14
T-Curiosity 6	1.04	0.06	1.17	0.04	-0.13	3.5214	1	0.06
T-Curiosity 7	0.12	0.06	0.15	0.03	-0.03	0.2164	1	0.64
T-Curiosity (R) 8	-1.07	0.07	-1.21	0.04	0.14	3.2902	1	0.07
T-Curiosity 9	-0.66	0.06	-0.47	0.04	-0.19	6.9634*	1	0.01
T-Curiosity (R) 10	-0.56	0.06	-0.74	0.04	0.18	6.0579*	1	0.01

*Note.* S.E. = Standard Error. * Statistically significant values at $p < 0.05$.
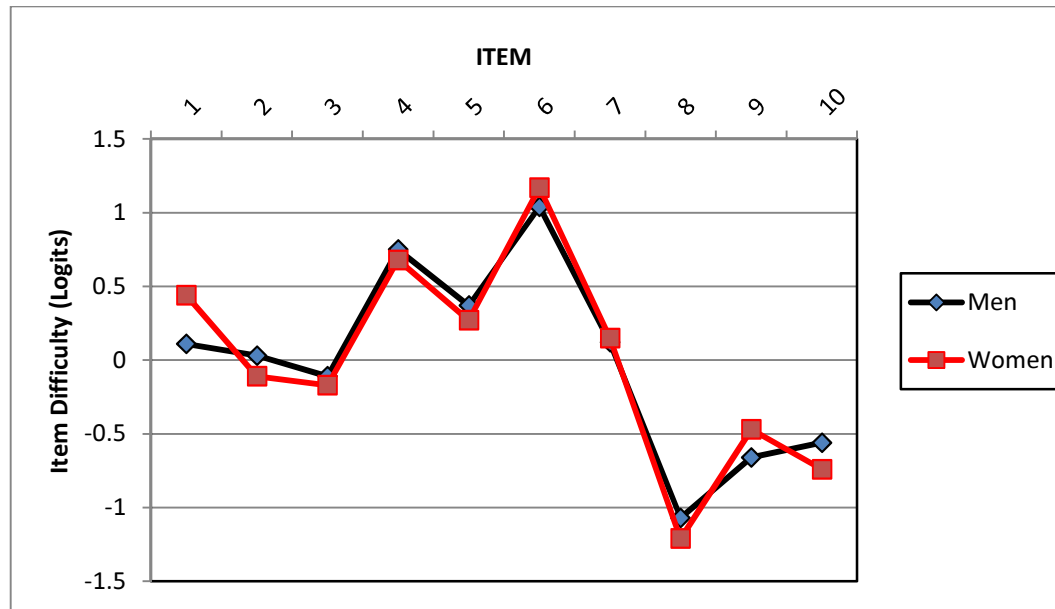
Figure D.8 Differential Item Functioning Across Gender Groups for Trait Curiosity

D.2. Differential Item Functioning Ethnic Group Comparison Tables and Plots

Table D.9

Differential Item Functioning Across Ethnic Groups for State Anxiety

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
S-Anxiety (R) 1		-0.02				4.6693	3	0.20
	African		0.05	0.07	0.04			
	Indian / Asian		-0.12	-0.1	0.12			
	Coloured		-0.02	0.00	0.14			
	White		-0.08	-0.06	0.05			
S-Anxiety 2		0				38.2634*	3	0.00
	African		0.21	0.20	0.05			
	Indian / Asian		0	0.00	0.12			
	Coloured		-0.1	-0.10	0.14			
	White		-0.19	-0.19	0.04			
S-Anxiety (R) 3		-0.48				3.0964	3	0.38
	African		-0.52	-0.04	0.04			
	Indian / Asian		-0.36	0.12	0.11			
	Coloured		-0.33	0.15	0.14			
	White		-0.48	0.00	0.04			

(table continues)

Table D.9 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
S-Anxiety 4		-0.62				3.2954	3	0.35
	African		-0.65	-0.03	0.04			
	Indian / Asian		-0.65	-0.03	0.11			
	Coloured		-0.77	-0.15	0.13			
	White		-0.57	0.05	0.04			
S-Anxiety 5		0.3				0.2875	3	0.96
	African		0.3	0.00	0.05			
	Indian / Asian		0.27	-0.02	0.12			
	Coloured		0.37	0.08	0.15			
	White		0.30	0.00	0.05			
S-Anxiety 6		0.89				5.0207	3	0.17
	African		0.96	0.08	0.05			
	Indian / Asian		0.97	0.08	0.14			
	Coloured		0.85	-0.04	0.17			
	White		0.81	-0.08	0.05			

Table D.9 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
S-Anxiety (R) 7		-0.42				12.2593*	3	0.01
	African		-0.31	0.11	0.04			
	Indian / Asian		-0.42	0.00	0.11			
	Coloured		-0.44	-0.02	0.14			
	White		-0.52	-0.11	0.04			
S-Anxiety 8		-0.26				1.1464	3	0.77
	African		-0.28	-0.03	0.04			
	Indian / Asian		-0.28	-0.03	0.11			
	Coloured		-0.26	0.00	0.14			
	White		-0.22	0.04	0.04			
S-Anxiety (R) 9		-0.90				12.1143*	3	0.01
	African		-1.01	-0.11	0.04			
	Indian / Asian		-0.84	0.07	0.11			
	Coloured		-0.80	0.10	0.13			
	White		-0.81	0.09	0.04			

(table continues)

Table D.9 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	df	p
S-Anxiety 10		1.51				89.1093*	3	0.00
	African		1.17	-0.34	0.05			
	Indian / Asian		1.41	-0.11	0.16			
	Coloured		1.51	0.00	0.20			
	White		2.00	0.49	0.07			

*Note.* S.E. = Standard Error. * Statistically significant values at p < 0.05.
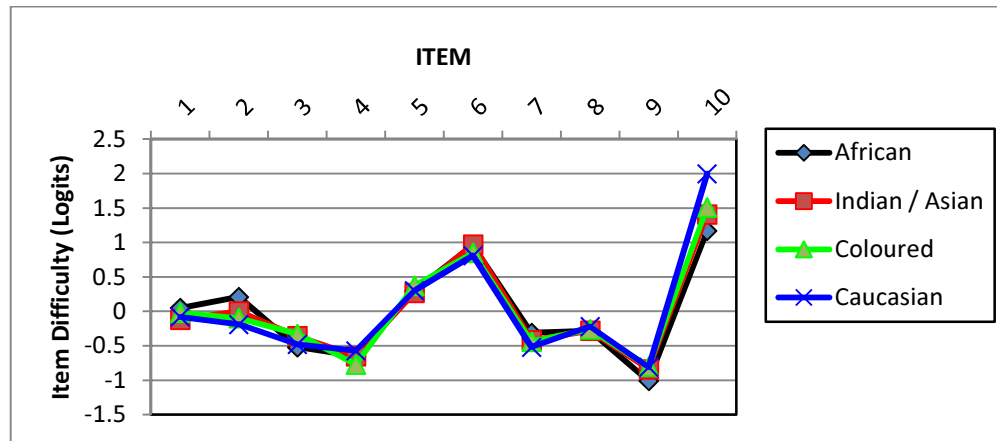
Figure D.9 Differential Item Functioning Across Gender Groups for State Anxiety

Table D.10

Differential Item Functioning Across Ethnic Groups for State Anger

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
S-Anger 1		0.15				58.0632*	3	0
	African		-0.17	-0.32	0.06			
	Indian / Asian		0.20	0.05	0.15			
	Coloured		0.49	0.35	0.22			
	White		0.54	0.39	0.08			
S-Anger 2		0.22				1.4207	3	0.70
	African		0.25	0.03	0.07			
	Indian / Asian		0.32	0.1	0.16			
	Coloured		0.14	-0.07	0.2			
	White		0.16	-0.05	0.07			
S-Anger 3		0.05				6.3574	3	0.09
	African		-0.05	-0.1	0.06			
	Indian / Asian		-0.01	-0.05	0.15			
	Coloured		0.1	0.06	0.2			
	White		0.17	0.12	0.07			

(table continues)

Table D.10 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
S-Anger 4		0.15				21.3512*	3	0.00
	African		0.26	0.12	0.07			
	Indian / Asian		-0.33	-0.47	0.13			
	Coloured		-0.33	-0.47	0.18			
	White		0.18	0.03	0.07			
S-Anger 5		0.41				1.3195	3	0.72
	African		0.38	-0.03	0.07			
	Indian / Asian		0.57	0.16	0.17			
	Coloured		0.31	-0.1	0.21			
	White		0.41	0	0.07			
S-Anger 6		0.36				3.3099	3	0.34
	African		0.28	-0.09	0.07			
	Indian / Asian		0.36	0	0.16			
	Coloured		0.4	0.04	0.21			
	White		0.46	0.09	0.08			

(table continues)

Table D.10 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	df	p
S-Anger 7		-0.89				17.8126*	3	0.00
	African		-0.83	0.06	0.05			
	Indian / Asian		-0.59	0.31	0.13			
	Coloured		-0.58	0.31	0.18			
	White		-1.04	-0.15	0.05			
S-Anger 8		0.51				5.0466	3	0.17
	African		0.57	0.07	0.07			
	Indian / Asian		0.2	-0.31	0.15			
	Coloured		0.59	0.08	0.22			
	White		0.48	-0.03	0.08			
S-Anger 9		-0.73				3.1164	3	0.37
	African		-0.73	0	0.05			
	Indian / Asian		-0.52	0.21	0.13			
	Coloured		-0.65	0.08	0.17			
	White		-0.76	-0.04	0.05			

Table D.10 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
S-Anger 10		-0.21				29.159*	3	0
	African		0.03	0.24	0.06			
	Indian / Asian		-0.36	-0.15	0.13			
	Coloured		-0.49	-0.28	0.18			
	White		-0.4	-0.19	0.06			

Note. S.E. = Standard Error. * Statistically significant values at $p < 0.05$.

Figure D.10 Differential Item Functioning Across Gender Groups for State Anger

Table D. 11

Differential Item Functioning Across Ethnic Groups for State Depression

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ²	df	p
S-Depression (R) 1		-0.99				50.6006*	3	0
	African		-0.77	0.22	0.04			
	Indian / Asian		-1.04	-0.05	0.11			
	Coloured		-1.03	-0.04	0.13			
	White		-1.19	-0.2	0.04			
S-Depression 2		0.44				6.2174	3	0.10
	African		0.36	-0.08	0.05			
	Indian / Asian		0.59	0.15	0.14			
	Coloured		0.36	-0.08	0.16			
	White		0.52	0.08	0.05			
S-Depression 3		0.62				37.8023*	3	0
	African		0.43	-0.19	0.05			
	Indian / Asian		0.37	-0.25	0.13			
	Coloured		0.66	0.05	0.17			
	White		0.88	0.26	0.06			

(table continues)

Table D.11 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
S-Depression 4		0.28				53.5881*	3	0
	African		0.04	-0.24	0.05			
	Indian / Asian		0.21	-0.07	0.13			
	Coloured		0.39	0.11	0.16			
	White		0.56	0.28	0.05			
S-Depression (R) 5		-0.11				27.8234*	3	0
	African		0.06	0.16	0.05			
	Indian / Asian		-0.08	0.03	0.12			
	Coloured		0.08	0.19	0.15			
	White		-0.28	-0.17	0.04			
S-Depression 6		0.47				27.2088*	3	0
	African		0.29	-0.18	0.05			
	Indian / Asian		0.42	-0.05	0.13			
	Coloured		0.52	0.06	0.16			
	White		0.67	0.21	0.05			

(table continues)

Table D.11 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	df	p
S-Depression (R) 7		-0.46				1.9322	3	0.59
	African		-0.46	0	0.04			
	Indian / Asian		-0.3	0.16	0.12			
	Coloured		-0.51	-0.05	0.13			
	White		-0.46	0	0.04			
S-Depression 8		0.44				49.0233*	3	0
	African		0.2	-0.24	0.05			
	Indian / Asian		0.53	0.09	0.14			
	Coloured		0.36	-0.07	0.16			
	White		0.71	0.28	0.06			
S-Depression (R) 9		-0.6				1.5281	3	0.68
	African		-0.6	0	0.04			
	Indian / Asian		-0.55	0.05	0.11			
	Coloured		-0.75	-0.15	0.13			
	White		-0.6	0	0.04			

(table continues)

Table D.11 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	df	p
S-Depression (R) 10		-0.09				125.118*	3	0
	African		0.31	0.4	0.05			
	Indian / Asian		-0.15	-0.06	0.12			
	Coloured		0	0.08	0.15			
	White		-0.43	-0.35	0.04			

Note. S.E. = Standard Error. * Statistically significant values at p < 0.05.
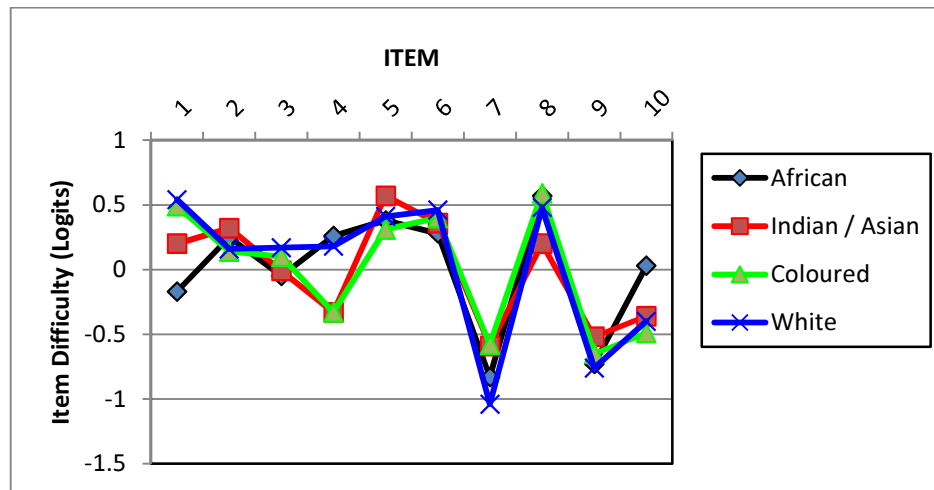

Figure D.11 Differential Item Functioning Across Gender Groups for State Depression

Table D.12

Differential Item Functioning Across Ethnic Groups for State Curiosity

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
S-Curiosity 1		0.75				2.2519	3	0.52
	African		0.75	0.00	0.04			
	Indian / Asian		0.86	0.12	0.1			
	Coloured		0.85	0.11	0.13			
	White		0.73	-0.02	0.04			
S-Curiosity 2		0.18				7.4319	3	0.06
	African		0.1	-0.08	0.04			
	Indian / Asian		0.21	0.03	0.1			
	Coloured		0.28	0.1	0.12			
	White		0.24	0.06	0.04			
S-Curiosity 3		-0.28				33.0856*	3	0
	African		-0.43	-0.15	0.04			
	Indian / Asian		-0.39	-0.11	0.1			
	Coloured		-0.4	-0.12	0.13			
	White		-0.11	0.17	0.04			

(table continues)

Table D.12 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
S-Curiosity 4		0.63				6.1154	3	0.11
	African		0.66	0.03	0.04			
	Indian / Asian		0.81	0.18	0.1			
	Coloured		0.68	0.05	0.12			
	White		0.57	-0.06	0.04			
S-Curiosity 5		0.59				27.1628*	3	0
	African		0.45	-0.14	0.04			
	Indian / Asian		0.64	0.05	0.1			
	Coloured		0.48	-0.11	0.12			
	White		0.74	0.15	0.04			
S-Curiosity 6		0.44				2.6052	3	0.46
	African		0.48	0.04	0.04			
	Indian / Asian		0.41	-0.03	0.1			
	Coloured		0.32	-0.12	0.12			
	White		0.41	-0.03	0.04			

(table continues)

Table D.12 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	df	p
S-Curiosity 7		-0.39				0.1897	3	0.98
	African		-0.39	0	0.04			
	Indian / Asian		-0.39	0	0.1			
	Coloured		-0.34	0.05	0.12			
	White		-0.39	0	0.04			
S-Curiosity (R) 8		-0.75				41.3344*	3	0
	African		-0.56	0.18	0.04			
	Indian / Asian		-0.7	0.04	0.11			
	Coloured		-0.71	0.03	0.13			
	White		-0.95	-0.2	0.04			
S-Curiosity 9		0.23				0.6197	3	0.90
	African		0.23	0	0.04			
	Indian / Asian		0.17	-0.06	0.1			
	Coloured		0.29	0.06	0.12			
	White		0.23	0	0.04			

(table continues)

Table D.12 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
S-Curiosity (R) 10		-1.39				26.8641*	3	0
	African		-1.21	0.18	0.05			
	Indian / Asian		-1.69	-0.3	0.13			
	Coloured		-1.47	-0.08	0.15			
	White		-1.52	-0.13	0.05			

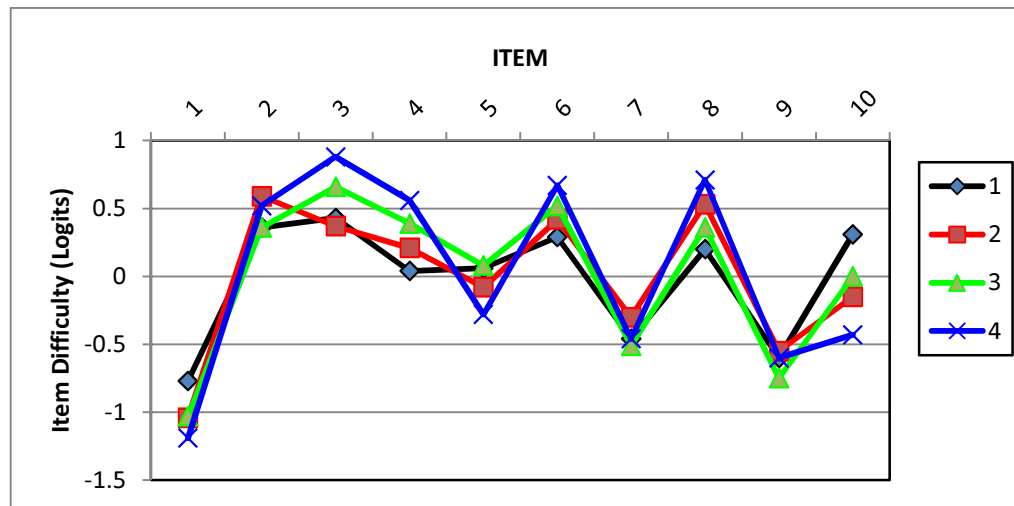*Note*. S.E. = Standard Error. * Statistically significant values at p < 0.05.
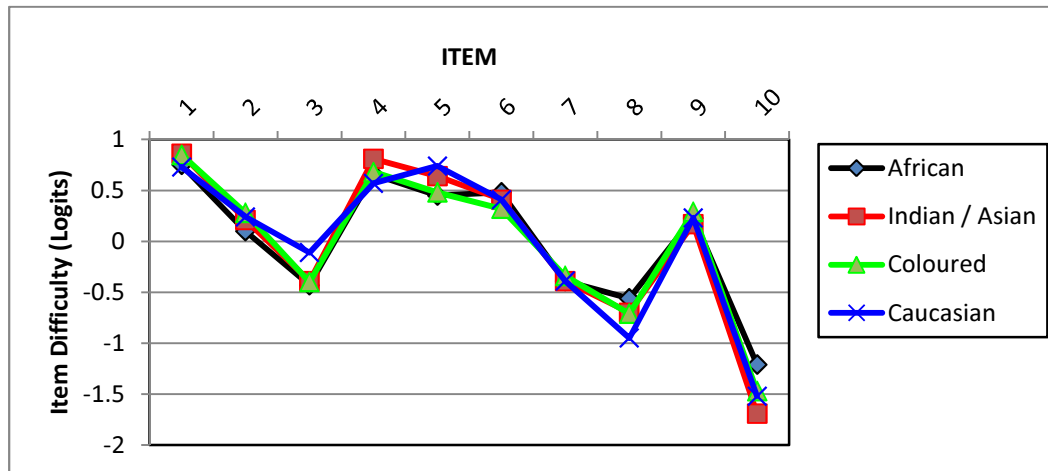
Figure D.12 Differential Item Functioning Across Gender Groups for State Curiosity

Table D.13

Differential Item Functioning across Ethnic Groups for Trait Anxiety

Item	Ethnic group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Anxiety (R) 1		-0.02				44.2618*	3	0
	African		-0.23	-0.21	0.04			
	Indian / Asian		0.22	0.24	0.12			
	Coloured		-0.05	-0.03	0.14			
	White		0.18	0.2	0.05			
T-Anxiety (R) 2		-0.2				44.3318*	3	0
	African		0.03	0.22	0.04			
	Indian / Asian		-0.36	-0.16	0.11			
	Coloured		-0.38	-0.18	0.14			
	White		-0.37	-0.18	0.04			
T-Anxiety 3		-0.65				0.3212	3	0.96
	African		-0.65	0	0.04			
	Indian / Asian		-0.69	-0.04	0.11			
	Coloured		-0.59	0.05	0.13			
	White		-0.65	0	0.04			

(table continues)

Table D.13 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Anxiety 4		-0.20				111.178*	3	0
	African		-0.53	-0.33	0.04			
	Indian / Asian		-0.20	0	0.12			
	Coloured		0.01	0.21	0.14			
	White		0.14	0.34	0.05			
T-Anxiety 5		1.07				1.9087	3	0.60
	African		1.07	0	0.05			
	Indian / Asian		1.18	0.1	0.15			
	Coloured		0.9	-0.18	0.17			
	White		1.1	0.03	0.05			
T-Anxiety 6		0.33				8.3058*	3	0.04
	African		0.43	0.1	0.05			
	Indian / Asian		0.26	-0.07	0.12			
	Coloured		0.33	0	0.15			
	White		0.24	-0.09	0.05			

(table continues)

Table D.13 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Anxiety (R) 7		-0.23				6.9608	3	0.07
	African		-0.31	-0.08	0.04			
	Indian / Asian		-0.1	0.14	0.12			
	Coloured		-0.3	-0.07	0.14			
	White		-0.17	0.07	0.04			
T-Anxiety 8		0.12				25.567*	3	0
	African		0.28	0.15	0.05			
	Indian / Asian		0.06	-0.07	0.12			
	Coloured		0.33	0.2	0.15			
	White		-0.04	-0.16	0.05			
T-Anxiety 9		0.62				7.0072	3	0.07
	African		0.56	-0.05	0.05			
	Indian / Asian		0.9	0.28	0.14			
	Coloured		0.47	-0.15	0.15			
	White		0.66	0.04	0.05			

(table continues)

Table D.13 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	df	p
T-Anxiety 10		-0.85				43.8594*	3	0
	African		-0.65	0.2	0.04			
	Indian / Asian		-1.09	-0.24	0.11			
	Coloured		-0.78	0.07	0.13			
	White		-1.02	-0.17	0.04			

Note. S.E. = Standard Error. * Statistically significant values at p < 0.05.
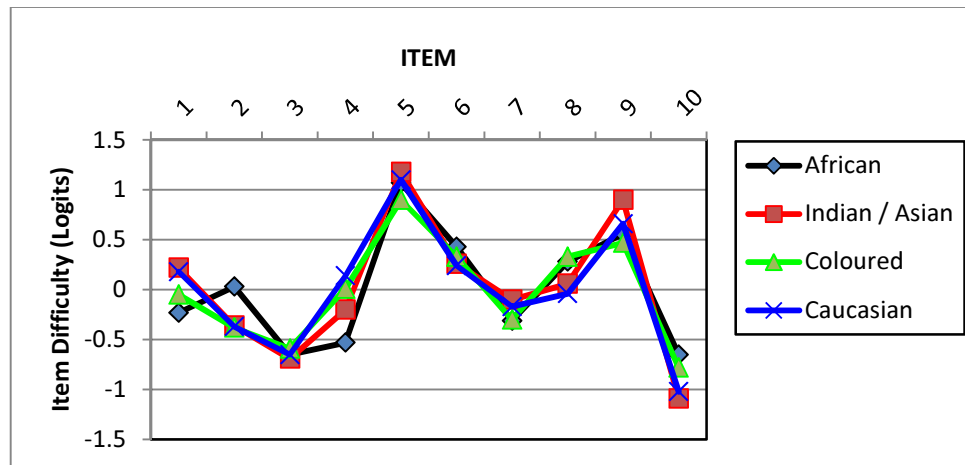
Figure D.13 Differential Item Functioning Across Gender Groups for Trait Anxiety

Table D.14

Differential Item Functioning across Ethnic Groups for Trait Anger

Item	Ethnic group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Anger 1		-0.01				1.7183	3	0.63
	African		0.03	0.04	0.04			
	Indian / Asian		-0.11	-0.1	0.11			
	Coloured		-0.01	0	0.13			
	White		-0.01	0	0.04			
T-Anger 2		0.48				11.8032*	3	0.01
	African		0.59	0.11	0.05			
	Indian / Asian		0.3	-0.18	0.11			
	Coloured		0.4	-0.08	0.14			
	White		0.4	-0.07	0.04			
T-Anger 3		0.56				7.3928	3	0.06
	African		0.47	-0.09	0.04			
	Indian / Asian		0.59	0.03	0.12			
	Coloured		0.59	0.03	0.14			
	White		0.65	0.09	0.05			

(table continues)

Table D.14 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Anger 4		-0.68				16.6217*	3	0.00
	African		-0.73	-0.04	0.04			
	Indian / Asian		-0.27	0.41	0.11			
	Coloured		-0.83	-0.14	0.12			
	White		-0.68	0	0.04			
T-Anger 5		-0.73				1.7514	3	0.62
	African		-0.75	-0.02	0.04			
	Indian / Asian		-0.64	0.09	0.11			
	Coloured		-0.63	0.10	0.12			
	White		-0.73	0	0.04			
T-Anger 6		1.23				3.3942	3	0.33
	African		1.17	-0.06	0.05			
	Indian / Asian		1.38	0.14	0.14			
	Coloured		1.27	0.04	0.16			
	White		1.28	0.05	0.05			

(table continues)

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Table D.14 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Anger 7		0.07				51.8835*	3	0
	African		0.29	0.22	0.04			
	Indian / Asian		-0.34	-0.41	0.11			
	Coloured		-0.06	-0.13	0.13			
	White		-0.07	-0.14	0.04			
T-Anger 8		-0.94				33.6551*	3	0
	African		-1.12	-0.17	0.04			
	Indian / Asian		-0.71	0.24	0.10			
	Coloured		-0.81	0.13	0.12			
	White		-0.82	0.12	0.04			
T-Anger 9		1.13				25.9371*	3	0
	African		1.30	0.17	0.05			
	Indian / Asian		0.72	-0.41	0.12			
	Coloured		1.2	0.07	0.16			
	White		1.03	-0.10	0.05			

(table continues)

Table D.14 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	df	p
T-Anger 10		-1.1				6.6968	3	0.08
	African		-1.18	-0.08	0.04			
	Indian / Asian		-1.02	0.09	0.11			
	Coloured		-1.1	0	0.12			
	White		-1.04	0.06	0.04			

Note. S.E. = Standard Error. * Statistically significant values at p < 0.05.
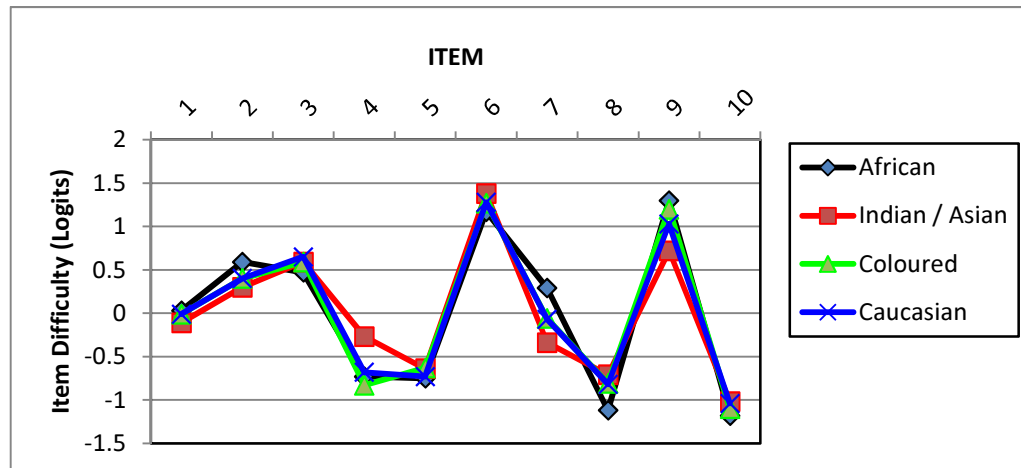
Figure D.14 Differential Item Functioning Across Gender Groups for Trait Depression

Table D.15

Differential Item Functioning Across Ethnic Groups for Trait Depression

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Depression 1		0.42				14.1562*	3	0.00
	African		0.29	-0.13	0.06			
	Indian / Asian		0.35	-0.06	0.15			
	Coloured		0.31	-0.11	0.17			
	White		0.59	0.17	0.06			
T-Depression (R) 2		0.17				2.2972	3	0.51
	African		0.19	0.03	0.05			
	Indian / Asian		0.33	0.16	0.15			
	Coloured		0.09	-0.07	0.17			
	White		0.12	-0.04	0.06			
T-Depression 3		0.02				4.73	3	0.19
	African		-0.03	-0.05	0.05			
	Indian / Asian		0.08	0.06	0.14			
	Coloured		-0.16	-0.18	0.16			
	White		0.10	0.08	0.05			

(table continues)

Table D.15 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Depression 4		0.19				6.4007	3	0.09
	African		0.19	0	0.05			
	Indian / Asian		-0.11	-0.30	0.14			
	Coloured		0.39	0.20	0.18			
	White		0.23	0.04	0.06			
T-Depression 5		0.51				1.4214	3	0.70
	African		0.55	0.05	0.06			
	Indian / Asian		0.54	0.03	0.15			
	Coloured		0.51	0	0.18			
	White		0.46	-0.05	0.06			
T-Depression 6		0.43				1.2918	3	0.73
	African		0.40	-0.03	0.06			
	Indian / Asian		0.58	0.15	0.15			
	Coloured		0.46	0.03	0.18			
	White		0.43	0	0.06			

(table continues)

Table D.15 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Depression (R) 7		-0.92				5.4623	3	0.14
	African		-0.97	-0.05	0.05			
	Indian / Asian		-0.76	0.16	0.13			
	Coloured		-0.64	0.28	0.15			
	White		-0.92	0	0.05			
T-Depression (R) 8		-0.56				4.2498	3	0.23
	African		-0.52	0.03	0.05			
	Indian / Asian		-0.38	0.18	0.13			
	Coloured		-0.74	-0.18	0.15			
	White		-0.6	-0.04	0.05			
T-Depression (R) 9		-0.71				40.2963*	3	0
	African		-0.48	0.23	0.05			
	Indian / Asian		-1.02	-0.31	0.13			
	Coloured		-0.64	0.07	0.16			
	White		-0.91	-0.20	0.05			

(table continues)

Table D.15 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
	African		0.38	-0.07	0.05			
	Indian / Asian		0.41	-0.05	0.14			
	Coloured		0.46	0	0.17			
	White		0.55	0.10	0.06			

Note. S.E. = Standard Error. * Statistically significant values at $p < 0.05$.
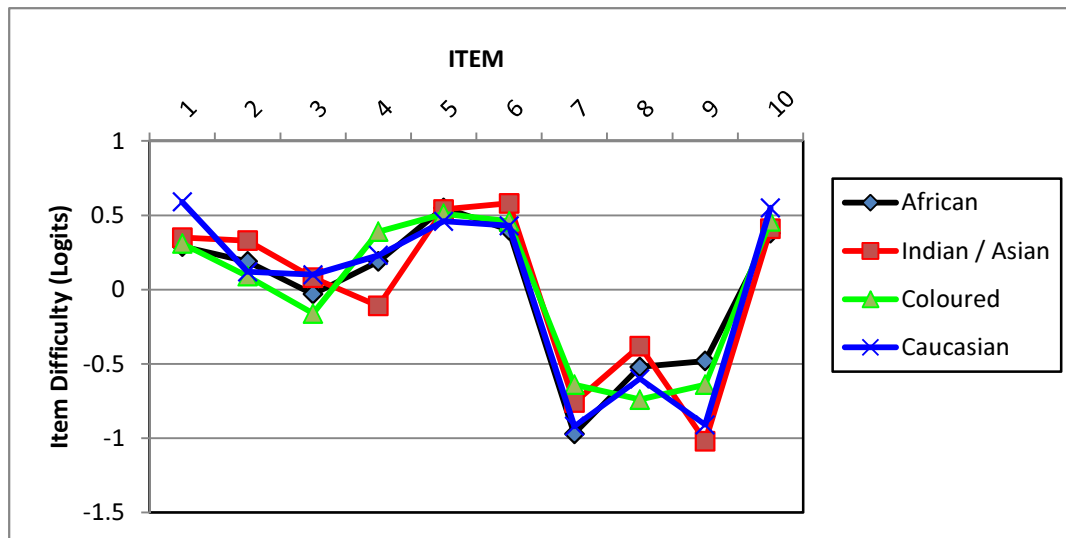

Figure D.15 Differential Item Functioning Across Gender Groups for Trait Depression

Table D.16

Differential Item Functioning Across Ethnic Groups for Trait Curiosity

Item	Ethnic group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Curiosity 1		0.36				2.3914	3	0.49
	African		0.31	-0.04	0.04			
	Indian / Asian		0.33	-0.03	0.12			
	Coloured		0.31	-0.05	0.14			
	White		0.41	0.05	0.05			
T-Curiosity 2		-0.08				6.0582	3	0.11
	African		-0.16	-0.08	0.05			
	Indian / Asian		0.09	0.16	0.12			
	Coloured		-0.04	0.04	0.14			
	White		-0.03	0.05	0.05			
T-Curiosity 3		-0.17				24.5224*	3	0
	African		-0.33	-0.16	0.05			
	Indian / Asian		-0.14	0.02	0.12			
	Coloured		-0.17	0	0.14			
	White		-0.01	0.16	0.05			

(table continues)

Table D.16 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	df	p
T-Curiosity 4		0.68				3.3379	3	0.34
	African		0.74	0.06	0.04			
	Indian / Asian		0.68	0	0.12			
	Coloured		0.68	0	0.14			
	White		0.62	-0.06	0.05			
T-Curiosity 5		0.3				1.3496	3	0.71
	African		0.30	0	0.04			
	Indian / Asian		0.30	0	0.12			
	Coloured		0.42	0.13	0.14			
	White		0.26	-0.03	0.05			
T-Curiosity 6		1.13				0.1893	3	0.98
	African		1.13	0	0.05			
	Indian / Asian		1.17	0.04	0.12			
	Coloured		1.17	0.04	0.14			
	White		1.13	0	0.05			

(table continues)

Table D.16 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Curiosity 7		0.15				8.2473*	3	0.04
	African		0.24	0.09	0.04			
	Indian / Asian		0.10	-0.05	0.12			
	Coloured		-0.10	-0.25	0.14			
	White		0.10	-0.05	0.05			
T-Curiosity (R) 8		-1.17				4.9905	3	0.17
	African		-1.15	0.02	0.05			
	Indian / Asian		-1.46	-0.29	0.13			
	Coloured		-1.14	0.04	0.15			
	White		-1.17	0	0.05			
T-Curiosity 9		-0.51				2.9108	3	0.40
	African		-0.46	0.05	0.05			
	Indian / Asian		-0.46	0.05	0.12			
	Coloured		-0.56	-0.05	0.14			
	White		-0.57	-0.06	0.05			

(table continues)

Table D.16 Continued

Item	Ethnic Group	Baseline Difficulty	DIF Location	DIF Size	S.E.	χ^2	*df*	*p*
T-Curiosity (R) 10		-0.69				4.8348	3	0.18
	African		-0.64	0.05	0.05			
	Indian / Asian		-0.66	0.03	0.12			
	Coloured		-0.56	0.13	0.14			
	White		-0.77	-0.08	0.05			

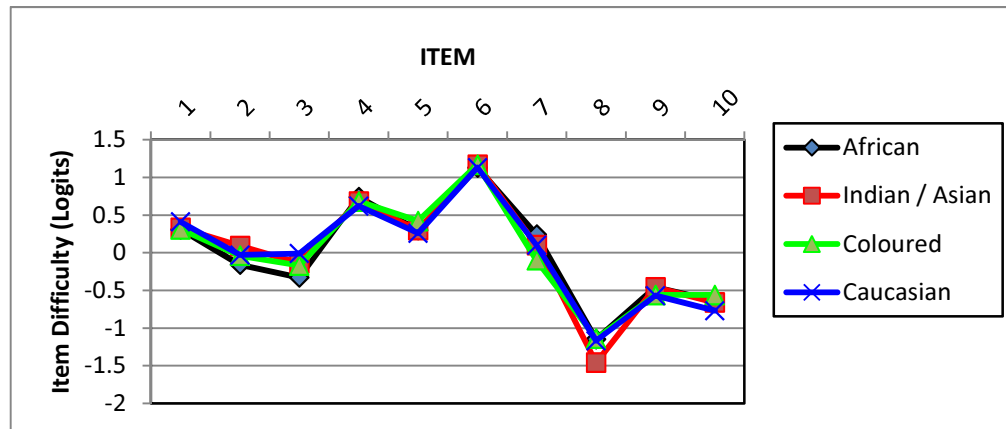*Note.* S.E. = Standard Error. * Statistically significant values at $p < 0.05$.

Figure D.16 Differential Item Functioning Across Gender Groups for Trait Curiosity

APPENDIX E: INFORMED CONSENT AND DEMOGRAPHIC FORM

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

RESEARCH STUDY: An Evaluation of the Psychometric Properties of the STPI (Form Y) for South African Students.

There are two parts to this informed consent form:

- An information sheet (to provide information about the study)
- A consent form (to sign if you choose to participate)

You will receive a copy of the information sheet.

Part 1: Information sheet

The purpose of the study

The researcher is affiliated with the University of Pretoria and is conducting research which aims to assess whether the psychometric measure – the STPI (Form Y) is useful for the South African student population. This measure assesses the long term personality trait presence and more fluctuating state experiences of anxiety, anger, depression and curiosity. These constructs are associated with measures of well-being and could prove valuable in the South African context.

Participation

The research will involve your participation by requesting that you complete this test as honestly as possible. The test will take approximately 20 minutes of your time. Your participation will be kept anonymous, which means that neither your name nor any other identifying details will be shared with anyone.

The information gathered during the course of the research process will only be used for the purpose of the research study and will thereafter be stored in a safe location at the University of Pretoria for 15 years for archiving purposes.

The information gathered in this study may be used for subsequent research purposes. The information that you provide will continue to be anonymous and confidential.

If some of the words or concepts contained within this document are not familiar to you, or if you do not understand some or any of the information provided, please inform the researcher of this so that they may provide a clearer explanation. Furthermore, your participation in this study is voluntary, which means that you may withdraw at any time without having to offer an explanation and without any consequences to you.

Potential risks or discomfort

There is no anticipated risk for participating in this study. However, if you feel that the content of this measure is upsetting in anyway, please inform the researcher or contact the student counselling services.

Benefits of participation

The study will not provide any direct benefit, however your participation will contribute to broader knowledge in assessing whether or not the STPI (form Y) can be used as a measure of wellness in South Africa. This can have important consequences in understanding how recent traumatic effects impact on people's well-being.

Any further questions regarding the research study may be directed at the researcher

Katherine du Plessis

Tel: 071 879 8864

Email: katherine.duplessis@gmail.com

RESEARCH STUDY: An Evaluation of the Psychometric Properties of the STPI (Form Y) for South African Students.

Part 2: Consent to participate

I hereby confirm that I have been informed about the nature, procedures, and risks of this study. I am aware that the information will only be used for research purposes, and that my confidentiality will be protected. I voluntarily participate in the study and I am aware that I can withdraw at any time without offering any explanation or suffering any consequences. I am aware that the data collected in this study may be used for further research endeavours.

Participant signature   _____

Date   _____

Researcher signature   _____

Date   _____

Thank you for your participation!

.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

DEMOGRAPHIC FORM

RESEARCH STUDY: An Evaluation of the Psychometric Properties of the STPI (Form Y) for South African Students.

Age in years: _____

Administration purposes only

Please check the appropriate box with an X:

Gender	1	Male			2	Female	

Nationality	1	RSA			2	Other	

Race	1	African			2	Asian	
	3	Caucasian			4	Coloured	

Home Language	Afrikaans			Northern Sotho (Sepedi)	
	English			Sesotho (Southern Sotho)	
	isiNdebele			SISWati (Swati)	
	isiXhosa			Tshivenda (Venda)	
	Xitsonga (Tsonga)			Other	

Marital status	1	Single			2	Married	
	3	Single with dependents			4	Married with dependents	

Residential Information	1	Live with parents			2	Live on own	
	3	Live with partner/ peers			4	University Residence	

APPENDIX F: LICENSE TO USE THE STPI-Y

For use by Katherine du Plessis only. Received from Mind Garden, Inc. on August 7, 2013

mind garden

www.mindgarden.com

To whom it may concern,

This letter is to grant permission for the above named person to use the following copyright material;

Instrument: *State-Trait Personality Inventory*

Author: *Charles D. Spielberger*

Copyright: *1995 by Charles D. Spielberger*

for his/her thesis research.

Five sample items from this instrument may be reproduced for inclusion in a proposal, thesis, or dissertation.

The entire instrument may not be included or reproduced at any time in any other published material.

Sincerely,

Vicki Jaimez
Mind Garden, Inc.
www.mindgarden.com

APPENDIX G: PERMISSION TO USE DATA

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
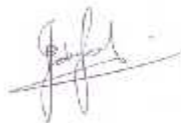Department of Psychology

29 April 2013

To: The Ethics Committee
         Faculty of Humanities

RE: USE OF DATA FOR STPI STUDY: KATHERINE DU PLESSIS; STUDENT NUMBER (12067645)

The State-Trait Personality Inventory (STPI Form Y) is currently administered in the Department of Physiology as part of our on-going research projects. I hereby give above-mentioned student permission to participate in the data collection procedure when the STPI Form Y is used. I furthermore grant the student access to the data collected on previous occasions. This data has never been used for the sole purpose of investigating the psychometric properties of the STPI (Form Y) and Ms. Du Plessis is therefore granted permission to use this data in her study. Please do not hesitate to contact me should you have any other inquiries pertaining to this matter.

Yours sincerely,

Dr PJ du Toit

Department of Physiology

Tel nr: 27-12-4202536

Fax: 0866188942

peet.dutoit@up.ac.za

Humanities Building, Room 11 – 02
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Republic of South Africa

Tel: 012 420 2919
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nicoleen.coetzee@up.ac.za
www.up.ac.za/psych

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Department of Psychology

29 April 2013

To: The Ethics Committee
        Faculty of Humanities

RE: USE OF SECONDARY DATA FOR STPI STUDY: KATHERINE DU PLESSIS; STUDENT NUMBER (12067645)

Please note that I was the principal researcher when data was collected on the STPI from 2008-1010. The respondents who participated in the study signed a consent form in which they indicated that the data could be used for research purposes. I was then employed at UJ and made the data available to my Honours students for writing research essays. The foci of these essays were the ability to report on a research project and hence the statistical analyses performed by the Honours students were not always correct. The data is in my possession and I have given Ms. Katherine du Plessis permission to access this data. The secondary data set will be merged with the data she will be collecting to form one new data set. The appropriate statistical analyses will then be performed on this new data set to determine the validity and reliability of the STPI in the South African context. The aim of Ms. Du Plessis's research will thus differ from that of the UJ Honours students since the correct statistical procedures will form the foundation of her study. Please do not hesitate to contact me should you have any other inquiries pertaining to this matter.

Yours sincerely,

NCoetzee

NICOLEEN COETZEE
PhD (PSYCHOLOGY)
LECTURER
DEPARTMENT OF PSYCHOLOGY
FACULTY OF HUMANITIES

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Republic of South Africa