THE PSYCHOMETRIC PROPERTIES OF THE EXPERIENCE OF WORK AND LIFE CIRCUMSTANCES QUESTIONNAIRE (WLQ)

By

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Submitted in fulfilment of the requirements for the degree

MCOM INDUSTRIAL PSYCHOLOGY

in the

FACULTY OF ECONOMIC AND MANAGEMENT SCIENCES

at the

UNIVERSITY OF PRETORIA

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August 2014

DECLARATION OF ORIGINAL AUTHORSHIP

I, Esli Amarja Kekana declare that the study “The Psychometric Properties of the WLQ” is my own work, both in execution and in content. I declare that all resources that have been used during the completion of this study have been cited and referred to in the reference list by means of a comprehensive referencing system. All assistance that I have received during the execution of this study has been referred to in my acknowledgements. I also declare that the content of this thesis has never before been used for any other qualification at any tertiary institute globally and that the only guidance received during this study derived from my allocated supervisor.

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Esli Amarja Kekana Date

ACKNOWLEDGEMENTS

In completion of this study I would like to extend my immense gratitude to the following individuals:

- To my husband thank you for showing a lot of understanding and support when I had to put in a lot of late nights. Your encouragement has truly made me believe that I can do anything if I put my mind to it.
- My dad thank you for grooming me up through the years to be able to face this challenge and for acting as my sound board when I needed a fresh perspective
- To Prof. Pieter Schaap thank you for setting me in the right direction and always providing me with insight. I appreciate your late night responses and your willingness to meet with me even though I mostly arrived unannounced. It was truly an honour to work with an expert like you and this study would not have been possible without your valuable input.
- To the employees at Nissan who willingly participated in my study and truly set the pace for the completion of my study.
- My editor, Tharina Hansmeyer, for supporting me with my deadline even when I thought it would be impossible

THE PSYCHOMETRIC PROPERTIES OF THE EXPERIENCE OF WORK AND LIFE CIRCUMSTANCES QUESTIONNAIRE (WLQ)

ABSTRACT

Objective: The purpose of the study is to determine the psychometric properties of the *Experience of Work and Life Circumstances Questionnaire* (WLQ) in terms of its reliability, dimensionality and second-order structural validity.

Method: The WLQ was administered to a sample of 217 employees working for the same automotive company in South Africa. The reliability of the WLQ was investigated by using Cronbach's Alpha. The dimensionality of the scales was determined by using Exploratory Factor analysis to establish essential unidimensionality (single common factor). A bifactor analysis technique, namely the Schmid-Leiman analysis, was used to determine the homogeneity of the item content of scales that appeared multidimensional (data are consistent with both a unidimensional and multidimensional structure). The second-order structural validity of the WLQ was investigated through confirmatory factor analysis.

Results: The results indicated a good reliability score for the WLQ's scales, but preliminary evidence suggests the possibility of item bias in Scale C2 and C3 and therefore needs to be further investigated. It was found that the scales are essentially unidimensional, except for Scale B and C2 that showed evidence of multidimensionality. The WLQ achieved a good second-order structural validity.

Conclusion: The results of this study indicate that the WLQ demonstrates adequate psychometric properties in relation to its internal consistency, the dimensionality of its scales and its second-order structural validity, with the exception of two scales that appear problematic and require further investigation.

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1.1 Background to the study

According to Stinchcomb (2004:259), "[s]tress is an occupational hazard of modern living" that causes degenerative diseases such as coronary heart disease, cancer and diabetes. The symptoms of stress in the workplace are high levels of absenteeism, high employee turnover, low morale, low job involvement and an increase in work accidents and conflicts (Vakola & Nikalaou, 2005). The use of psychological assessment to measure the levels of stress within an organisation can enable the organisation to identify the source of the problem (Foxcroft & Roodt, 2005; Mauer, 2000).

The use of psychometric assessments in South Africa is frowned upon because of a potential bias against people from different race groups (Mauer, 2000; Patterson & Uys, 2006). Pre-1980, a knowledge gap regarding multicultural diversity resulted in most of the psychometric assessments being developed for a westernised population (Foxcroft, 1997; Geisinger, 2000). Even though the psychometric properties of these tests were based on a westernised population, the tests were still administered to other race groups. This led to unfair selection practices in South Africa that favoured the white population over any other population that were not westernised (Mauer, 2000).

This unfair selection concerns led to a debate whether or not testing in a South African context is relevant and useful (Foxcroft, 1997). Shuttleworth-Jordan (1996) claims that the use of psychological assessment tools should not be abolished and that the problem is viewed in a stagnant form and without foresight. According to Shuttleworth-Jordan (1996), the rapid rate of urbanisation and westernisation should be taken into consideration before

psychometric tests developed pre-1980 are disregarded completely. Rather, the psychometric properties of these tests should be validated on the relevant populations to determine if the psychometric properties are valid, reliable and fair across multiple cultures and races (Shuttleworth-Jordan, 1996).

Using psychometric assessment aids in describing the individual's current situation, provides the necessary information to make effective decisions and can illustrate the extent to which an intervention has worked (Moerdyk, 2009). The inappropriate use of psychometric assessments gave rise to the Employment Equity Act 55 of 1998, which states that the use of a psychological assessment tool on a person is prohibited unless it can be proven to be valid, reliable, not biased towards any group and that it can be applied fairly across different cultural groups (Foxcroft & Roodt, 2005; Moerdyk, 2009). The responsibility falls on the test user to ensure that the psychological assessment tool that he or she has selected adhere to these requirements (Foxcroft & Roodt, 2005).

1.2 Problem statement

Psychological assessment tools that were developed pre-1994, such as the Experience of Work and Life Circumstances Questionnaire (WLQ), could still be very useful in the new South Aftican context provided that they adhere to the Employment Equity Act 55 of 1998.

The WLQ was developed in South Africa with the specific purpose of measuring the level of stress and determining the sources of stress among South Africans (Van Zyl & Van der Walt, 1991). The test was developed in 1989 and, even though it has not been adapted since, is still classified as a psychological test according to Form 207 of the Health Professions Council of South Africa (HPCSA) and available in the MindMuzik Catalogue (MindMuzik,

2013). As set out in Form 208 of the HPCSA, a test must adhere to the minimum requirements before it can be classified as a psychological test. The basic requirements to classify a psychological test – based on the Employment Equity Act (55 of 1998) - are that the psychometric properties of the test must be acceptable; thus the test must be valid and reliable (Foxcroft & Roodt, 2005).

The Kuder-Richardson reliability score obtained from a sample of the WLQ ranges from 0.83-0.92, which can be deemed satisfactory (Van Zyl & Van der Walt, 1991). However, the sample selected to determine the reliability of the test raises some concern.

The sample was selected from governmental and semi-governmental organisations and consisted predominantly of white males. The sample was as follows:

Table 1.2: Sample selected from a governmental and semi-governmental organisation

Language	Male	Female
Afrikaans	319	39
English	73	10
Xhosa	45	0
Zulu	30	0
Northern Sotho	34	0
Other African languages	114	0
TOTAL	615	49

Due to the political and socio-economic changes in South Africa since 1989 (Patterson & Uys, 2006), this sample is non-representative of the current workforce population and thus must be re-standardised on an adequate workforce population. The sample on which a psychometric assessment is standardised can have an impact on its reliability (Tavakol &

Dennick, 2011) and an assessment cannot be valid without being reliable (Loewenthal, 2001). Hence, it could be deduced that the psychometric properties of the WLQ is no longer valid or reliable due to the outdated sample. The need for re-standardisation of the WLQ is thus clearly indicated.

1.3 Purpose statement

The aim of the research is to evaluate the psychometric properties of the WLQ.

1.4 Research objectives

The objectives of this study are as follows:

- To evaluate the reliability of the scales of the WLQ
- To evaluate the dimensionality and the factor structure of the scales
- To evaluate the second-order factor model of the WLQ.

1.5 Academic value and contribution of the study

As mentioned earlier, this test was developed in 1989, before South Africa underwent dramatic socio-political changes that resulted in drastic changes in the workforce composition. Before 1994, the workforce consisted mainly of white males whereas the current workforce consists mainly out of previously disadvantaged groups. A knowledge gap regarding the applicability of the test on the current workforce population is thus clearly indicated.

Under the Employment Equity Act 55 of 1998, it could even be illegal to use this test based on the outdated sample used to standardise the test. Thus, it goes beyond addressing a knowledge gap; it is imperative by law to review the psychometric properties of the WLQ.

This study aimed to breech the knowledge gap in terms of the outdated psychometric properties and could assist the test distributor to adhere to the legal requirements.

1.6 Chapter outline

The purpose, content and results of the study are comprehensively described in five chapters. The following section provides a brief description of each of the chapters of the study:

- Chapter 1 – Introduction and Background

The objective of Chapter 1 is to provide the reader with the background to the study, the problem and purpose statements and the research objectives. The chapter further illustrates the academic value that the current study potentially creates. Thus the main objective of this chapter is to clarify what the study aims to achieve and the value it could potentially create.

- Chapter 2 – Literature Review

Chapter 2 focuses on an in-depth study of current literature available on the theories of stress, stress in the workplace, psychometric assessment and the WLQ instrument. The specific focus of the literature review is to emphasise the importance of validating current psychometric properties to ensure that the assessment instrument adheres to the requirements of the law.

- Chapter 3 – Methodology

Chapter 1 establishes the direction of the study and the objectives it aims to meet. Chapter 3 provides a description of the research structure used to meet these objectives in a methodical and standardised manner to ensure that the best results are achieved.

- Chapter 4 – Findings and Results

Chapter 4 reveals the results obtained through using the research structure that was proposed in Chapter 3. Specifically, the chapter reveals the reliability coefficient and dimensionality of the scales in the WLQ and its structural validity.

- Chapter 5 – Discussion, Recommendations, Limitations and Conclusion

Chapter 5 is an integrated discussion of the results obtained through the study and makes recommendations based on these results. The chapter points out the potential limitations to the study that should be taken into consideration when interpreting the results.

1.7 Conclusion

The purpose of this chapter was to provide an overview of the direction that the study followed. The background to the study laid the foundation of the study by emphasising the importance of its purpose. The purpose of the study was explained in terms of its objectives and the potential academic value and contribution of the study. The chapter was rounded off by providing an overview of each of the chapters in the study. The following chapter provides insight into the research available on the theories of stress, work-related stress, psychometric assessments and the *Experience of Work and Life Circumstances Questionnaire.*

Chapter 2: Literature Review

2.1 Introduction

Stress is a well-researched and universal phenomenon (Stinchcomb, 2004; Taylor, 2003) and a notion borrowed from an engineering term used to describe the process in which an agent applies force on an object (Kolb & Whishaw, 2009). This definition can be defined in the social context as a stimulus that disrupts the body's equilibrium and triggers a physiological and behavioural response to eliminate or reduce stress (Kolb & Whishaw, 2009).

The effect of stress in the workplace can be quite damaging as it results in higher absenteeism and turnover (Virtanen et al., 2007). A tool popularly used to determine work-related stress is the *Experience of Work and Life Circumstances Questionnaire* (WLQ). The WLQ was registered as a psychometric assessment with the HPCSA in 1991 and has not been reviewed or updated since. According to legislation that governs the use of psychometric assessments, it becomes the responsibility of the administrator to ensure that the assessment instrument still adheres to the requirements as set out by the Employment Equity Act.

The purpose of the study is to establish the psychometric properties of the WLQ to determine whether it is still acceptable to use the WLQ to measure the construct of stress. Thus this chapter focuses on the theories of stress, how it affects the human body and the notion of work-related stress. The chapter further aims to describe the WLQ as an assessment tool and to describe the use of psychometric assessments in South Africa.

2.2 The concept of stress

Robbins, Odendaal and Roodt (2003:420) define stress as “a dynamic condition in which an individual is confronted with an opportunity, constraint or demand related to what he or she desires and for which the outcome is perceived to be both uncertain and important.” Stress occurs when there is a mismatch between a perceived external demand and a person’s perceived ability to deal with it (Taylor, 2003). A person sums up a stressor according to its threat value, based on their previous experience in a similar context or based on their self-mage (Louw, Van Ede, & Louw, 1998).

The aforementioned definitions of stress illustrate that an individual’s experience and response to stress are largely psychological, accompanied by physiological processes that equip the individual to deal with the identified stressor. Defining stress would be an endless journey as there are different theories from which the definitions stem. The next sections explain how the concept and definitions of stress have developed over time and the physiological response to and consequences of stress, later focusing on work-related stress.

2.3 Theories of stress

Understanding human interaction with stress has been of great interest for the past century. Walter Cannon is one of the pioneers in stress research following his interest in the effect of certain environmental stressors (such as cold temperature and lack of oxygen) on organisms (Hobfoll, 1989). Cannon noticed that the organism underwent certain physiological changes when introduced to a stressor that enabled it to either escape from or confront the threat and he termed this response the *flight or fight* reaction (Taylor, 2003). He further noticed that the

prolonged experience of such stressors wore down the physiological functioning of the organism (Hobfoll, 1989).

Hans Selye followed in Cannon's footsteps and described stress as an instinctive response that is designed to protect the body from physical harm and consists of a series of orchestrated physiological responses (Hobfoll, 1989). He introduced this response as the *General Adaptive Syndrome* and argued that an animal or human confronted with a stressor physiologically adapts to confront this stressor and that this response is detrimental to the host's health over a prolonged period (Taylor, 2003). Even though Selye's theory explained the effect of stress on a physiological level, it excluded the psychological effect of stress and did not explain why people respond differently when faced with the same stressor (Van der Merwe, 2004).

Lazarus and Folkman (1984) suggest that stress is a combination of the aforementioned theories, but that these theories lack an important differentiating variable between people: perception. The *Psychological Appraisal and the Experience of Stress* theory holds that stress is perceived and evaluated according to a primary and secondary appraisal process (Hobfoll, 1989; Lazarus & Folkman, 1984; Taylor, 2003). The primary appraisal process evaluates an event to determine whether it is a harm (assessment of damage that has already taken place due to the event), a threat (assessment of the future damage that can occur due to this event) or a challenge (the potential to overcome and benefit from the event)(Ennis, Kelly & Lambert, 2001; Gartland, O'Connor, & Lawton, 2012).The secondary appraisal process focuses one's own abilities and resources to combat the harm, threat or challenges that the event poses and determines whether these abilities and resources will be sufficient (Ennis et al., 2001; Gartland et al., 2012).

According to Lazarus and Folkman (1984), the effect of stress on an individual is based on the relationship between the primary and secondary appraisal process. Thus, if a person perceives the event as a high threat and perceives his or her abilities to deal with it as low, the event will have a greater negative impact on that individual (Gartland et al., 2012; Taylor, 2003).

Hobfoll (1989) attempted to clarify stress by developing the *Model of Conservation of Resources,* based on Freud's pleasure principle. This model states that people attempt to build, protect and keep their resources and defines stressors as a threat to these resources. The resources can be tangible (employment, socio-economic status, wealth, materialistic possessions) or intangible (self-esteem, learned resourcefulness, dignity, confidence, trust, integrity). Thus, any threats to either tangible or intangible resources are factors that cause stress, because individuals make internal attributions of success that either contribute or diminish their self-worth (Wu & Griffin, 2012). Hence, if an individual develops excess resources, he or she is likely to experience positive stress, also called *eustress*. If a person experiences a lack of these resources, he or she experiences negative stress, also known as *distress* (Hobfoll, 1989).

Hobfoll (1989) further suggests that individuals invest their tangible or intangible resources in others (especially in their offspring) to ensure that their resources do not diminish over time. This notion is supported by a more recent theory of stress which was discovered by Taylor and colleagues and is called the *Tend-and-Befriend* stress response (Taylor, Klein, Lewis, Gruenwald, Gurung & Updegraff, 2000). Before this response was discovered, the physiological stress response was mainly tested on males due to the hormonal inconsistencies women experience throughout a month (Ennis et al., 2001; Taylor, 2003).

Once the physiological stress response was tested among women, it was found that women initially had the same physiological reaction as men (fight or flight), but that their stress response have evolved from fleeing or fighting to actions that ensure their own and their offspring's survival (Taylor et al., 2000). This response causes females to tend to their offspring and to affiliate with social groups in an instinctive attempt to reduce the risk of danger (Ennis et al., 2001; Taylor et al., 2000).

The stress response theories discussed form the foundation of the concept of stress. Stress arises from any environment in an individual's life and the next section explores the damaging effects of work-related stress.

2.4 Work Related Stress

Several countries report that there is a significant increase in work-related stress due to the volatile global market and constant adaption to the latest technologies (Virtanen et al., 2007). Furthermore, the ease of access to information has turned the normal nine-to-five working day into a continuous twenty-four-seven work week (Virtanen, et al., 2007). The increase in work-related stress has resulted in the number of reported mental illnesses among employees to increase drastically (Virtanen et al., 2007). Work-related stress has been proven to be linked to cardiovascular diseases, DSM-IV depression, anxiety, fatigue and burnout (Akerstedt, Knutsson, Westerholm, Theorell, Alfredsson & Kecklund, 2004; Virtanen et al., 2007).

It has also been proven that people (especially males) who suffer from work-related stress are at a higher risk to start using anti-depressant medication (Virtanen et al., 2007). In addition, fatigue has become a great epidemic in most westernised countries and accounts

for the doubling of absence due to illness in Sweden (Akerstedt et al., 2004). The ease of access to information, as well as the increase in job demands on employees, has resulted in employees finding it difficult to disengage from work during their leisure time (Akerstedt, Kecklund & Axelsson, 2007; Sonnentag, 2012). This preoccupation with work has been directly associated with disturbed sleeping patterns (Sonnentag, 2012).

An article in the *Mail and Guardian* reported that R19,1 billion were lost due to sick leave of which 3,4% consisted of stress-related illnesses (Mail and Guardian: Africa's Best Read, 2008). Stress-related illness is rated as the second most common health problem (after back pain) in the European Union with a reported 28% of employees who suffer from work-related stress and symptoms (Greiner, 2008). It was further found that employees who are experiencing stress are 25% more likely to resign from the company or to be absent (Greiner, 2008).

In Britain it is estimated that mental and emotional problems among employees have resulted in a loss of 40 million workdays (Van der Klink, Blonk, Schene & van Dijk, 2001). The cost associated with work-related stress can be measured in terms of the cost of absenteeism, loss of productivity, high accident rates, lower quality work and health care consumptions (Van der Klink et al., 2001). The costs on an individual level are high rates of tension and aggression, anxiety, depression, mental fatigue, sleep disturbances, changes in appetite, apathy and burnout (Van der Klink et al., 2001).

There is some debate whether it is the organisational characteristics and influence that cause stress or whether it is the makeup of the individual that makes him or her more vulnerable in certain environments (Luthans, 2008). Type A personalities are more affected by stress and suffer more often from stress-related diseases (Robbins & Judge, 2007).

These personality types are also more prone to be unable to disengage from work during their leisure time (Robbins & Judge, 2007).

Whether or not this argument holds true, Luthans (2008) found that 90% of the workforce has Type A tendencies and therefore the need is even greater to understand the relationship between the employee and the work environment and how it results in stress.

Luthans (2008) suggests that work-related stress stems from four environments, namely extra-organisational stressors, organisational stressors, group stressors and individual stressors. This is further supported by the model of stress of Robbins and Judge (2007), which includes environmental factors, organisational factors, individual factors and individual differences. According to Luthans (2008), individual stressors encompass individual factors and differences as one contributing factor to the experience of stress, whereas Robbins and Judge (2007) defines it separately. This differentiation can be due to an employee's struggle to exert much influence over individual factors while being able to control and change the individual differences. Individual factors also determine an employee's susceptibility to stress (Wu & Griffin, 2012).

Figure 2.4 presents a stress model that includes the suggestions of both Luthans(2008) and Robbins and Judge (2007) with regard to work-related stress. The literature illustrated that the experience of stress has a significant impact on employee health. It also showed that there are significant costs associated with stress. Moerdyk (2009) argues that psychometric assessments can assist an organisation to understand the intrinsic difficulties that an employee may be dealing with. The following section discusses the *Experience of Work and Life Circumstances Questionnaire* (WLQ) and the usefulness of such an assessment tool in the modern working organisation.

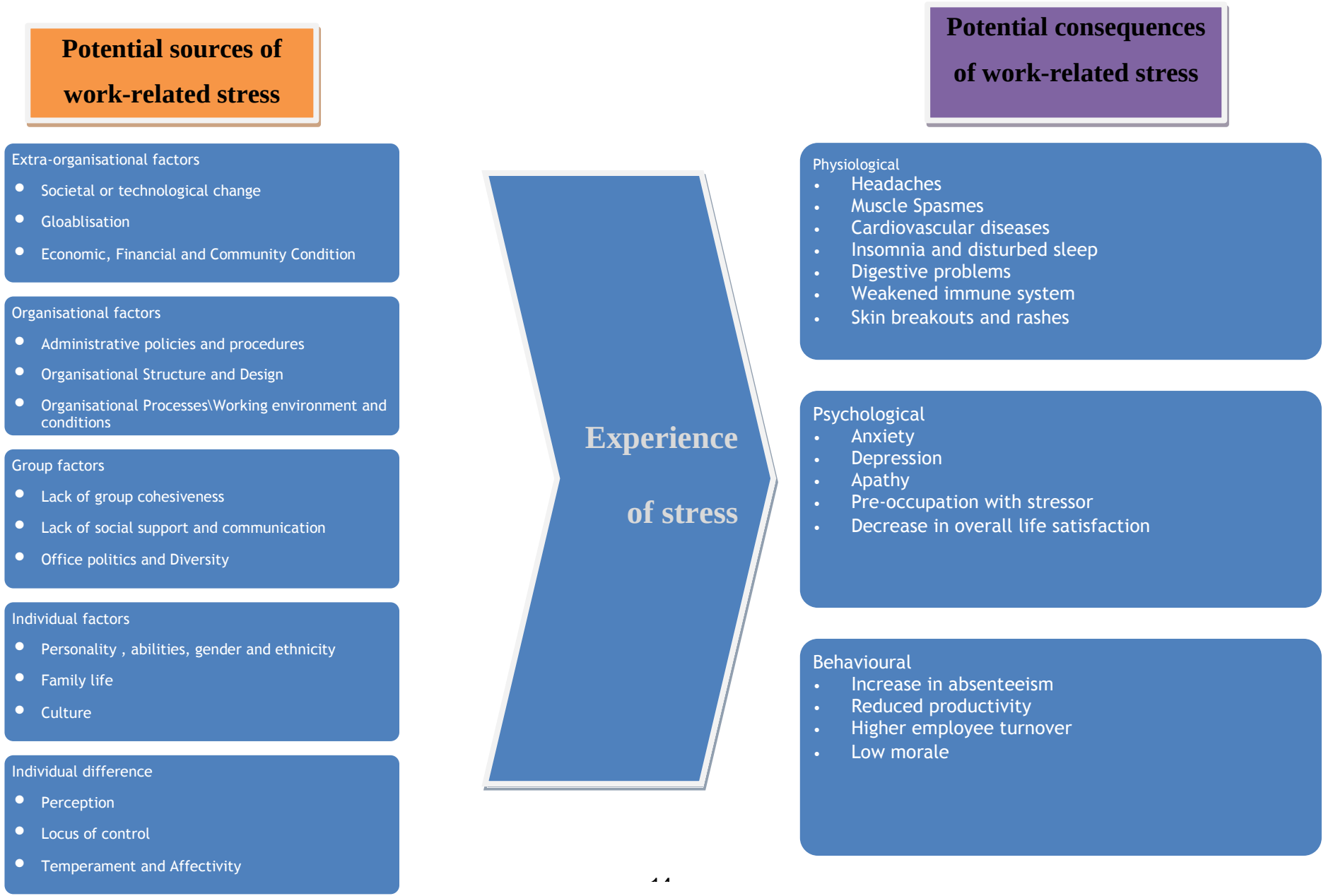


Figure 2.4: Causes and consequences of work related stress adapted from Luthans (2009) and Robbins and Judge (2007)

2.5 The WLQ

The WLQ is based on Cox and McKay's model of stress which is rooted in Lazarus's definition of stress – stress is a result of the relationship between an individual's primary perception and secondary perception of whether an event is perceived as a threat, challenge or harm (Lazarus & Folkman, 1984; MindMuzik, 2013).

According to Van Zyl and Van der Walt (1991) there are four phases in Cox and McKay's model of stress:

- **Phase 1:** The individual's evaluation of the internal and external demands to determine their status (harm, threat, challenge).
- **Phase 2:** The individual's evaluation of his or her ability to cope with the demand perceived in phase 1.
- **Phase 3:** The individual's emotional, cognitive and behavioural response to the identified stressor.
- **Phase 4:** The effect of this response on the individual.

The aim of the WLQ is to determine the level of stress as well as the sources of stress of an employee (MindMuzik, 2013). The first part of the questionnaire consists of 40 items that are related to aspects that could cause an individual to experience stress, such as the availability of social support, self-confidence, conflicts with others, and tendency to experience anxiety or be worrisome (MindMuzik, 2013). The second part of the test consists of 76 items that aim to determine whether stress arises as a result of the individual's personal environment or work environment with regard to circumstances or missed expectations (MindMuzik, 2013).

The WLQ does not define the factors that cause stress outside of the work environment as separate constructs. However, Van der Merwe (2004) suggests that causes of stress outside of the work environment are related to family problems, financial circumstances, phase of life, general economic situation in the country, changing technology, facilities at home, social situations, status, health, background, effect of work on home life, transport facilities, religious life, political views, availability of accommodation and recreational activities.

In the work environment, the unfulfilled expectations are related to organisational functioning, task characteristics, physical working environment, career matters, social matters, remuneration, fringe benefits and personnel policy (MindMuzik, 2013).

Organisational functioning pertains to the following characteristics and expectations of the work environment: employee's contribution to decision making and strategy creation; trust in the supervisor or manager; effective organisational structure; positive management climate; recognition; and degree to which open communication can take place between employee and supervisor or manager (Luthans, 2008). Task characteristics have to do with the extent to which an employee can control his or her work, the level of rewarding challenges experienced from his or her work, the quality of instructions received for a task, the level of autonomy, reasonable deadlines, and enough and a variety of work to keep him or her busy (Luthans, 2008).

Many factors in an individual's immediate working environment can cause loss of concentration and fatigue (Akerstedt et al., 2004). These factors include inadequate lighting, temperature of the working area, availability of proper office equipment, cleanliness of the working area, and distance and condition of the bathrooms (Linton, Hellsing, Halme & Akerstedt, 1994; Luthans, 2008). Career matters can be a source of stress in terms of an

individual's expectations regarding further training, use of skills and talents, career development and job security (Luthans, 2008). Social matters in the workplace are related to the employee's experience of social interaction in the work environment and include expectations with regard to a high status in one's job; positive relations with the manager/supervisor and colleagues; and reasonable social demands (Lundberg, 2005). Employees can be remunerated by means of a fixed, commission-based or piece-rate salary. Fringe benefits include any tangible or intangible reward that the company offers their employees (Luthans, 2008). The financial aspect of work can be a source of stress due to its connection to the individual's livelihood (Luthans, 2008) or the connection that financial reward has with an individual's identity (Wu & Griffin, 2012).

Organisations are currently experiencing a war for talent due to the high demand for talented workers (Berger & Berger, 2011) and any of the aforementioned sources of stress that arise from the workplace are related to higher absenteeism and employee turnover (Greiner, 2008). Therefore, organisations can benefit from using a tool such as the WLQ to determine which aspects of the work environment are deemed unhealthy to the employees.

The results from the WLQ can be used to determine how healthy the organisation actually functions regarding the needs of their employees. Understanding the underlying factors that cause employees to either commit or disengage from work could provide a potential competitive advantage for the organisation (Luthans, 2008).

The challenge with using the WLQ is that it was standardised in 1991 and since then South Africa has undergone some major socio-political changes. The Employment Equity Act prohibits psychological assessment of individuals unless it can be proven that the assessment is not biased towards any group of individuals, is valid and reliable and is fair

(Foxcroft, 2011). Thus, even though the results of the WLQ can be insightful for organisations, the psychometric properties of the assessment must be determined in today's South African population to ensure that the test administrator and developer comply with the Employment Equity Act.

The following section provides an overview of the history of psychological assessment, its relevance in today's society and assessment in South Africa.

2.6 Psychological assessment

2.6.1 Brief Historical Overview of Psychological Assessment

Mankind has persistently searched for different ways in which to measure a person's personal attributes. Ancient astrologers collected data on seasonal patterns to enable them to predict when to sow and when to harvest (Lehoux, 2004). The primitive tool that they used quickly developed into the origin of the Zodiac table (Lehoux, 2004). The Zodiac signs were developed to illustrate the movement of the stars and planets during the different seasons and became a tool to predict the attributes of a person depending on the time of year and season they were born in (Lehoux, 2004). Ancient astrologers evolved this practice from merely diagnosing an individual's personality to predicting life events by using the same calculations used to predict seasonal changes (Lehoux, 2004).

Many people steered away from using astrology due to their strong religious convictions against fortune telling that led to assessing people based on association (Berland, 2003). The doctors used association to create medicine for different diseases such as to cure kidney infections with a plant that has the same appearance as a human kidney (Berland,

2003). It was believed that a person's personality and character were expressed through their face (Boshears & Whitaker, 2013). This practice is called Physiognomy (Berland, 2003).

The practice of Phrenology is consistent with physiognomy but states that the brain is organised into functional sections in which the different parts of a person's personality and character are hidden (Boshears & Whitaker, 2013). The more of a specific trait a person possessed, the larger that part of the brain (scull) appeared. Thus it was believed that the bumps and crevices on the scull were evidence of the prominence or lack of some aspect of personality or character (Boshears & Whitaker, 2013; Foxcroft & Roodt, 2005).

As time passed, the need to differentiate between people based on their mental ability and intelligence rather than physical attributes became greater. The concept of measuring a person's mental ability was coined as a *mental test* by James McKeen Cattell in 1890 (Geisinger, 2000).

In the same era, Alfred Binet developed an intelligence test for school children in France to assist the teachers in separating the children according to their learning ability (Geisinger, 2000). The outbreak of World War I required an efficient and effective way to sort people according to their ability to learn new tasks (Christie & Montiel, 2013). Psychological assessments were also used during World War II to sift out troops with potential psychiatric disorders or who suffered from psychopathology (Christie & Montiel, 2013).

Psychometric assessments were introduced to South Africa during the 1900s and are still commonly used by professional psychologists. The next section discusses psychometric assessments in South Africa in more depth.

2.6.2 Psychometric Assessment in South Africa

The use of Psychological assessments in South Africa follows international trends as most assessments were imported and developed by westernised countries (Mauer, 2000; Van de Vijver & Rothman, 2004). Pre-1980 the country was still under the Apartheid regime and therefore limited research was conducted on the potential bias that arose due to the fact that the test was administered in a multi-cultural context even though it was designed with English and Afrikaans people in mind (Van de Vijver & Rothman, 2004).

During the 1980's greater interest was shown in research about the presence of bias psychometric assessments in South Africa and was found that there are different cultural artifacts and language barriers that caused this bias (Van de Vijver & Rothman, 2004). For example, feelings of hostility, aggression, frustration and anger describe different emotions of an individual in English but in some African languages there might be one word that describes that emotion (Foxcroft, 2011). The danger was that organisations used psychological assessments as part of recruitment and selection practices which favoured white applicant over non-white applicants for a particular positions (Foxcroft & Roodt, 2005).

The end of Apartheid lead to the development of the Employment Equity Act 55 of 1998 section 8 which states that: "Psychological Testing and other similar assessments are prohibited unless the test or assessment being used – (a) has been scientifically shown to be valid and reliable, (b) can be applied to all employees, and (c) is not biased against any employee or group." (Employment Equity Act, 1998). There is currently debates surrounding the amendment of the law to include that (d) the assessment has to be certified by the HPCSA (Dowdeswell, 2012) Thus in South Africa the responsibility falls unto the practitioner to be responsible in selecting and using assessments that are culturally fair and unbiased

(Van de Vijver & Rothman, 2004). The intention of this law is good but the application thereof appears to be a challenge for practitioners (Kubiszyn, et al., 2000).

The following section provides a discussion on the relevance of psychometric assessments in the work context.

2.6.3 Relevance of Psychological Assessments

There is an ongoing debate about the future of psychological assessments. It is believed that the use of psychometric assessments has decreased over the past few decades due to the vast amounts of research that a psychological practitioner has to sift through to ensure that the assessment adheres to the requirements of the Employment Equity Act and the regulations set out by the Health Professions Council of South Africa (Kubiszyn et al., 2000). According to the Health Professions Act 56 of 1974 only a registered professional can administer a psychometric assessment. This responsibility resonates with the inner accountability of a psychological practitioner to uphold their ethical oath and ensure the realisation of the objectives of the laws governing the assessment of individuals (Benjamin & Louw-Potgieter, 2008).

It is also believed that the scope is too great for a practitioner to sift through all the research and to still maintain a profitable practice (Kubiszyn et al., 2000). Some authors argue that the solution is to create local psychological assessments instead of importing them or to translate the imported assessments into the 11 official languages (Paterson & Uys, 2005). The challenge with translating psychological assessments is that there are nuances and expressions that cannot truly be translated into all 11 official languages (Foxcroft, 2011).

Others believe that the use of psychometric assessments should be completely abandoned and replaced with behavioural interviews (Kubiszyn et al., 2000). This mindset poses a great threat to the profession of psychology as the use of psychological assessments is a defining factor in this profession. Hence it is imperative for psychologists to take up the responsibility of updating and developing sound psychometric assessments (Camara, Nathan, & Puente, 2000; Foxcroft & Roodt, 2005; Groth-Marnat, 2009). Shuttleworth-Jordan (1996) suggests that professionals should not reinvent the wheel. This author points out that the work environment moulds employees into becoming more westernised and therefore redesigning assessments that already exists could end up being redundant (Shuttleworth-Jordan, 1996). Thus, instead of creating all new assessments, it is suggested that current imported assessments or outdated local assessments be re-standardised to current South African norms (Patterson & Uys, 2006; Shuttleworth-Jordan, 1996).

According to Foxcroft and Roodt (2005), psychological assessments are great tools in the South African workplace due to their ability to identify strengths and areas of development, illustrate whether development or progress has taken place, and select the most suitable candidate for a position. It provides an objective view of the individual and knowledge about the individual's functioning that might have otherwise gone unnoticed (Moerdyk, 2009). Organisations can use psychological assessments as part of their selection and recruitment practices, career development, performance appraisals and succession plans (Berger & Berger, 2011).

Psychological assessment in the workplace is a powerful HR tool, but it is also a visible mechanism that regulates job opportunities and therefore should be approached with some caution in this environment (Theron, 2007). Even though personality, intelligence, aptitude

and interests assessments are mostly administered in the workplace, there are other assessments available that focus on the wellbeing of an employee and could assist in the healthy functioning of the organisation (Foxcroft & Roodt, 2005). The *Experience of Work and Life Circumstances Questionnaire* is an example of a stress assessment used in organisations as part of their employee wellness initiatives. The assessment provides valuable information about factors surrounding an employee's work life that could cause stress.

The purpose of the current study identifies with the argument proposed by Shuttleworth-Jordan (1996) and thus aims to add to the development and updating of a psychometric assessment that could provide rather valuable information to organisations.

2.7 Conclusion

The chapter provided an overview of the different theories of stress and their relation to challenges that arise in the workplace. The literature illustrated how stress is directly related to levels of absenteeism, employee turnover and accident rates. The causes of stress for an individual are due to his or her perception of the stressor. According to the literature and the scales in the WLQ, the characteristics of the working environment that could potentially cause stress are related to organisational functioning, task characteristics, the physical work environment, career matters, social matters, remuneration, fringe benefits and personnel policy.

It was further illustrated that psychometric assessments could provide insight in this regard but, due to the legislative requirements that psychometric assessments need to adhere to, some professionals argue that the use of psychometric assessments should be replaced with

behavioural interviews. The chapter pointed out that the researcher takes on the perspective of Shuttleworth-Jordan (1996), focusing on the re-standardisation and improvement of existing assessments to ensure their adherence to the requirements as set out in the Employment Equity Act. The next chapter describes the process followed to acquire the results that answers the research objectives.

Chapter 3: Methodology

3.1 Introduction

The purpose of this chapter is to outline the method of investigation used in the present study. The main objective of the research is to determine the psychometric properties of the *Experience of Work and Life Circumstances Questionnaire* (WLQ), with specific focus on the reliability and dimensionality of the scales in the WLQ and its structural validity. Particular care should be given to the approach used to attain the data and a clear plan should be set out on what will be done with the data once the information has been gathered (Blumberg, Cooper, & Schindler, 2008). A clear structure and process to be followed in conducting the research will effectively assist the researcher to answer the research objectives. This chapter defines the research design, sampling method, data collection, data analysis and ethical considerations in the present study.

3.2 Research design

The research design is a strategic framework that outlines the action plans required to bridge the gap between the research objectives and the execution of the research (Terre Blanche, Durrheim, & Painter, 2006). The research paradigm forms the foundation of the strategic framework and establishes the manner in which data are collected, analysed and interpreted (Babbie, 2013).

3.2.1 Research Paradigm

A paradigm is a frame of reference used to organise observations and reasoning (Babbie, 2013). It is the underlying principle that governs the manner in which the researcher gathers, analyses and interprets the data (Terre Blanche et al., 2006).

Two paradigms lie at the core of the research design, namely quantitative and qualitative research paradigms. A quantitative research design aims to quantify the variation or relationship between events, phenomenon and social interactions (Kumar, 2011). As it aims to test theories instead of creating them, it applies a deductive reasoning approach (Bryman, 2012). The advantage of a quantitative research design is that the findings are more generalisable compared to the findings of a qualitative research design, but it lacks the richness of data that qualitative research offers (Terre Blanche et al., 2006).

Various research paradigms stem from the two major paradigms because of the great need to study phenomenon in different ways (Terre Blanche et al., 2006). The variety of research paradigms available differ from one another in their epistemology and ontology. Epistemology is concerned with the nature and scope of knowledge whereas ontology studies the nature of social entities and what is perceived to be reality (Bryman, 2012). Table 3.2.1 summarises the different paradigms according to its epistemology, ontology and methodology.

The positivistic paradigm claims that there is a certain standard that has to be met before something can be proven as truth and knowledge and observations are based on realistic factors as experienced through the five senses (Babbie, 2013). The positivistic paradigm forms the basis for most quantitative research due to its objective nature (Babbie, 2013). The

current study requires objectivity and quantifiability of its results and therefore it is quantitative and positivistic in nature.

Table 3.2.1 : Summary of research paradigms adapted from Terre Blanche et al., (2006:6)

Paradigm	Ontology	Epistemology	Methodology
Positivistic	• Stable external reality • Rigid	• Objective • Disconnected observer	• Validation • Experimental • Quantitative • Hypothesis testing
Interpretive	• Internal reality of subjective experience	• Empathetic • Observer subjectivity	• Interactional • Interpretation • Qualitative
Constructionist	• Socially constructed reality	• Suspicion • Observer constructing versions	• Deconstruction • Textual analysis • Discourse analysis
Post-modernistic	• Reality is as a result of social norms	• Subjective • Detached observer	• Qualitative research

3.2.2 Type of Research

The next step in research design is to determine the character of the research: is it descriptive, exploratory or experimental? Or does it focus on validating a psychometric instrument? A validation study aims to determine the statistical conclusion, internal construct

and external validity of a psychometric test (Blumberg et al., 2008). As the main focus of this study was to determine the reliability, dimensionality and structural validity of the WLQ, the type of research done was validation research (Straub, Boudreau & Gefen, 2004).

3.2.3 Research Approach

Another aspect of the research design is whether it is experimental, non-experimental or quasi-experimental in its approach. In an experimental research design the researcher manipulates certain variables to study the effect thereof on other variables (Babbie, 2013). In a non-experimental research design the researcher does not manipulate the variables and studies the phenomenon as is or as it naturally develops (Kumar, 2011).

In this study there were no selected variables as it merely investigated the psychometric properties of the WLQ and did not aim to study a cause–effect relationship. As no manipulation of variables took place, a non-experimental research design was adopted in this study (Kumar, 2011).

3.2.4 Intent of research

Basic research is embarked on in pursuit of new knowledge while applied research is based on a practical need to know (Babbie, 2013). The current study focused on establishing the psychometric properties of an existing psychometric assessment to determine its adherence to the requirements of the law. Therefore, being rooted in a practical need to know, this study is applied research.

3.3 Sampling

The population of a study is a larger pool of units of analysis that are the main focus of the research study (Bryman, 2012). In the present study the population comprises employees in the automotive industry. According to Bryman (2012), it might be difficult to obtain a sample from a population due to its size and therefore the author suggested establishing a sampling frame. A sampling frame is the point of access to the population from which the researcher can select a sample (Bryman, 2012). In the present study the sampling frame comprised individuals working for a specific automotive company, across 15 departments and from different ethnicities, language groups and genders.

There are different aspects of data sampling that influence the quality of the results such as the sampling strategy and sample size (Welman, Kaugen & Mitchell, 2012). Each of these aspects are discussed further in the following sections.

3.3.1 Sampling Strategy

Two sampling strategies can be used to obtain the sample, namely probability sampling (PS) and non-probability sampling (NPS). PS is a sampling method where the selection of elements for the sample is based on randomness while NPS is a method where the elements for the sample are not selected randomly (Babbie, 2013).

Babbie (2013) argues that PS in social research is not always purely based on randomness because the individuals who choose to participate could represent a certain type of character and thus affect the representativeness. Consequently, NPS is the more commonly used sampling strategy in social research.

Convenience sampling is a NPS method that is used when the participants are available at the convenience of the researcher (Babbie, 2013); thus the researcher takes advantage of the natural gathering of the participants to create the sample (Remler & van Ryzin, 2011). In the present study the researcher approached the general managers (GMs) of 15 different departments and asked their permission and support to conduct the study. The GMs provided the researcher with adequate access to the sampling frame.

3.3.2 Sample Size

The sample size of a study has a great impact on the generalisability of the results (Terre Blanche et al., 2006). There are two main reasons for obtaining a larger sample, namely to decrease the sample bias and to increase the statistical power (Loewenthal, 2001). A challenge to obtaining a large sample size is the availability of respondents (Babbie, 2013). A sample size of 217 respondents was selected for the study due to the availability of candidates during the time frame in which the assessment was administered.

Costello and Osbourne (2005) provide a practical rule of thumb to calculate an adequate sample size. The method for determining a sample size is based on a subject-to-item ratio of between 5 and 10 respondents per item (Costello & Osbourne, 2005). Scale A consists of 40 items and there were 5.5 respondents per item, which is sufficient. Scale B consists of 16 items and there were 13.5 respondents per item, which is more than sufficient. Scale C has six subscales which consist of 8, 15, 8, 9, 8 and 15 items respectively. The subject ratio was between 14 and 27 respondents per item, which is more than sufficient (Van Zyl & Van der Walt, 1991).

3.4 Data collection

The sample determines from where the data will be sourced, but it is important to determine the unit of analysis of the study – in other words the "what" or "who" being studied in the research (Babbie, 2013). In this study the psychometric properties of the WLQ were the "what" being studied and therefore the reliability, dimensionality and structural validity of the WLQ were studied.

The data used in research can be based on primary or secondary data. Primary data refer to data that did not exist previously (Babbie, 2013). In the current study the data were sourced directly from respondents via a questionnaire and did not exist previously, which makes it primary data.

The study can be further defined by the frequency of data collection over a period of time; thus a study can be longitudinal or cross sectional (Blumberg et al., 2008). The present study obtained data from participants once and therefore it is a cross-sectional study (Kumar, 2011).

There are various methods by which data can be sourced from the sample, for example by means of surveys, questionnaires or interviews (Kumar, 2011). In this study data were sourced by administering the WLQ. The WLQ is a paper-and-pen-based questionnaire that consists of three sections (Van Zyl & Van der Walt, 1991). The first section (Scale A) consists of 40 items that focus on establishing the respondents' overall level of stress (Van Zyl & Van der Walt, 1991). The second section (Scale B) consists of 23 of which items 8 to 23 focus on determining the factors outside of the workplace that might make the respondent susceptible to stress (Van Zyl & Van der Walt, 1991). The third section (Scale C) consists of 53 items that, together with the first 7 items of Scale B, define 6 subscales focused on factors

within the work environment that might be a source of stress (Van Zyl & Van der Walt, 1991). Table 3.4 provides a summary of how the items are divided into the different scales.

The items are answered on a likert scale with five options where “1” is virtually never, “2” is sometimes, “3” is reasonably often, “4” is very often and “5” is virtually always (Van Zyl & Van der Walt, 1991).

The research instrument determines what type of data is obtained for the research and the sample determines the quality of the data that is extracted for research purposes. The key to answering the research question is, however, determined by the data analysis techniques. The following section describes the variety of data analysis techniques applied to answer the research question.

Table 3.4: Summary of the scale composition of the WLQ

Scale	Description	Item
Scale A	Level of stress	A1-A40
Scale B	Causes outside of work	B8-B23
Scale C1	Organisational functioning	B 1, C1, C18, C21, C40, C41, C45, C52
Scale C2	Task characteristics	B2, C3,C4, C5, C6, C8, C17, C19, C20, C27, C28, C39, C42, C46, C47
Scale C3	Physical environment	B3, C9, C22, C23, C24, C29, C34, C37
Scale C4	Career matters	B4, C10, C11, C12, C26, C33, C43, C48, C51
Scale C5	Social matters	B5, C14, C15, C30, C31, C44, C50, C53
Scale C6	Fringe benefits, remuneration and personnel policy	B6, B7, C2, C7, C13, C16, C25, C32, C35, C36, C38, C49

3.5 Data analysis

The different statistical analysis techniques used in the study are explained in the following section.

3.5.1 Descriptive statistics

The purpose of descriptive statistics is to reduce the data from unmanageable details to manageable summaries (Montgomery & Runger, 2011). In the study conducted in 1989 descriptive statistics was used to obtain a summary of the composition of the sample and an item analysis and to determine correlations between the different fields of the WLQ (Van Zyl & Van der Walt, 1991). That study specifically focused on comparing groups according to language groups instead of race or gender. In the present study the researcher compares the sample with the sample from 1989 based on language groups to illustrate how the demographics have changed.

3.5.2 Cronbach-Alpha Reliability Test

Reliability can be defined as the consistency with which the items within the assessment measure the construct it sets out to measure (Foxcroft & Roodt, 2005). The present study aimed to determine the inter-item reliability. Inter-item reliability determines the consistency of the responses to the items in the assessment (Foxcroft & Roodt, 2005). The Kuder-Richardson or Cronbach-Alpha formula (CA) is used to establish the reliability (Foxcroft & Roodt, 2005). The Kuder-Richardson 8 (KR 8) formula was used to determine the inter-item consistency with the standardisation of the WLQ in 1989 (Van Zyl & Van der Walt, 1991). It resulted in a KR 8 score of between 0.83 and 0.92, which is regarded as satisfactory (Van Zyl & Van der Walt, 1991).

According to Foxcroft and Roodt (2005), the KR formula is used for items that are dichotomous; in other words it is used on items that have either a right or wrong answer. The WLQ – as with other attitude and personality assessments – has no right or wrong answers and aims to capture the state of a person. Therefore, in the current study the CA formula was used to determine the inter-item reliability. The results obtained from the CA formula are, however, interpreted in the same way as those of the KR formula (Loewenthal, 2001). The CA statistic will fall between -1 and 1, where 1 illustrates a coefficient that is positively correlated, -1 illustrates a coefficient that is negatively correlated and 0 illustrates coefficients that are not correlated (Loewenthal, 2001). A Cronbach-Alpha score of above 0.90 is considered to be excellent, between 0.80 and 0.89 good, between 0.70 and 0.79 fair and for values below 0.70 not acceptable (Dumont, Kroes, Korzillius, Didden & Rojahn, 2014).

3.5.3 Exploratory Factor Analysis

Dimensionality is the structure of a construct or a phenomenon that indicates which latent traits are explained by which items (Slocum-Gori & Zumbo, 2011). Exploratory factor analysis (EFA) is commonly used in validation studies since it identifies the underlying factor structure of the instrument without any influence from the researcher (Hayton, Allen & Scarpello, 2004; Weng & Cheng, 2005). It can be broadly defined as a statistical analysis that focuses on reducing data and sorting the variables according to common factors that explain the patterns of the observed correlations (Hayton et al, 2004). It thus determines the dimensionality of the scales. In this study Statistical Package for Social Science version 22 (SPSS22) was used to conduct EFA.

The factorability of the sample needs to be determined before EFA can be conducted (Dzuiban & Shirkey, 1974). There are two measures that are included in the SPSS package,

namely Barlett's test for sphericity and the Kaiser-Maiken-Olken's (KMO) measure of sample adequacy. If Barlett's test for sphericity is significant ($p < 0.05$) and KMO is greater than 0.6, the sample is adequate to act as a factor (Dumont et al., 2014). Once the factorability of the sample is confirmed, EFA can commence. There are key aspects of EFA that play a critical role in defining the number of factors of the underlying structure, namely factor retention, rotation and extraction, which are explained in the following section.

a) Factor Retention

Factor retention is the process which results in the number of factors to retain in EFA (Weng & Cheng, 2005). This activity plays a crucial role in the accuracy of factor analysis as some techniques could lead to over-extraction or under-extraction of factors, which results in erroneous conclusions (O'Connor, 2000). Over-extraction could lead to factor splitting, which results in a greater number of factors with lower factor loadings and could cause the researcher to inaccurately attribute importance to insignificant factors (O'Connor, 2000). Under-extraction could result in fusion of two or more factors, thus increasing error loadings that could lead to the researcher neglecting potentially noteworthy factors (O'Connor, 2000).

With this in mind, there is a selection of factor retention methods to choose from. The most common factor retention technique is called the Kaiser criterion technique in which factors with an Eigenvalue > 1 are retained (Nelson, Canivez, Lindstorm & Hatt, 2007). Following this approach is Cattell's scree plot method in which Eigenvalues are plotted unto a graph and examined for discontinuities (Weng & Cheng, 2005). In recent research this has been known to over-extract factors, which could make it more difficult to interpret the results (Hayton et al., 2004).

Both the Kaiser criterion and Catell's scree plot methods are based on heuristic techniques and not statistical methods (Gaskin & Happell, 2014). Parallel Analysis (PA) is a factor retention technique that has gained more popularity in recent studies (Gaskin & Happell, 2014; O'Connor, 2000) and is based on statistical methods (Gaskin & Happell, 2014). PA analysis creates a random data set based on the sample size of the study and the number of items in the assessment (Hayton et al., 2004). It then extracts Eigenvalues from the random data set parallel to the actual data set (O'Connor, 2000). The factors are retained on condition that the Eigenvalue of the factor from the actual data set is greater that the Eigenvalue of the factor from the random data set, again on condition that the raw Eigenvalue is greater than 1 (Weng & Cheng, 2005). This has proven to result in a more accurate method for factor retention (Hayton et al., 2004).

The main reason for the over-reliance on the Kaiser criterion and the scree plot methods is because it is included in most of the statistical packages, whereas PA needs to be calculated either by hand or by writing a syntax in SPSS (O'Connor, 2000). This syntax is provided in O'Connor's (2000) article and was adapted to suit the current study (see Annexure A).

b) Factor Extraction

There are six different methods of factor extraction included in SPSS that could potentially yield different results (Costello & Osbourne, 2005; Gaskin & Happell, 2014). Some of the methods are applicable to normally distributed samples (maximum likelihood and generalised least squares method) while other methods are applicable to samples that are not normally distributed (principle axis factoring (PAF), unweighted least squares, image factor analysis and alpha factoring) (Gaskin & Happell, 2014).

PAF has been proven to yield superior results and is the recommended extraction method for PA (Gaskin & Happell, 2014; Weng & Cheng, 2005); thus PAF in SPSS was the extraction method used for EFA in the present study.

c) Factor Rotation

The purpose of factor rotation is to clarify the current data structure and therefore factor rotation is commonly performed to obtain data that are easier to interpret than the initial factor (Costello & Osbourne, 2005; Gaskin & Happell, 2014). There are two types of rotation, namely orthogonal rotation and oblique rotation (Tonsing, 2013).

Orthogonal rotation is used if it is assumed that factors are not correlated and oblique rotation is used when it is assumed that the factors are correlated (Costello & Osbourne, 2005). In social science factors are rarely divided into independent factors and therefore oblique rotation will provide a more accurate solution (Costello & Osbourne, 2005). Furthermore, oblique rotation can be applied to factors even if they are completely uncorrelated and it will still yield the same results as when orthogonal rotation has been used, but if orthogonal rotation is applied to correlated factors, different results would be rendered compared to when oblique rotation has been applied (Gaskin & Happell, 2014). Thus, whether factors are correlated or not correlated, oblique rotation is the most favourable rotation technique to use in EFA. The method selected in SPSS is Promax with a default Kappa 4 value (Costello & Osbourne, 2005).

The main objective of conducting the EFA was to determine the dimensionality of the WLQ as it affects the quality of the instrument as a whole (Smits, Timmerman & Meijer, 2012). If the developers designed the scales of the WLQ to measure one specific construct

(unidimensional) and it appeared as if more than one construct was measured (multidimensional), the validity of the scales would come into question. The probability of the scales being purely unidimensional is quite small and it was expected that there would be some level of noise. For this reason, if some of the scales were found to be multidimensional, the researcher would conduct bi-factor analysis (Wolff & Preising, 2005).

3.5.4 Bi-factor Analysis: The Schmid-Leiman Approach

In assessments that measure substantively complex constructs – such as stress or depression – it is scarce to find a purely unidimensional construct as the construct in itself aims to measure one thing (stress or depression) but also measures different facets of the same thing (Reise, Moore & Haviland, 2010). For example, depression is indicated by lacklustre, loss of appetite and moodiness (Van der Merwe, 2004). The aforementioned are all different facets of depression, yet each is an indication of depression. Therefore, in many cases where assessments indicate essential unidimensionality, they indicate evidence of multidimensionality at the same time (Reise et al., 2010). The general or secondary factor is the overall factor that the items intend to measure and the group factors are smaller factors within the general factor that are uncorrelated with one another but are correlated with the general factor (Wolff & Preising, 2005). If the general factor explains more than 60% of the total variance of the factor, it can be assumed that the factor is essentially unidimensional (Wolff & Preising, 2005).

Bifactor analysis is conducted to determine the presence of a general factor. In the present study the Schmid-Leiman analysis was used. Hierarchical factor analysis assumes that the group factors are correlated because they correlate with the general factor. The disadvantage with this method is that the high correlation between group factors accounts for

a larger percentage of the explained variance, which hinders the process of determining unidimensionality (Wolff & Preising, 2005).

The Schmid-Leiman analysis determines each group factor's correlation with the general factor without assuming a correlation between the group factors (Wolff & Preising, 2005). It results in a stronger general factor which is more advantageous in establishing essential unidimensionality. The Schmid-Leiman analysis was used in the present study to measure the quality of the items in regard of its measurement of the general factor. This analysis indicates problematic items that measure a factor other than the general factor and therefore should be removed (Reise et al., 2010).

In order to make use of the Schmid-Leiman analysis, a syntax for SPSS22 was written to conduct a second-order factor analysis (see Annexure B). The results from the second-order factor analysis were uploaded on the Schmid-Leiman Analysis Program that was developed by Ian Rothman Jr.

Once the dimensionality of the scales was determined the second-order structural validity of the proposed model could be tested using a structural equation modelling technique, namely confirmatory factor analysis.

3.5.5 Structural Equation Modelling (SEM)

In the present study EQS is the statistical software used to conduct SEM. Structural equation modelling (SEM) is a technique that comprises a variety of statistical techniques that enable the researcher to study the relationship between an independent and dependent variable (Ullman, 2006). The examination of this relationship is especially useful in testing theories as it determines the structural validity of such a theory (Ullman, 2006). In essence, SEM is a

technique that combines regression analysis and factor analysis to study this relationship (Savalei & Bentler, 2009). There are different measurement models available to use in SEM. In this study the researcher made use of confirmatory factor analysis techniques.

a) Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) is the measurement model of SEM that relates the variables or items to the different constructs (Iacobucci, 2009). CFA differs from EFA in that it allows the researcher to hypothesise the theoretical structure on which the data are imposed (Iacobucci, 2009), whereas EFA identifies the overarching structure that explains the relationship that arises between variables (Santor et al, 2011). In this study the researcher hypothesised the structure as presented in Figure 3.5.5. A second-order CFA was conducted with "overall level of stress" identified as the second-order latent variable, which is represented by F4 in Figure 3.5.5. Scale A (F3), Scale B (F2) and Scale C (F1) represent the latent variables that are measured by the items from each of the scales. Due to the proposed unidimensionality of Scale A and Scale B, these scales were interpreted as the observed scales of F4. The subscales of Scale C are represented by V1 to V6 respectively.

CFA was used to determine the structural validity of the WLQ by comparing the proposed theoretical model of the WLQ to the model derived from the data (Ullman, 2006). The performance of the hypothesised model was determined by combining a variety of "goodness-of-fit" statistics such as Santorra-Bentler Chi-Square Statistics, comparative fit index (CFI), normed fit index (NFI), non-normed fit index (NNFI) and the root mean squared error of approximation (RMSEA).

CFA only accounts for the covariance among the items (thus ignoring error variance), unlike common factor analysis that accounts for variance attributable to the underlying factor and error variance (Santor, et al., 2011). Thus variance error is illustrated in the diagram as a latent variable.

CFA clearly links items to hypothesised factors by illustrating factor loadings of the measurable variable onto the latent variable (Iacobucci, 2009). A factor loading of 0.5 or higher illustrates a good factor loading (Iacobucci, 2009). The next step in SEM is path modelling.

b) Path Modelling

Path modelling in SEM relates constructs to other constructs (Iacobucci, 2009). The correlation between the constructs is represented by Cohen's Kappa which is calculated by multiplying the factor loadings of the scales with one another (Dumont et al., 2014). It can be expected that Scale C will have an inverse relationship with Scale A and Scale B respectively (a negative factor loading), due to the difference in interpretation of its score compared to Scale A and Scale B. A high score on Scale A and Scale B is indicative of a high level of stress, whereas a low score on Scales C1 to C6 indicates a high level of stress. For this reason Cohen's Kappa is calculated using a positive value for Scales C1 to C6.

Cohen's Kappa is the measurement of agreement of how the participants rate certain items where the rating is not as a result of error or coincidence (Dumont et al., 2014). It therefore calculates the inter-rater reliability. In other words, it determines the extent of agreement in the manner in which participants answered items on one scale compared to another scale.

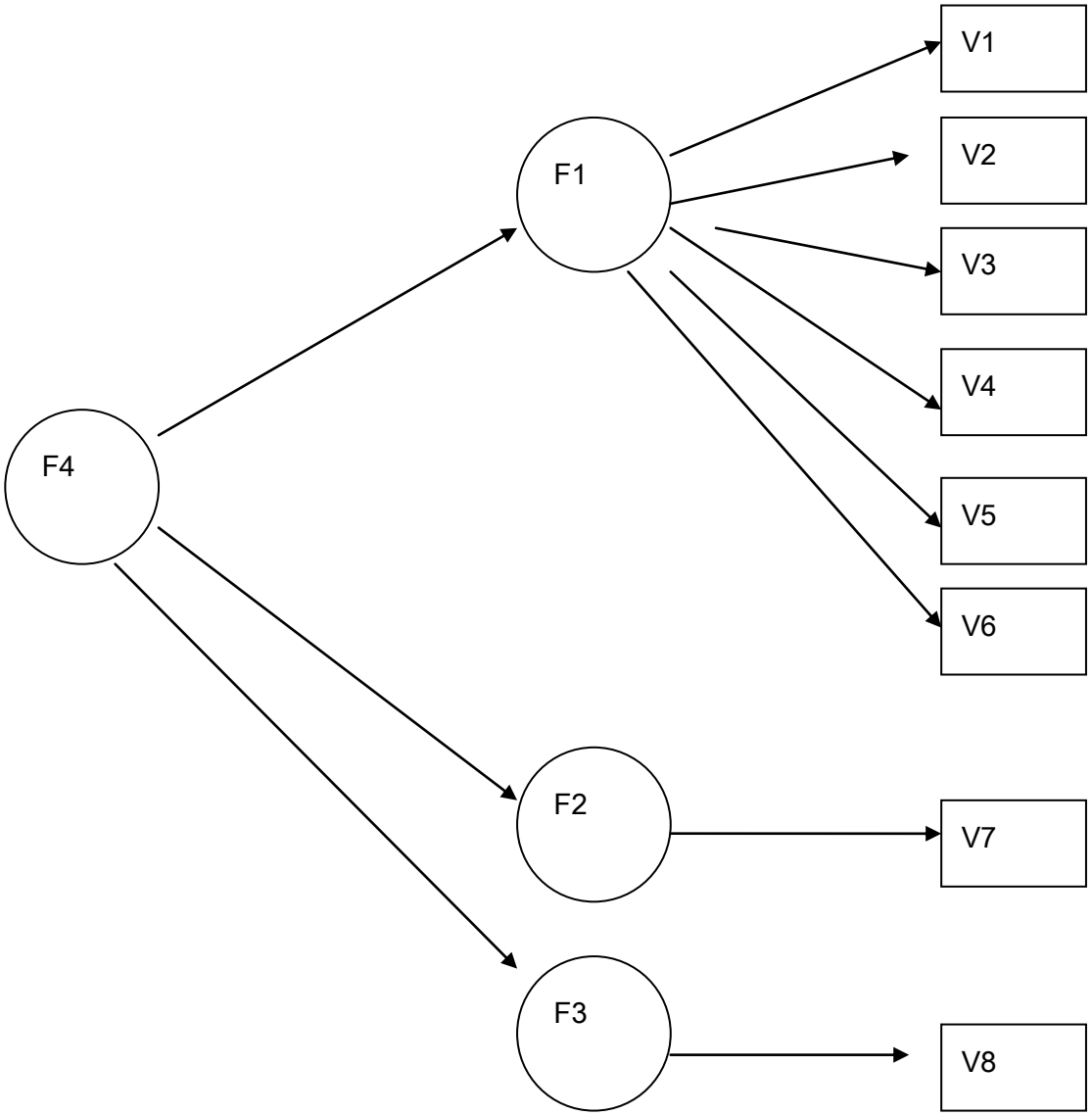


Figure 3.5.5: Hypothesised Theoretical Structure for CFA

Dumont et al. (2014) suggest that Kappa scores below 0.40 are insufficient; between 0.40 and 0.59 are moderate; between 0.60 and 0.74 are good; and between 0.75 and 1.00 are excellent. McHugh (2012) explains that negative Cohen Kappa scores (scores below 0) indicate strong disagreement amongst raters (McHugh, 2012). The effect of f bias is greater when the Cohen's Kappa value is small (closer to 0) or has a negative value compared to when it has a larger positive value (closer to 1). Thus, a small or negative Cohen's Kappa value could indicate the presence of bias and it is suggested that a tool is adapted if these values occur (McHugh, 2012).

3.6 Research ethics

Ethics are norms and behaviours associated with morality and assist an individual to distinguish between what is right and wrong (Babbie, 2013). In the psychological field and in research there are ethical standards that the professional needs to comply with due the potential intrusive nature of such research (Babbie, 2013). Research could require of an individual to disclose information that is sensitive with no true benefit to the participant except the benefit of potentially benefiting the greater community (Babbie, 2013).

For this reason, a researcher should not force an individual to participate in a research study and should use ethical guidelines to govern the execution of the research (Babbie, 2013). The Health Professions Council of South Africa (HPCSA) has created guidelines for social researchers on ethical research practice. These guidelines include acting in the interests of the research participants, respect for research participants, informed consent, research participant confidentiality, impartiality and justice and duties of the researcher (Health Professions Council of South Africa [HPCSA], 2008). These guidelines are parallel to the ethical guidelines set out in the Belmont report which includes respect of persons,

beneficence, justice, informed consent, assessment of risk and benefits and selection of subjects (Human Subject Research, 1979). The aforementioned practices are discussed in the next section, which also include how the researcher went about ensuring adherence to the principles.

3.6.1 Acting in the Interest of the Research participants

The relationship between the researcher and the respondent is an imbalanced relationship where the researcher is placed in a position of power (HPCSA, 2008). Because of the imbalanced relationship, the researcher must ensure that he or she always honours the trust that the respondents place in their intentions and must act in the best interest of the respondents by placing their well-being, privacy and dignity above his or her own interest (HPCSA, 2008).

In the present study, the research does not pose a high risk for respondents and the researcher upheld this principle by respecting the respondents' privacy and by responding to their queries in a constructive and informative manner.

3.6.2 Respect for Research Participants

The information obtained from respondents for research could be sensitive and the researcher must therefore ensure that respondents are treated with respect at all times by treating them with consideration, respecting their privacy and upholding their human rights (HPCSA, 2008). The Belmont report requires *beneficence,* which is understood to cover acts of kindness that go beyond the researcher's obligations (Human Subject Research, 1979). Acts of beneficence include that no harm is done to participants, benefits are maximised and potential harms are minimised (Human Subject Research, 1979).

The study ensured respect for participants by treating the respondents with politeness and diplomacy.

3.6.3 Informed Consent

It is unethical for a researcher to withhold information about the research study from the respondents unless it can be justified that the benefit of withholding the information substantially outweighs the damage it could cause to the respondents. Also, the respondents should receive a proper debriefing after the research is done (HPCSA, 2008). But this type of research is not very common and therefore informed consent should be obtained from respondents before they take part in the study.

Informed consent can be defined as the permission obtained from respondents to take part in a study, with full knowledge of the purpose of the study and the consequences for taking part in the study (Terre Blanche et al., 2006). This requires of the researcher to ensure that the participants have sufficient knowledge of the purpose of the research. They should also be informed of their right to revoke their consent at any time during the study without any consequences and about the limits to confidentiality in the case where the data are inspected by the National Health Research Ethics Committee (HPCSA, 2008). The informed consent should be obtained from the participants in writing to ensure that the respondent understand what is required (HPCSA, 2008). According to the Belmont report (1979), a key driver of informed consent is voluntary participation.

In the present study informed consent was obtained from the respondents via the informed consent documentation attached as Annexure C. The purpose of the research was explained to the respondents and they were given the opportunity to ask questions about the research

if they had any. It was further explained to them that the results from the study would be shared with their GM as an aggregate and, therefore, through the manner in which the data were to be presented to the GM, their individual responses would not be identifiable. The respondents were informed of their right to participate and that they could withdraw from the study at any point in time without negative consequences. After this information was relayed to the respondents, they were given the opportunity to sign the informed consent document.

3.6.4 Research Participant Confidentiality

Confidentiality can be defined as the act where information provided by an individual is safeguarded by a professional or researcher unless permission has been obtained from the individual to disclose the information (Terre Blanche et al., 2006). Confidentiality is important because it speaks to the ethical principle of respecting the research participants by acting in their best interest and protecting their privacy and dignity. It is the responsibility of the researcher to ensure that the respondents' identity is protected and the information that they provide is safeguarded.

In the present study confidentiality was insured by limiting access to the information to the researcher. In other words, the researcher captured the data and was the only person who had access to the data.

The researcher required anonymous participation to further support the confidentiality of the respondents and made sure that it would not be possible to single out the respondents from the data. The respondents provided their names purely for individual feedback purposes and not for research purposes.

3.6.5 Impartiality and Justice

The researcher must ensure that he or she does not discriminate against the research participants based on their demographic makeup unless it is a requirement of the research (HPCSA, 2008). Should the research revolve around a particular group, the researcher must ensure that the benefits and burdens of the research on the specific groups are balanced and thus prevent over-researching of certain subjects (Human Subject Research, 1979; HPCSA, 2008).

In the current research study, the method of sample selection was based on the purposive sampling technique and thus the sample selected was focused on a specific group of respondents, in this case employees with at least an NQF 4 education. Aside from this requirement, the research was open to respondents from any ethnicity, age, gender and language group.

3.6.6 Duties of the Researcher

The National Health Act 56 of 1974 requires of the psychological professional who administers an assessment to ensure that he or she is competent in the administration and scoring of the assessment; that the invigilators (if any) are competent to assist in the administration and scoring of the assessment; that the data are analysed and interpreted in such a way that the information is transparent; and that the documents obtained during the data sampling procedures are kept in a safe place where only people that are permitted have access to them. The ethical approval from the participating University is dependent on the adherence to the aforementioned requirements and approval from other stakeholders.

The research proposal was sent to the WLQ distributor (MindMuzik Media) and the study was approved by the CEO via email. Their full support was illustrated by providing the researcher with 20 assessment booklets, 250 answer sheets, 6 scoring stencils and the manual. Their only requirement was to gain access to the results obtained from the assessments even though the University possesses the publishing rights.

The proposal was sent to the HR Director of the automotive company and was approved on condition that the researcher presents the findings obtained from the research to the Director and that the company remains anonymous in the study. The participating company further agreed to safeguard the completed assessments and signed consent forms in their archives.

The research proposal was presented to the University of Pretoria's ethics board on 2 August 2013 and was approved. The data sampling commenced on 25 November 2013.

The researcher approached the general managers (GMs) of the different departments and explained the purpose of the study. Once the GM had agreed to the study, an email requesting voluntary participation was sent out to the employees in the department. The researcher booked meeting rooms according to the date and times that the participants were available. A total of 217 employees from 15 different departments were assessed within a 3-month period (1 December 2013 – 28 February 2014). Each GM received feedback on the overall results of his or her department and was advised on a plan forward based on their results.

3.7 Conclusion

The research question determines the research design of the study because the study should yield certain answers to satisfy the research question. In this study the research question set the research design in the direction that would determine the psychometric properties of the WLQ.

It was established at the beginning of this chapter that the reliability, dimensionality of the scales and structural validity of the overall proposed theoretical model would be determined through this study. In order to determine these psychometric properties, the research design, data sampling, analysis methods and ethical considerations were described in detail to ensure that the research framework would adequately yield the required results. In the next chapter the results of the study are revealed and interpreted.

Chapter 4: Findings and Results

4.1 Introduction

This chapter focuses on establishing the reliability, dimensionality and structural validity of the WLQ by using different statistical methods. The first section of this chapter illustrates and describes the biographical makeup of the sample, followed by the results for the reliability scores of the scales or its Cronbach Alpha scores. The factorability of the sample is determined by interpreting the KMO and Barlett's test for sphericity. Once factorability has been confirmed, the results from the EFA for each scale are illustrated. If a scale appears unidimensional, its factor matrix is illustrated and interpreted to determine which items might be problematic. If a scale appears multidimensional, its pattern matrix is illustrated and interpreted to identify problematic items, which is followed by the results from the bi-factor analysis. The results from the bi-factor analysis illustrate whether the scale is unidimensional (thus measuring a general factor) or whether it remains multidimensional.

The structural validity of the WLQ is determined by testing the second-order theoretical model of the WLQ by using an SEM technique, namely confirmatory factor analysis (CFA). CFA determines whether the theoretical model is a good fit with the model that is created by the data, thus establishing structural validity. The path model is used to determine the correlation between the scales in relation to the overall construct of stress.

4.2 Biographical distribution of sample

The biographical distribution of the sample is illustrated in Table 4.2. The sample consisted of males (n=152) and females (n=65). The majority of the respondents were between the ages of 18 and 39 years old (72.3%). The sample is almost equally divided among married

(51.2%) and unmarried (48.8%) individuals. The majority of the respondents indicated an African language as their first language (53.5%) and the second largest group indicated Afrikaans as their first language (30%). The respondents predominantly consisted of individuals who have obtained a post-graduate degree (47%), 35.5% of the respondents have obtained some form of a post-matric qualification and 17.5% of the respondents only have a matric or NQF 4 level education. Only 28% of the respondents did not have any dependants while 28% have at least one dependant and the majority of the respondents have between 2 and 5 dependants (42.4%). Only 1.4% of the respondents had more than 5 dependants. The respondents were relatively equally divided according to their length of service in the company; 22.6% have been there for less than two years, 26.7% between 2 and 5 years, 18% between 6 and 10 years and 32.7% have been with the company for more than 10 years.

Table 4.2: Biographical distribution of sample

Gender	Frequency	Percentage	Cumulative%
Male	152	70.0	70.0
Female	65	30.0	100.0
Total	217		
Age	**Frequency**	**Percentage**	**Cumulative%**
18-29	69	31.8	31.8
30-39	88	40.5	72.3
40-59	31	14.3	86.8
59-65	29	13.4	100.0
Total	217		
Marital Status	**Frequency**	**Percentage**	**Cumulative%**
Married	111	51.2	51.2
Not-married	106	48.8	100.0
Total	217		
Language	**Frequency**	**Percentage**	**Cumulative%**
Afrikaans	65	30.0	30.0
English	36	16.6	46.5
Ndebele	6	2.8	49.3
N-Sotho	23	10.6	59.9
Shangaan	2	0.9	60.8
S-Sotho	6	2.8	63.6
Tsonga	10	4.6	68.2
Tswana	40	18.4	86.6
Venda	7	3.2	89.9

Zulu	16	7.4	98.6
Other	3	1.4	100.0
Total	217		
Qualification Level	**Frequency**	**Percentage**	**Cumulative%**
Matric/NQF4	38	17.5	17.5
Post-matric certificate/Diploma/ Degree	77	35.5	53.0
Post-graduate degree	102	47.0	100.0
Total	217		
Number of Dependants	**Frequency**	**Percentage**	**Cumulative%**
0	61	28.1	28.1
1	61	28.1	56.2
2	55	25.3	81.6
3	24	11.1	92.6
4	7	3.2	95.6
5	6	2.8	98.6
More than 5	3	1.4	100.0
Total	217		
Length of Service	**Frequency**	**Percentage**	**Cumulative%**
Less than 2 years	49	22.6	22.6
Between 2 and 5 years	58	26.7	49.3
Between 6 and 10 years	39	18	67.3
More than 10 years	71	32.7	100.0
Total	217		

4.3 Reliability of the items

Table 4.3 depicts the reliability scores obtained for the WLQ assessment. The table illustrates that Scale A achieved an excellent reliability score (above 0.90), Scale B, C1, C4, C5 and C6 achieved a good reliability score (between 0.80 and 0.89) and Scale C2 and C3 achieved a fair reliability score (between 0.70 and 0.79). Overall the reliability score for the WLQ is good, yet the lower score on Scale C2 and C3 could be as a result of the presence of item bias (Tavakol & Dennick, 2011).

Table 4.3: Reliability of WLQ scales

SCALE	Kuder Richardson Formula 8 (Standardisation 1989)	Cronbach-Alpha Coefficient (Current study)
Scale A – Level Of stress	0.92	0.95
Scale B – Causes outside of the work environment	0.85	0.82
Scale C1 – Organisational functioning	0.83	0.82
Scale C2 – Task characteristics	0.83	0.76
Scale C3 – Physical work environment	0.84	0.75
Scale C4 – Career matters	0.84	0.84
Scale C5 – Social matter	0.84	0.82
Scale C6 – Fringe benefits, remuneration and personnel policy	0.86	0.88

Factors that influence the reliability or internal consistency could be as a result of the manner in which the test was administered or the manner in which the test items were constructed (Moerdyk, 2009). If the test items appear to be difficult, confusing or ambiguous, it can have

a negative impact on the assessment's reliability score (Foxcroft & Roodt, 2005). The table illustrates that the reliability of the WLQ remained the same on Scale C4, increased on Scale A and C6 and decreased on Scale B, C1, C2 and C3. Further investigation into the items of the different scales could support the interpretation of these reliability scores. The following section reveals the results obtained through the EFA. An item analysis is conducted after the number of factors to be retained per scale is determined. The item analysis identifies potentially problematic items that affect the dimensionality of the scales and could have a detrimental impact on the reliability of the scales.

4.4 Exploratory factor analysis

4.4.1 Sample Adequacy

The EFA was conducted on each of the scales and subscales of the WLQ and the results from the KMO and Barlett's test for sphericity are depicted in Table 4.4.1.

Table 4.4.1: Results of KMO and Barlett's test of sphericity

Scale	KMO measure of sampling adequacy	Barlett's test of sphericity		
		Approx. Chi square	df	Sig.
Scale A	0.906	4254.171	780	0.000
Scale B	0.857	799.072	120	0.000
Scale C1	0.816	424.225	21	0.000
Scale C2	0.749	769.277	105	0.000
Scale C3	0.807	491.512	28	0.000
Scale C4	0.855	656.979	36	0.000
Scale C5	0.827	534.978	28	0.000
Scale C6	0.871	11156.806	66	0.000

According to Dumont et al (2014), a sample is adequate for EFA if the KMO value is at a minimum of 0.6 and the Barlett's test for sphericity is significant at the 95th percentile ($p < 0.5$). Table 4.4.1 illustrates that the minimum KMO score achieved by the scales are 0.749 and each scale was significant, thus it can be concluded that the sample for each scale is adequate to perform EFA.

4.4.2 Dimensionality of the Scales

This section evaluates the results obtained from EFA to determine whether the scales are unidimensional or multidimensional. The criteria used to determine the dimensionality are based on Horn's parallel analysis (PA) which determines the number of factors to retain (O'Connor, 2000) and total variance explained by each factor (Lai, Crane & Cella, 2006). A minimum of 5% of the total variance should be explained by each factor retained (Lai et al., 2006). The cumulative variance explained should be in the region of 40% to indicate a good factor structure (Pallant, 2007).

It is suggested that a factor is confirmed by three or more items with a factor loading of > 0.3 per item and it is further suggested by Costello and Osbourne (2005) that a solid factor consists of 5 items with a factor loading of 0.5 or higher.

In each of the pattern matrices the items with an acceptable factor loading are bolded and highlighted in blue, whereas the items with an insignificant factor loading are highlighted in red. If the item appears to crossload onto more than one factor the item content is bolded.

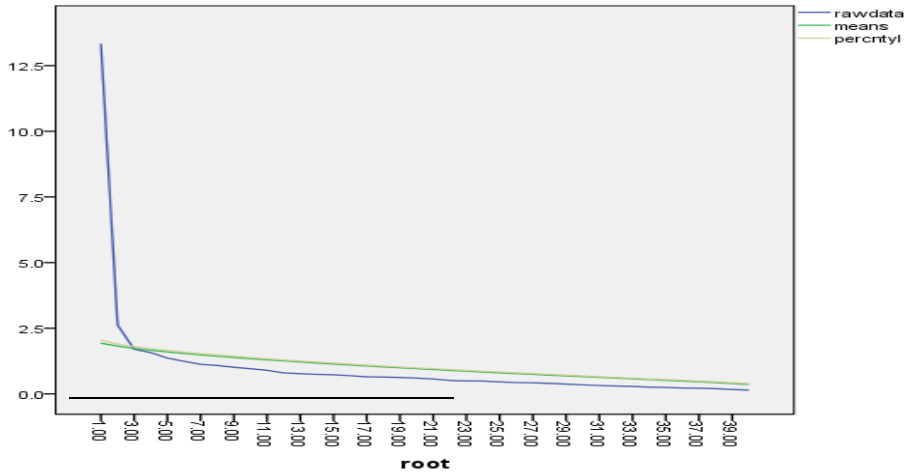
The appearance of a multidimensional scale could be as a result of weak item loadings onto a factor (< 0.3); cross-loading items (items that have a factor loading of 0.30 or more than one underlying factor); or an insufficient number of items that load onto a factor (three or less

items per factor) (Costello & Osbourne, 2005). In the aforementioned instances factors are over-extracted and undue significance is given to a factor that might be as a result of an error (Weng & Cheng, 2005). The Schmid-Leiman analysis is used on the scales that appear to be multidimensional to determine the presence of a general factor. Essential unidimensionality of a scale is prevalent if the general factor explains at least 60% or more of the variance (Wolff & Preising, 2005). If the group factors individually explain a large portion of the variance, the scale is multidimensional (Wolff & Preising, 2005).

4.4.2.1 Dimensionality of Scale A

Figure 4.4.2.1 graphically illustrates the scree plot of Eigenvalues obtained through parallel analysis. The figure illustrates that the random Eigenvalue exceeds the raw Eigenvalue at a point before three factors and therefore two factors are retained. The results from the EFA (shown in Table 4.4.2.1[1] indicate that Scale A has the appearance of a multidimensional scale as two factors explain 40% of the total variance. The dimensionality of Scale A is further investigated by bi-factor analysis after the pattern matrix is investigated to identify problematic items.

Figure 4.4.2.1: Eigenvalues obtained for Scale A



[1] Only significant Eigenvalues according to parallel analysis are reported. The full table of Eigenvalues and variances explained are not reported due to limited space and can be acquired from the author.

Table 4.4.2.1: Exploratory factor analysis results for Scale A using parallel analysis

Scale	Number of factors	Eigenvalues	Random data Eigenvalues (Parallel analysis)	Variance explained	Cumulative variance
A	1	13.337	2.492	33.342	33.342
	2	2.628	1.897	6.570	39.912

4.4.2.2 Pattern Matrix for Scale A

The pattern matrix for Scale A is depicted in Table 4.4.2.2. From this table it can be deduced that factor 1 has 20 items with a factor loading of 0.3 or higher of which 16 are not cross-loading items. Furthermore, factor 1 consists of 12 items that have a factor loading of 0.5 or higher (excluding the cross-loading items) and is therefore considered a solid factor. Factor 2 has 22 items with a factor loading of 0.3 or higher of which 18 items are not cross-loading items. In addition, factor 2 comprises 13 items with a factor loading of 0.5 or higher and is thus considered to be a solid factor. The table further illustrates that items A7 and A22 do not load strongly onto either factors. According to the table, items A4, A18, A25 and A27 have a factor loading higher than 0.3 on both factors and are thus cross-loading items. The cross-loading items appear to measure factor 1 and factor 2 and if it is found through bi-factor analysis that the items do not load highly onto the general factor, adapting or removing the items should be considered (Costello & Osbourne, 2005).

Table 4.4.2.2: Pattern matrix of Scale A with four factors retained

Item #	Item content	Factor	
		1	2
A1	As if you are coming up against a wall and simply cannot make any progress?	0.432	0.206
A2	Afraid, not knowing of what exactly?	0.154	0.481
A3	Uncertain?	0.038	0.551
A4	Worried?	0.438	0.311
A5	That your views clash with those of another person?	0.635	-0.135
A6	That you are experiencing conflict?	0.748	-0.199
A7	Bored?	0.117	0.209
A8	Irritated?	0.735	-0.186
A9	That you have no confidence in yourself?	-0.170	0.662
A10	That you depend too much on the help of others?	-0.161	0.577
A11	Alone?	0.294	0.337
A12	That you would like to attack another person?	0.598	0.006
A13	That you merely accept things as they are?	-0.148	0.509
A14	That you are disturbed whenever you work hard at something?	0.528	-0.041
A15	That you are losing control of your temper?	0.796	-0.206
A16	That no-one wants to support you?	0.730	-0.097
A17	That your work situation compares unfavourably with others	0.540	0.151
A18	Despondent?	0.382	0.316
A19	That you have broken some rule or other?	0.123	0.358
A20	Inferior (low self-confidence, unimportant)	-0.120	0.709

A21	That someone or situation is annoying you terribly?	0.673	-0.007
A22	Guilty?	0.220	0.258
A23	Downhearted?	0.431	0.293
A24	Fearful?	0.187	0.494
A25	That you can do nothing about a situation?	0.304	0.407
A26	Aggressive? (want to hurt someone or break something)	0.709	-0.121
A27	That you are getting sad?	0.314	0.374
A28	Overburdened? (too much work responsibilities)	0.659	0.005
A29	Angry?	0.585	0.163
A30	Afraid without knowing whether you are afraid of a particular person or situation?	0.029	0.710
A31	Not exactly sure how to act?	0.023	0.609
A32	That you have trouble concentrating since you are worried about something?	0.113	0.577
A33	That you have no interest in the activities around you?	-0.030	0.522
A34	That you need assistance continuously?	-0.220	0.665
A35	That you do not want to participate in anything?	0.174	0.362
A36	Afraid of colleagues and/or supervisors?	-0.109	0.761
A37	That it seems as if you will never get out of a mess?	0.230	0.515
A38	Dissatisfied?	0.481	0.184
A39	That you are tearful? (weeping, sorrowful)	0.002	0.687
A40	That you have too many responsibilities and too many problems?	0.439	0.247

4.4.2.3 Bi-factor Analysis for Scale A

Table 4.4.2.3.a illustrates the summary results obtained from the higher order factor analysis and Table 4.4.2.3.b illustrates the hierarchical factor matrix for Scale A with two factor retained. Table 4.4.2.3.a shows that 62% of the variance is explained by a general factor and thus Scale A can be considered essentially unidimensional.

Table 4.4.2.3.b illustrates that there are some items that load onto the general factor but not onto any of the underlying factors. These items include item A1, A4, A7, A11, A18, A22, A23, A25, A27, A35 and A40. Upon further investigation, the table illustrates that each of the aforementioned items seem to load positively on one of the factors and negatively onto the other factor. Thus, it appears as if the items with the weak factor loadings still measure either one of the factors indicated by the positive factor loading, but the factor loading is not strong enough to group the item into the specific factor (> 0.3).

The item content has a great influence on the factor loading of an item (Costello & Osbourne, 2005). Thus, the weak factor loadings for the identified items could be as a result of outdated language use, leading items, double barrel questions or irrelevance of the item content to the individual's context (Moerdyk, 2009). Item A7 has a weak factor loading on both factors and onto the general factor; thus it is suggested that the item is removed. Item A13 appears to have a good loading onto factor 1 (0.31) yet a weak loading onto the general factor (0.28). It is suggested that item A13 be updated or removed.

Table 4.4.2.3.a: Results from Schmid-Leiman bi-factor analysis for Scale A

Scale A	Sum of squared loadings	Proportion of variance
General factor	9.20	62%
Group factors	5.54	38%
Factor 1	2.76	19%
Factor 2	2.78	19%

Table 4.4.2.3.b: Bi-factor matrix for Scale A with two factors retained

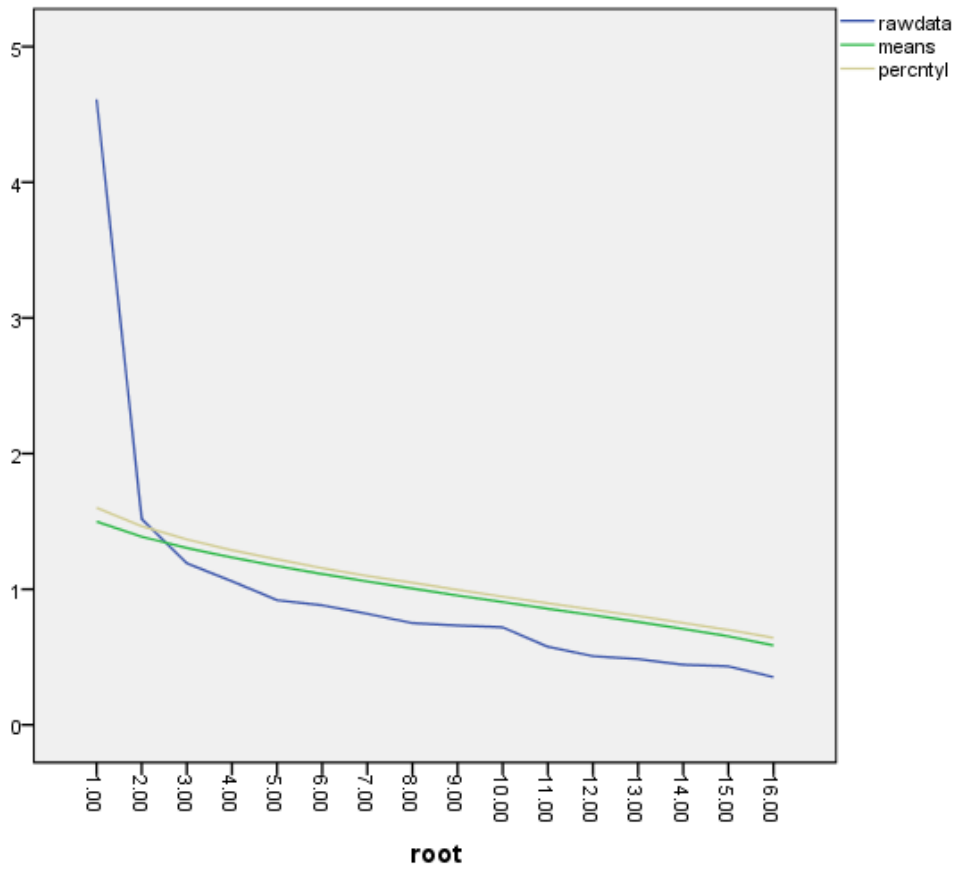
Item #	Item content	General	Factor 1	Factor 2
A1	As if you are coming up against a wall and simply cannot make any progress?	0.50	0.16	-0.28
A2	Afraid, not knowing of what exactly?	0.50	0.31	-0.13
A3	Uncertain?	0.46	0.34	-0.06
A4	Worried?	0.59	0.22	-0.29
A5	That your views clash with those of another person?	0.39	-0.04	-0.38
A6	That you are experiencing conflict?	0.43	-0.07	-0.45
A7	Bored?	0.25	0.14	-0.09
A8	Irritated?	0.43	-0.06	-0.44
A9	That you have no confidence in yourself?	0.38	0.40	0.06
A10	That you depend too much on the help of others?	0.33	0.35	0.06
A11	Alone?	0.49	0.23	-0.20
A12	That you would like to attack another person?	0.47	0.05	-0.37
A13	That you merely accept things as they are?	0.28	0.31	0.06
A14	That you are disturbed whenever you work hard at something?	0.38	0.01	-0.32
A15	That you are losing control of your temper?	0.46	-0.07	-0.48
A16	That no one wants to support you?	0.50	-0.01	-0.44

A17	That your work situation compares unfavourably with others	0.54	0.13	-0.34
A18	Despondent?	0.55	0.22	-0.26
A19	That you have broken some rule or other?	0.38	0.23	-0.10
A20	Inferior? (low self-confidence, unimportant)	0.46	0.43	0.03
A21	That someone or situation is annoying you terribly?	0.52	0.04	-0.41
A22	Guilty?	0.37	0.18	-0.15
A23	Downhearted?	0.57	0.21	-0.28
A24	Fearful?	0.53	0.32	-0.15
A25	That you can do nothing about a situation?	0.56	0.27	-0.21
A26	Aggressive? (want to hurt someone or break something)	0.46	-0.03	-0.43
A27	That you are getting sad?	0.54	0.25	-0.22
A28	Overburdened? (too much work, responsibilities)	0.52	0.05	-0.41
A29	Angry?	0.59	0.14	-0.37
A30	Afraid without knowing whether you are afraid of a particular person or situation?	0.58	0.44	-0.06
A31	Not exactly sure how to act?	0.49	0.38	-0.05
A32	That you have trouble concentrating since you are worried about something?	0.54	0.37	-0.11
A33	That you have no interest in the activities around you?	0.38	0.32	-0.02
A34	That you need assistance continuously?	0.35	0.40	0.09
A35	That you do not want to participate in anything?	0.42	0.24	-0.13
A36	Afraid of colleagues and/or supervisors?	0.51	0.46	0.02
A37	That it seems as if you will never get out of a mess?	0.58	0.34	-0.17
A38	Dissatisfied?	0.52	0.15	-0.31
A39	That you are tearful? (weeping, sorrowful)	0.54	0.43	-0.05
A40	That you have too many responsibilities and too many problems?	0.54	0.18	-0.29

4.4.2.4 Dimensionality of Scale B

Figure 4.4.2.4 graphically illustrates the scree plot with the Eigenvalues obtained for Scale B. The figure illustrates that the raw data Eigenvalue is intercepted by the random data value at two factors. Table 4.4.2.4[2] illustrates the results obtained through EFA and shows that each of the two factors explains more than 5% of the total variance. A two-factor structure, however, explains 38% of the total variance, which is not ideal. Based on these results, bi-factor analysis is used to establish the dimensionality of Scale B.

Figure 4.4.2.4: Eigenvalues obtained for Scale B



[2] Only significant Eigenvalues according to parallel analysis are reported. The full table of Eigenvalues and variances explained are not reported due to limited space and can be acquired from the author.

Table 4.4.2.4: Exploratory factor analysis results for Scale B using parallel analysis

Scale	Number of factors	Eigenvalues	Random data Eigenvalues (Parallel analysis)	Variance explained	Cumulative variance
B	1	4.612	1.612	28.826	28.826
	2	1.518	1.465	9.490	38.316

4.4.2.5 Pattern Matrix for Scale B

Table 4.4.2.5 is the pattern matrix for Scale B with two factors retained. The table illustrates that factor 1 has 6 items with significant factor loadings (> 0.3) but only comprises 3 items with a factor loading of 0.5 or higher. Factor 2 has 6 items with significant factor loadings (> 0.3) and 5 of these items have a factor loading of 0.5 or higher. Based on these results, it is thus established that factor 1 is considered a factor whereas factor 2 is considered to be a solid factor. The table illustrates that the following items have insignificant factor loadings: B16, B17, B18 and B20. Upon further investigation, the table shows that item B17 seems to have a stronger loading onto factor 1 (0.265) than factor 2 (0.048). This could be an indication of an item that needs some adaption or refinement in order to accurately measure factor 1. Items B16, B18 and B20 seem to have an insignificant factor loading on both factors and if it is found that these items have a low loading onto the general factor, removal of the items should be considered (Costello & Osbourne, 2005).

Table 4.4.2.5: Pattern matrix for Scale B with two factors retained

Item #	Item content	Factor	
		1	2
B8	Family crisis (death, illness and strife) has an adverse effect on your life?	0.397	0.093
B9	Financial obligations (for example payment of house loan) make life difficult for you?	0.778	-0.008
B10	The phase of life in which you find yourself currently (for example middle age and/or retirement) makes life difficult for you?	0.711	-0.071
B11	The general economic situation in the country (for example inflation) makes life exceptionally difficult for you?	0.775	-0.179
B12	Rapidly challenging technology poses a problem for you?	0.312	0.242
B13	Facilities (for example water laid on, electricity) at home are unfavourable?	0.373	0.294
B14	Social situations with friends and/or relatives are difficult to handle?	-0.046	0.671
B15	Your status among your friends/relatives is difficult to handle?	0.079	0.616
B16	Your health does not allow you to do what you would like to?	0.133	0.218
B17	Your background (i.e. your past life/where you come from) causes you embarrassment?	0.265	0.048
B18	Your home life is adversely affected owing to the fact that you have to spend too much time on activities at work?	0.180	0.256
B19	Problems with transport make life difficult for you?	0.291	0.306
B20	There is something wrong with your spiritual life?	0.275	0.105
B21	Your own views differ from those of other people?	-0.037	0.501

B22	Inadequate provision is made for accommodation (for instance, your housing is not suitable)?	0.154	0.564
B23	There are too few recreational activities (for example golf and squash)?	-0.149	0.630

4.4.2.6 Bi-factor Analysis for Scale B

The results from the bi-factor analysis are shown in Table 4.4.2.6.a. The table illustrates that the general factor explains 58% of the variance and the group factors account for large portions of the variance individually. This demonstrates that Scale B has some evidence of unidimensionality – total variance explained is close to an acceptable percentage – and for this reason hierarchical factor analysis is conducted to determine whether scale B contains problematic items that could affect its dimensionality.

The hierarchical factor matrix in Table 4.4.2.6.b illustrates that items B12 and B13 measure the general factor (factor loading > 0.4) but neither of the underlying factors. The results in Table 4.4.2.6.b illustrate that each of the items have a higher loading onto factor 1 than factor 2 but not significantly enough to consider it as items that measure factor 1. This could be as a result of the use of outdated language, leading items, double-barrelled questions or irrelevance of the item content to the individual's context (Moerdyk, 2009).

Table 4.4.2.6.b further shows that items B16, B17 and B20 do not have a significant factor loading onto the general factor or either of the underlying factors. It is suggested that these items are removed to improve the dimensionality of Scale B.

Table 4.4.2.6.a: Results from Schmid-Leiman bi-factor analysis for Scale B

Scale B	Sum of squared loadings	Proportion of variance
General factor	2.84	58%
Group factors	2.05	42%
Factor 1	1.08	22%
Factor 2	0.98	20%

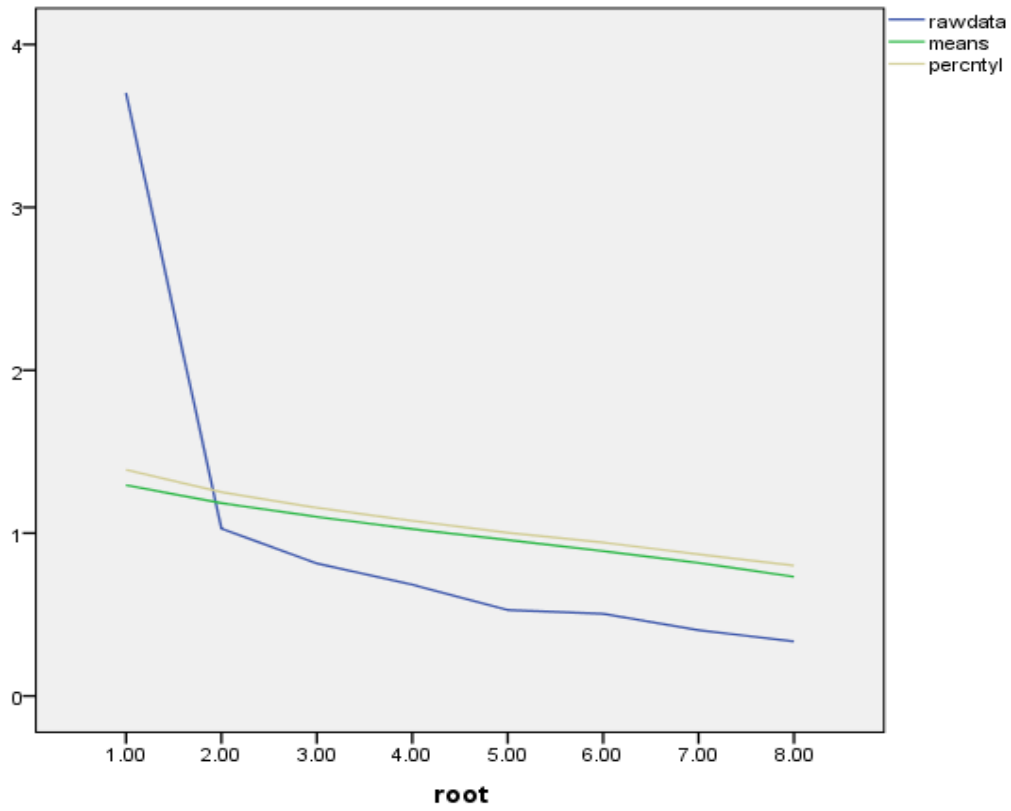
Table 4.4.2.6.b: Bi-factor matrix for Scale B with two factors retained

	Item	General	Factor 1	Factor 2
B8	Family crisis (death, illness and strife) has an adverse effect on your life?	0.37	0.26	0.06
B9	Financial obligations (for example payment of house loan) make life difficult for you?	0.58	0.52	-0.01
B10	The phase of life in which you find yourself currently (for example middle age and/or retirement) makes life difficult for	0.48	0.47	-0.05
B11	The general economic situation in the country (for example inflation) makes life exceptionally difficult for you?	0.45	0.52	-0.12
B12	Rapidly challenging technology poses a problem for you?	0.41	0.21	0.16
B13	Facilities (for example water laid on, electricity) at home are unfavourable?	0.50	0.25	0.20
B14	Social situations with friends and/or relatives are difficult to handle?	0.47	-0.03	0.45
B15	Your status among your friends/relatives is difficult to handle?	0.52	0.05	0.41
B16	Your health does not allow you to do what you would like to?	0.26	0.09	0.14
B17	Your background (i.e. your past life/where you come from) causes you embarrassment?	0.23	0.18	0.03
B18	Your home life is adversely affected owing to the fact that you have to spend too much time on activities at work?	0.33	0.12	0.17
B19	Problems with transport make life difficult for you?	0.45	0.19	0.20
B20	There is something wrong with your spiritual life?	0.28	0.18	0.07
B21	Your own views differ from those of other people?	0.35	-0.02	0.33
B22	Inadequate provision is made for accommodation (for instance your housing is not suitable)	0.54	0.10	0.37
B23	There are too few recreational activities (for example golf and squash)?	0.36	-0.10	0.42

4.4.2.7 Dimensionality of Scale C1

Figure 4.4.2.7 is a graphic illustration of a scree plot with the Eigenvalues obtained for Scale C1. The figure shows that the random Eigenvalue is greater than the raw data Eigenvalue at two factors and therefore one factor is retained. The results from the EFA are displayed in Table 4.4.2.7[3] and illustrate that one factor explains 42.3% of the variance, thus Scale C1 is essentially unidimensional.

Figure 4.4.2.7: Eigenvalues obtained for Scale C1



[3] Only significant Eigenvalues according to parallel analysis are reported. The full table of Eigenvalues and variances explained are not reported due to limited space and can be acquired from the author.

Table 4.4.2.7: Exploratory factor analysis results for Scale C1 using parallel analysis

Scale	Number of factors	Eigenvalues	Random data Eigenvalues (Parallel analysis)	Variance explained	Cumulative variance
C1	1	3.703	1.388	46.290	46.290

4.4.2.8 Factor Matrix of Scale C1

The EFA showed that Scale C1 is unidimensional and therefore its factor matrix is considered. Table 4.4.2.8 illustrates the factor matrix of Scale C1 and from the table it is derived that each of the items has a significant factor loading onto the construct measured in Scale C1 (all the factor loadings are above 0.3). The table shows that each of the items has a factor loading of 0.5 or higher except for item NCC1. These scores indicate that Scale C1 is a solid factor. NCC1 appears to be a double-barrelled item and thus could cause the item to become problematic (Moerdyk, 2009).

Table 4.4.2.8: Factor matrix for Scale C1

Item #	Item content	Factor loading
CC1A	You receive recognition for what you do?	0.596
CC1B	You are included in the decision making that concerns you?	0.606
CC1C	You can trust your supervisor under all circumstances?	0.604
CC1D	The way in which fringe benefits are organised contributes to your good achievement?	0.552
CC1E	Management believes its employees to be hardworking and/or reliable?	0.695
CC1F	Your good achievements are noticed?	0.753
CC1G	You are able to talk to your supervisor whenever you want to?	0.739
NCC1	The organisation as a whole does not function satisfactorily (for example owing to poor organisation, little confidence and incorrect leadership styles)?	0.382

4.4.2.9 Dimensionality of Scale C2

Figure 4.4.2.9 illustrates the scree plot with the Eigenvalues for Scale C2. The figure demonstrates that the random Eigenvalue exceeds the raw Eigenvalue at a point just before the fourth factor, thus Scale 2 appears to consist out of three factors. The results from the EFA are depicted in Table 4.4.2.9[4] which shows that three factors explain 47% of the total variance. It appears as though Scale C2 is multidimensional and thus bi-factor analysis is conducted.

[4] Only significant Eigenvalues according to parallel analysis are reported. The full table of Eigenvalues and variances explained are not reported due to limited space and can be acquired from the author.

Figure 4.4.2.9: Eigenvalues for Scale C2

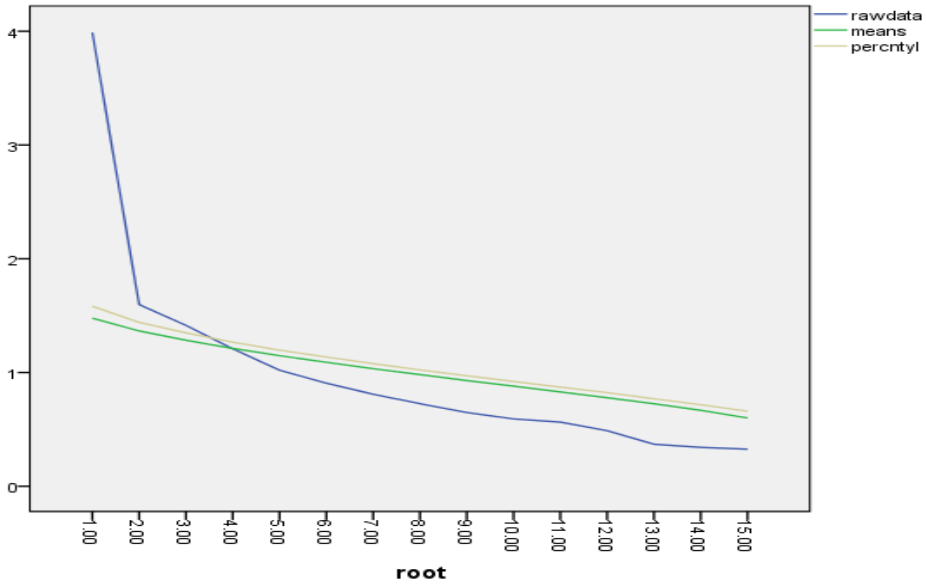


Table 4.4.2.9: Exploratory factor analysis results for Scale C2 using parallel analysis

Scale	Number of factors	Eigenvalues	Random data Eigenvalues (Parallel analysis)	Variance explained	Cumulative variance
C2	1	3.989	1.582	26.593	26.593
	2	1.597	1.450	10.649	37.242
	3	1.415	1.348	9.431	46.673

4.4.2.10 Pattern Matrix of Scale C2

Table 4.4.2.10 portrays the pattern matrix for Scale C2 with three factors retained. Both factor 1 and factor 3 have 3 items and factor 2 has 5 items with a significant factor loading (> 0.30). Neither of the factors have more than 5 items with a factor loading of 0.5 or higher; consequently the factors are not considered as solid factors but are considered to be factors. The table illustrates that there are no cross-loading items, further supporting the illustrated factor structure of Scale C2. Items with an insignificant factor loading are NCC2, CC2E,

CC2F and CC2I. These items could potentially be problematic or irrelevant to the factor structure.

Table 4.4.2.10: Pattern matrix of Scale C2 with three factors retained

Item #	Item content	Factor		
		1	2	3
NCC2	You are dissatisfied about the nature (content) of your work (for example it is not interesting and challenging or it does not correspond with your aptitude)?	0.168	-0.056	0.218
CC2A	You can get the work assigned to you done in time?	0.292	0.471	-0.148
CC2B	You are able to perform your tasks without having to be on your feet for long periods, having to lift heavy objects, having to be in bent or crouching and/or uncomfortable positions?	0.482	0.117	0.037
CC2C	You are able to assume full responsibility for all you do?	0.760	0.017	0.012
CC2D	You can perform your tasks without the nature of your work and your actions endangering other people's safety/lives and/or having a negative effect on the natural environment/quality of their lives?	0.788	-0.214	0.041
CC2E	You are able to function independently?	0.294	0.165	0.215
CC2F	You can perform your tasks without endangering your own safety as a result of the nature of your work and the actions required of you?	0.211	0.228	0.184
CC2G	You can perform tasks without coming into conflict with other people or straining your relations with other people as a result of the nature of your work?	0.007	0.721	-0.087

CC2H	The instructions that you receive are in keeping with previous instructions (in other words that you do not receive contradictory instructions)?	0.236	0.467	-0.012
CC2I	You have sufficient knowledge and information available to do your work?	0.089	0.103	0.287
CC2J	Your tasks can be performed without demanding your continued and intense concentration?	-0.180	0.502	0.157
CC2K	You are able to perform your duties without time playing too big a role?	-0.098	0.628	-0.047
CC2L	You have enough work to keep busy?	0.129	-0.225	0.366
CC2M	You are able to display initiative?	-0.042	0.051	0.750
CC2N	You are able to be involved in different tasks?	-0.046	0.055	0.699

4.4.2.11 Bi-factor Analysis of Scale C2

Table 4.4.2.11.a illustrates the results obtained through conducting bi-factor analysis on Scale C2. The table illustrates that the general factor accounts for 48% of the variance and the groups factors individually account for a greater portion of variance. It is therefore confirmed that Scale C2 shows little evidence of unidimensionality and appears to be multidimensional.

Table 4.4.2.11.a: Results from Schmid-Leiman bi-factor analysis for Scale C2

Scale C2	Sum of squared loadings	Proportion of variance
General factor	2.48	48%
Group factors	2.74	52%
Factor 1	1.09	21%
Factor 2	0.53	10%
Factor 3	1.11	21%

Items CC2I and NCC2 have a weak factor loading onto the general factors and the underlying factors and it is thus suggested that the items are removed. Item CC2L has an insignificant factor loading onto the general factor but a significant factor loading onto factor 3 (0.32). As the item measures a factor other than the general factor and could be a contributing factor to the multidimensional appearance of Scale C2, it is suggested that the item is removed.

Table 4.4.2.11.b: Bi-factor matrix for Scale C2 with three factors retained

	Item	General	Factor 1	Factor 2	Factor 3
CC2A	You can get the work assigned to you done in time?	0.51	0.23	0.26	-0.13
CC2B	You are able to perform your tasks without having to be on your feet for long periods, having to lift heavy	0.42	0.38	0.06	0.03
CC2C	You are able to assume full responsibility for all you do?	0.50	0.59	0.01	0.01
CC2D	You can perform your tasks without the nature of your work and your actions endangering other	0.33	0.61	-0.12	0.04
CC2E	You are able to function independently?	0.43	0.23	0.09	0.19
CC2F	You can perform your tasks without endangering your own safety as a result of the nature of your	0.41	0.16	0.12	0.16
CC2G	You can perform tasks without coming into conflict with other people or straining your relations with	0.57	0.01	0.39	-0.08
CC2H	The instructions that you receive are in keeping with previous instructions (in other words that you do not	0.53	0.18	0.25	-0.01
CC2I	You have sufficient knowledge and information available to do your work?	0.28	0.07	0.06	0.25
CC2J	Your tasks can be performed without demanding your continued and intense concentration?	0.38	-0.14	0.27	0.14
CC2K	You are able to perform your duties without time playing too big a role?	0.44	-0.08	0.34	-0.04
CC2L	You have enough work to keep busy?	0.07	0.10	-0.12	0.32
CC2M	You are able to display initiative?	0.38	-0.03	0.03	0.66
CC2N	You are able to be involved in different tasks?	0.36	-0.04	0.03	0.61
NCC2	You are dissatisfied about the nature (content) of your work (for example it is not interesting and	0.16	0.13	-0.03	0.19

4.4.2.12 Dimensionality of Scale C3

Figure 4.4.2.12 illustrates the scree plot with the Eigenvalues for Scale C3. The figure shows that the random Eigenvalue exceeds the raw Eigenvalue just before factor 2 and therefore Scale C3 retains one factor. The results of the EFA (as shown in Table 4.4.2.12[5]) demonstrate that the variance explained by one factor is 42% and therefore Scale C3 is essentially unidimensional.

Figure 4.4.2.12: Eigenvalues for Scale C3

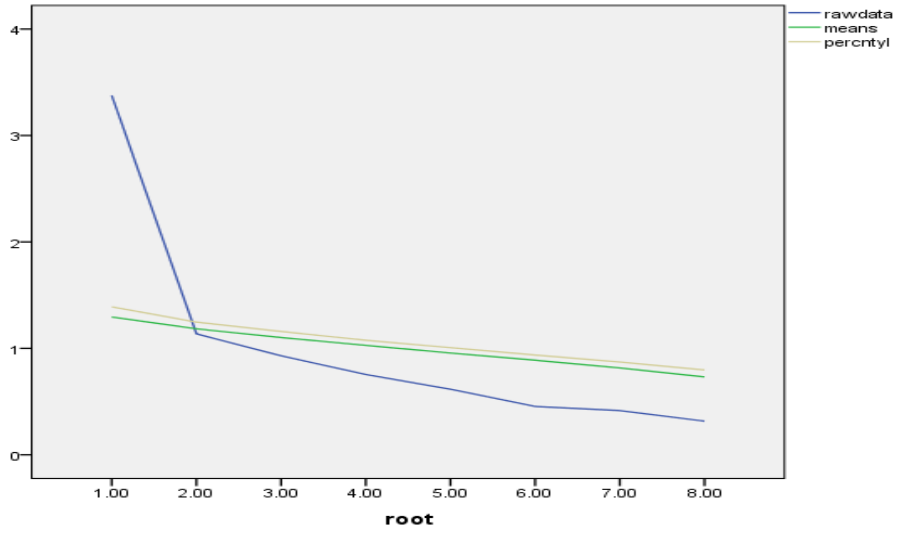


Table 4.4.2.12: Exploratory factor analysis results for Scale C3 using parallel analysis

Scale	Number of factors	Eigenvalues	Random data Eigenvalues (Parallel analysis)	Variance explained	Cumulative variance
C3	1	3.377	1.390	42.213	42.213

[5] Only significant Eigenvalues according to parallel analysis are reported. The full table of Eigenvalues and variances explained are not reported due to limited space and can be acquired from the author.

4.4.2.13 Factor Matrix of Scale C3

Table 4.4.2.13 illustrates the factor matrix of Scale C3. The table shows that all of the items (except for item CC3F) have a significant factor loading of 0.30 or higher. Item CC3F scored closely to a significant score and therefore the item should be refined in order to accurately measure Scale C3. Scale C3 has 5 items with a factor loading of 0.5 or higher and is considered to be a solid factor.

Table 4.4.2.13: Factor matrix of Scale C3

Item #	Item content	Factor loading
CC3A	Your necessary job equipment (for example stationery, tools, electronic and laboratory equipment) is always available?	0.556
CC3B	Facilities (such as toilets and kitchens) meet your needs?	0.670
CC3C	You have sufficient job equipment at your disposal?	0.699
CC3D	Physical working conditions (for example lighting and temperature) are satisfactory?	0.763
CC3E	The nature of the furniture and decorations in your working area create a pleasant working environment?	0.470
CC3F	Your job equipment (for example computer, stationery and tools) is in working order?	0.296
CC3G	Your physical working conditions (for example lighting and office space) are adequate for the type of work that you do?	0.697
NCC3	You encounter one or more of the following: considerable noise, high/low temperatures, odours, gases, poor lighting, crowding of people and/or any problems concerning your physical work conditions?	0.420

4.4.2.14 Dimensionality of Scale C4

Figure 4.4.2.14 illustrates the scree plot of Eigenvalues obtained from conducting EFA on Scale C4. It was found that the random Eigenvalue exceeds the raw data Eigenvalue before factor 2 and therefore it retains one factor.

Figure 4.4.2.14: Eigenvalues for Scale C4

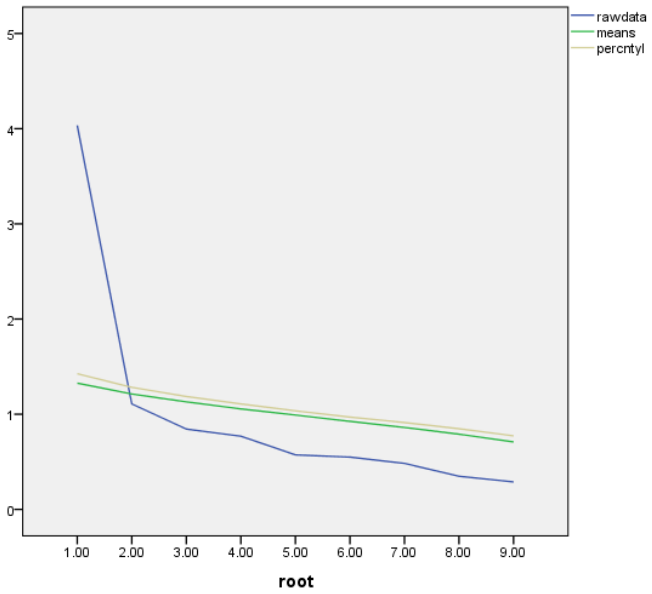


Table 4.4.2.14: Exploratory factor analysis results for Scale C4 using parallel analysis

Scale	Number of factors	Eigenvalues	Random data Eigenvalues (Parallel analysis)	Variance explained	Cumulative variance
C4	1	4.035	1.425[6]	44.830	44.830

[66] Only significant Eigenvalues according to parallel analysis are reported. The full table of Eigenvalues and variances explained are not reported due to limited space and can be acquired from the author.

Based on Table 4.4.2.14, one factor in Scale C4 explains 45% of the total variance and therefore Scale C4 is essentially unidimensional.

4.4.2.15 Factor Matrix of Scale C4

Scale C4 was confirmed to be essentially unidimensional and Table 4.4.2.15 depicts its factor matrix. All of the items in Scale C4 have a factor loading of 0.30 or higher and thus all of the items are significant. There are 7 items that scored 0.5 or higher and therefore Scale C4 is considered to be a solid factor.

Table 4.4.2.15: Factor matrix of Scale C4

Item #	Item content	Factor loading
CC4A	You are exposed to the necessary training courses?	0.523
CC4B	All your good qualities are being used?	0.700
CC4C	You are satisfied with your promotion?	0.694
CC4D	Your abilities and skills are developed and extended?	0.799
CC4E	You are making progress?	0.586
CC4F	The requirements of your job correspond with what you have to offer?	0.553
CC4G	Your post is essential and will be retained?	0.375
CC4H	Your potential is used to the full?	0.757
NCC4	Situations in which you find yourself have a negative effect on the progress and development of your career (for example your weaknesses are over emphasised and/or you find it difficult to progress to higher posts)?	0.482

4.4.2.16 Dimensionality of Scale C5

Figure 4.4.2.16 shows the scree plot with the Eigenvalues obtained through conducting EFA on Scale C5. The figure shows that the random Eigenvalue exceeds the raw Eigenvalue just before factor 2 and therefore Scale C5 retains one factor. Table 4.4.2.16[7] illustrates that 45% of the total variance is explained by the one factor and therefore Scale C5 is unidimensional.

Figure 4.4.2.16: Eigenvalues for Scale C5

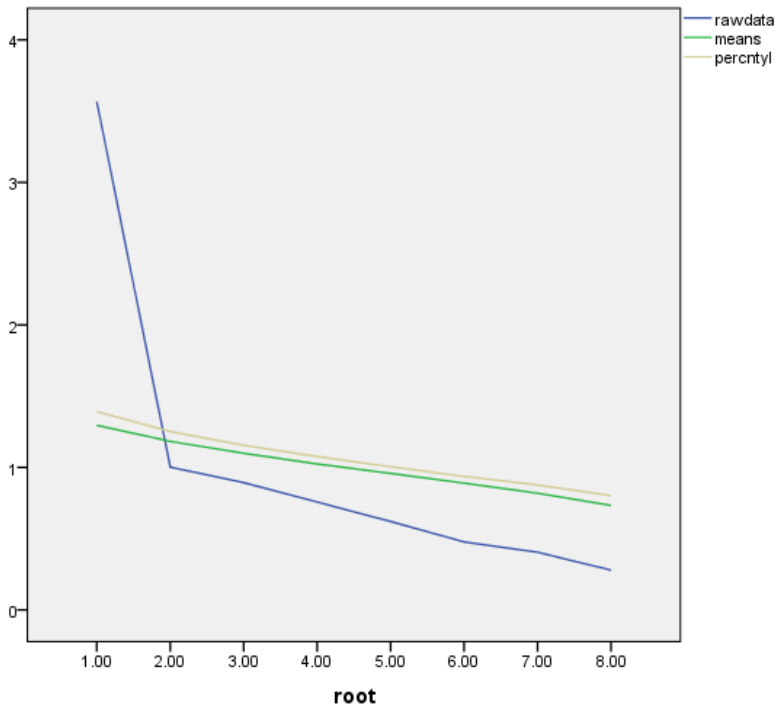


Table 4.4.2.16: Exploratory factor analysis results for Scale C5 using parallel analysis

Scale	Number of factors	Eigenvalues	Random data Eigenvalues (Parallel analysis)	Variance explained	Cumulative variance
C5	1	3.567	1.391	44.591	44.591

[7] Only significant Eigenvalues according to parallel analysis are reported. The full table of Eigenvalues and variances explained are not reported due to limited space and can be acquired from the author.

4.4.2.17 Factor Matrix of Scale C5

Table 4.4.2.17 illustrates the factor matrix of Scale C5. The table shows that each of the items has a significant factor loading of 0.30 or higher and 6 of the items have a factor loading of 0.50 or higher and thus Scale C5 is considered to be a solid factor.

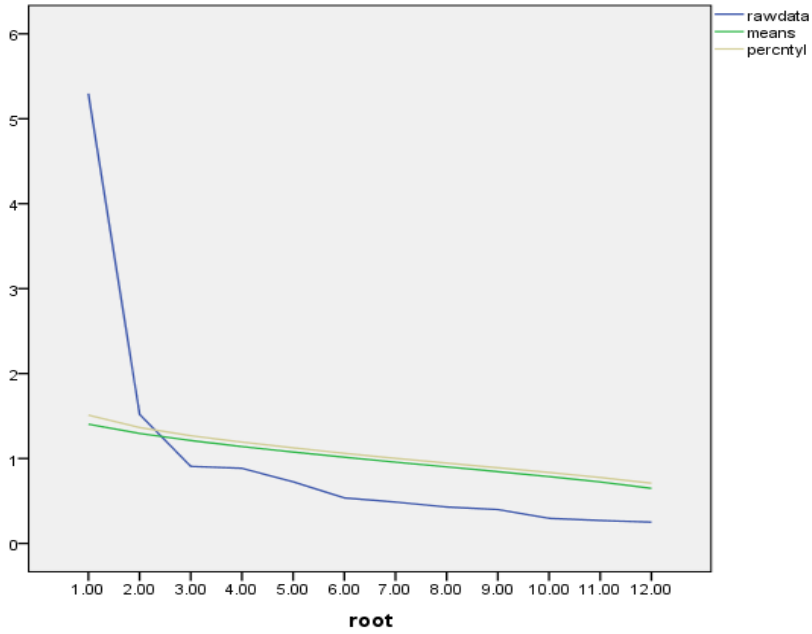
Table 4.4.2.17: Factor matrix of Scale C5

Item #	Item content	Factor loading
CC5A	You have status (to feel important)?	0.488
CC5B	You are able to get along with your supervisor?	0.679
CC5C	You have good relations with your colleagues?	0.693
CC5D	Your colleagues consider you successful and/or hard-working?	0.610
CC5E	The social demands made on you are of such a nature that you can easily satisfy them (maintain good relations with others)?	0.603
CC5F	You are able to maintain good relations with your supervisor?	0.703
CC5G	You are able to maintain good social relationships with everybody?	0.667
NCC5	You find it difficult to deal with social matters (such as socialising in a group and/or maintain good interpersonal relationships)?	0.349

4.4.2.18 Dimensionality of Scale C6

The Eigenvalues obtained through EFA for Scale C6 are presented in the scree plot in Figure 4.4.2.18, which illustrates that the random Eigenvalue exceeds the raw Eigenvalue just before the third factor and therefore Scale C6 retains two factors. Table 4.4.2.18[8] illustrates that the total variance explained by two factors are 57%. It appears as though Scale C6 is multidimensional and therefore bi-factor analysis is conducted.

Figure 4.4.2.18: Eigenvalues for Scale C6



[8] Only significant Eigenvalues according to parallel analysis are reported. The full table of Eigenvalues and variances explained are not reported due to limited space and can be acquired from the author.

Table 4.4.2.18: Exploratory factor analysis results for Scale C6 using parallel analysis

Scale	Number of factors	Eigenvalues	Random data Eigenvalues (Parallel analysis)	Variance explained	Cumulative variance
C6	1	5.297	1.510	44.144	44.144
	2	1.520	1.363	12.666	56.810

4.4.2.19 Pattern Matrix of Scale C6

Table 4.4.2.19 illustrates the pattern matrix for Scale C6 with two factors retained. Factor 1 has 7 significant items (factor loading greater than 0.30), all of which obtained a factor loading of 0.50 or higher; thus factor 1 is considered to be a solid factor. Factor 2 has 5 items with a significant factor loading. Four of the items have a factor loading greater than 0.50 and thus factor 2 is not considered to be a solid factor due to Item NCC6_2. Upon further investigation, the table illustrates that NCC6_2 seems to have a weak cross loading onto factor 1, showing that the item should be refined to ensure that it only measures factor 2. However, if it is found that the item loads significantly onto the general factor, it can remain as is. There is an absence of significant cross loadings and the items that load onto a factor either have a negative or low factor loading onto the other factor.

Table 4.4.2.19: Pattern matrix of Scale C6

Item #	Item content	Factor	
		1	2
CC6A	Your fringe benefits (for example housing) ensure your support and security?	0.649	0.059
CC6B	Your salary is market related, in other words it compares well with what persons with similar qualifications and experience earn?	0.644	0.082
CC6C	Regulations regarding personnel matters (for example work hours, conditions of employment and working clothes) reflect well on the organisation?	-0.093	0.520
CC6D	The personnel regulations (for example working clothes and working hours) satisfy your needs	-0.032	0.700
CC6E	Your fringe benefits (for example housing subsidy) supplement your salary adequately?	0.874	-0.140
CC6F	You salary is adequate to motivate you to work hard at all times?	0.678	0.127
CC6G	Personnel regulations (for example those regarding transfer and working hours) contribute to your satisfaction?	0.103	0.648
CC6H	Your input is adequately remunerated?	0.538	0.187
CC6I	You are happy with the nature of your fringe benefits?	0.820	-0.013
CC6I	You find regulations regarding staff matters (for example working hours, working clothes) satisfactory?	-0.042	0.784
NCC6_1	You are dissatisfied with one or a few of the following: pension, medical and housing aid, bursaries, achievement bonuses, group and other insurance, salary and/or any other	0.756	-0.151

	aspects of your remuneration package?		
NCC6_2	You are dissatisfied with one or more of the following: working clothes, working hours, conditions of employment, communication channels with regard to grievances and complaints, rules regarding transfers, termination of employment and/or any other regulations?	0.271	0.348

4.4.2.20 Bi-factor Analysis for Scale C6

From Table 4.4.2.20.a, it can be deduced that the general factor of Scale C6 explains 60% of the variance, thus confirming that Scale C6 is essentially unidimensional.

Table 4.4.2.20.a: Results from Schmid-Leiman bi-factor analysis for Scale C6

Scale C6	Sum of squared loadings	Proportion of variance
General factor	3.49	60%
Group factors	2.32	40%
Factor 1	1.50	26%
Factor 2	0.82	14%

Furthermore, Table 4.4.2.20.b shows that there are no items with an insignificant factor loading onto the general factor.

Table 4.4.2.20.b: Bi-factor matrix for Scale C6 with 2 factors retained

	Item	General	Factor 1	Factor 2
CC6A	Your fringe benefits (for example housing) ensure	0.33	-0.06	0.33
CC6B	Your salary is market related, in other words it compares well with what persons with similar	0.56	0.41	0.05

CC6C	Regulations regarding personnel matters (for example work hours, conditions of employment and	0.55	0.41	0.04
CC6D	The personnel regulations (for example working clothes and working hours) satisfy your needs?	0.51	-0.02	0.45
CC6E	Your fringe benefits (for example housing subsidy) supplement your salary adequately?	0.57	0.56	-0.09
CC6F	You salary is adequate to motivate you to work hard at all times?	0.62	0.43	0.08
CC6G	Personnel regulations (for example those regarding transfer and working hours) contribute to your	0.58	0.07	0.41
CC6H	Your input is adequately remunerated?	0.56	0.34	0.12
CC6I	You are happy with the nature of your fringe	0.62	0.52	-0.01
CC6I	You find regulations regarding staff matters (for	0.57	-0.03	0.50
NCC6_1	You are dissatisfied with one or a few of the following: pension, medical and housing aid, bursaries, achievement bonuses, group and other insurance, salary and/or any other aspects of your remuneration package?	0.47	0.48	-0.10
Ncc6_2	You are dissatisfied with one or more of the following: working clothes, working hours, conditions of employment, communication channels with regard to grievances and complaints, rules regarding transfers, termination of employment and/or any other regulations?	0.48	0.17	0.22

4.5 Confirmatory Factor Analysis – Structural Equation Modelling

4.5.1 Model Fit

Mardia's coefficient establishes whether the sample is normally distributed or non-normally distributed (Ullman, 2006). A normally distributed sample has a Mardia's coefficient of between -2.0 and 2.0 (Ullman, 2006). The sample of the study obtained a Mardia's coefficient of 16.0985 with a normalised estimate of 9.3740, which illustrates that the sample is not normally distributed. Consequently, the robust goodness-of-fit indices are used to determine the structural validity of the proposed model (Ullman, 2006).

Table 4.5.1: Summary of goodness-of-fit indices

Goodness-of-fit indices	Score
Non-robust	
Standardised root-mean square residual	0.045
Robust	
Santorra-Bentler scaled chi square Degrees of freedom Probability value for each chi-square statistic	5.2576 16 0.99432
Bentler normal fit index (NFI)	0.992
Bentler non-normal fit index (NNFI)	1.029
Comparative fit index (CFI)	1.000
Root mean-square error of approximation (RMSEA)	0.000

Table 4.5.1 illustrates a non-robust fit index which is used to determine model fit. According to Chen, Sousa and West (2009), a standardised RMR score should be smaller than 0.08 to indicate a good model fit. The table also indicates the different robust fit indices used to

indicate goodness of fit. Ullman (2006) suggests that a lower chi square with a probability value for each chi-square statistic greater than 0.05 indicates a good model fit. Ullman (2006) states that the CFI ranges from 0.00 to 1.00 and the closer to 1 the CFI is, the better the model fit is. The NNFI and NFI illustrates a good model fit with scores of 0.9 or higher (Einarsen, Hoel & Notelaers, 2009). Chen et al. (2009) and Ullman (2006) state that an RMSEA score of less than 0.05 indicates a good fit and values with a score greater than 0.1 indicate a poor fit.

The chi-square value derived from the table appears not to be significant ($p > 0.05$) and thus the model is rejected. According to multiple authors (Chen et al., 2009; Einarsen et al., 2009), the chi-square statistic is sensitive to sample size and might reject the structure based on irrelevant variability. Thus, due to the robustness of the non-normally distributed sample, the researcher used the GFI as a determinant of the acceptability of the proposed structure.

The table illustrates that the theoretical model shows a good fit to the structural model that emerges from the data (SRSR 0.045; NFI 0.992; NNFI 1.029; CFI 1.000 and RMSEA 0.000).

It is therefore confirmed by the goodness-of-fit indices that the theoretical model proposed by the authors has a good fit with the structure obtained from the data.

4.5.2 Path Analysis

Figure 4.5.2 is a depiction of the theoretical model that CFA was administered on. The unobserved or latent variable of the overall construct of stress is represented by F4 in the figure. Scale A (F3) and Scale B (F2) are not presented in the model as latent variables and therefore E7 and E8 are fixed parameters (E=1). The second order structural model assumes

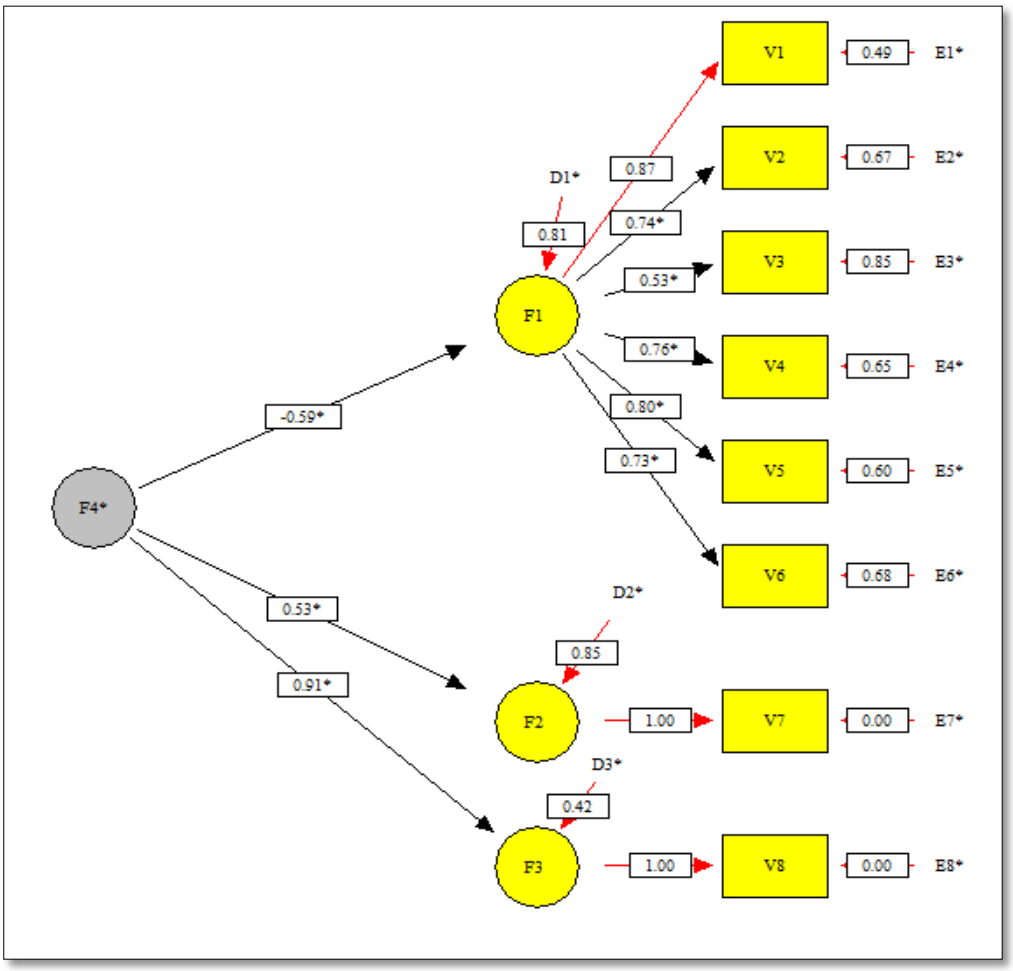
F3 and F2 are unidimensional and therefore it is presented by a single or observable variable.

The figure illustrates that each of the scales have a good loading onto F4 (loading of > 0.4) (Dumont et al., 2014). Therefore, each of the scales is a good measure of the overall construct of stress, especially Scale A (F3) as it obtained a loading of 0.91. The figure illustrates that F1 has an inverse relationship with the overall construct of stress (F4). This relationship is due to the difference in interpretation of the scores of the different scales. A high score on Scale A and Scale B is interpreted as a high level of stress, whereas a low score on Scale C's sub-scales is interpreted as a high level of stress. This is indicated by Figure 4.5.2 as a positive factor loading of Scale A (F3) and Scale B (F2) and a negative factor loading of Scale C (F1) onto the overall construct of stress (F4). For this reason Cohen's Kappa is calculated using a positive value for Scale C3 (F1).

Cohen's Kappa for the scales is calculated as follows:

- F3 and F2: 0.91 x 0.53 = 0.48
- F2 and F1: 0.53 x 0.59 = 0.29
- F1 and F3: 0.59 x 0.91 = 0.54

Figure 4.5.2: Structural model of WLQ through CFA



The results show that the Kappa scores of F3 and F2 are moderate, whereas for F2 and F1, and F3 and F2 the Kappa score is insufficient (negative value). In terms of the study, it illustrates that the manner in which the participants answered in Scale A moderately determined how they answered in Scale B. The manner in which they answered in Scale A and Scale B did not determine how they would answer in Scale C.

The standardised solution is depicted in Table 4.5.2 and illustrates the R-square for each observed variable. From the table it is clear that all the variables have a good R-squared value, and consequently the majority of the variance in the variables are accounted for by the factor. It is also found from the table that V3, F1 and F2 have a R-Squared that is not as dominant as F3's R-Squared value and as a result the variance in the variable is not accounted for by the factor.

Table 4.5.2: Standardised solution and R-squared

Standardised solution		R-squared
V1	V1 = 0.872 F1 + 0.490 E1	0.760
V2	V2 = 0.742*F1 + 0.670 E2	0.551
V3	V3 = 0.525*F1 + 0.851 E3	0.276
V4	V4 = 0.757*F1 + 0.653 E4	0.573
V5	V5 = 0.801*F5 + 0.598 E5	0.642
V6	V6 = 0.734*F1 + 0.679 E6	0.539
V7	V7 = 1.000 F2 + 0.000 E7	1.000
V8	V8 = 1.000 F3 + 0.000 E8	1.000
F1	F1 = -0.529*F4 + 0.806 D1	0.350
F2	F2 = 0.531*F4 + 0.847 D2	0.282
F3	F3 = 0.906*F4 + 0.424 D3	0.820

In other words, the variance in V3 (Scale C3) - Physical work environment - is not predominantly explained by F1 (Scale C) – Causes within the work environment. The variance in F1 (Scale C) – Causes within the work environment – and F2 (Scale B) – Causes

outside of the work environment – is not predominantly explained by F4 – overall experience of stress.

4.6 Conclusion

The purpose of this chapter was to determine the reliability, subscale dimensionality and structural validity of the WLQ by using different statistical methods. Before validity could be established, reliability was established through obtaining the Cronbach-Alpha reliability score. The score obtained from the current study seems to compare favourably with the reliability scores obtained in the original study and the recent study conducted by Oosthuizen and Koortzen (2009). It was found that the Cronbach-Alpha reliability score was acceptable for each of the scales.

EFA was used in this study to establish the unidimensionality of the scales in order to confirm the construct validity of the WLQ. Initially all three scales of the WLQ appeared to be multidimensional. These results are similar to those obtained by Oosthuizen and Koortzen (2009). For this reason, the researcher decided to use PA to determine the number of factors to retain per scale. After the researcher used PA, unidimensionality of C1, C3, C4 and C5 was confirmed. Unidimensionality of Scale A and C6 was confirmed only after a bi-factor analysis showed a strong general factor for each of the scales, thus showing that the other factors within the scales are trivial. Scale B and C2 appeared to be multidimensional.

The researcher's next focus was to determine the structural validity of the WLQ. The theoretical model as proposed by the developers of the WLQ was used in CFA. From the results the second-order structural validity of the WLQ model was confirmed by the GFI scores (NFI 0.992; NNFI 1.029; CFI 1.000; RMSEA 0.000).

A path analysis was conducted by determining Cohen's Kappa and it was illustrated that there is a moderate correlation between how participants answered in Scale A and B and Scale A and C. It was further found that there is a low correlation between how the participants answered in Scale B and C.

The researcher examined the standardised solution obtained from the CFA to determine the strength of the relationship between the proposed observed variable and the latent variable and to establish the R-squared scored. It was found that the variance in the majority of the observed variables is well explained by the latent variable.

The next chapter is an integrated discussion on how the results link in with theory and other research about the matters concerned.

Chapter 5: Discussion, Recommendations, Limitations and Conclusion

5.1 Introduction

The purpose of the study was to establish the psychometric properties of the WLQ by uncovering the reliability, dimensionality of the scales and the second-order structural validity of the psychometric assessment. The previous chapter revealed the findings obtained through conducting the different statistical analyses as stated in Chapter 3. The current chapter provides an integrated discussion of the results and how the study ties in with current research.

5.2 Interpretation of Results

Chapter 1 outlined the objectives of the study as follows:

- To evaluate the reliability of the scales of the WLQ
- To evaluate the dimensionality and the factor structure of the scales
- To evaluate the second-order factor model of the WLQ.

The following section focuses on each of these objectives in order to answer the research question.

5.2.1 Reliability of the Scales of the WLQ

Initially, the concern with the WLQ, having been standardised in 1989, pertained to its potentially outdated psychometric properties. The concern mainly arose from the outdated sample on which the WLQ was standardised and the effect that a sample can have on the reliability of the assessment (Tavakol & Dennick, 2011). The reliability determines how consistently the items or scales measure the construct of stress in this case. Specific focus

was placed on the internal consistency of the WLQ which determines to what extent all of the items in each scale measure the construct that the scale aims to measure. Tavakol and Dennick (2011) suggest that the number of items in the assessment and the makeup of the sample can have an impact on the reliability.

The sample of the present study had almost an opposite distribution to the sample that the WLQ was standardised on. The sample distribution in 1989 consisted of 93% males and 7% females; 54% of the sample was Afrikaans, 12% was English and 34% had an African language as a first language.

The current study's sample distribution consisted of 70% males and 30% females; 30% of the sample was Afrikaans, 17% of the sample was English and 52% of the sample had an African language as a first language. There was a tremendous improvement on the inclusion of women in the current study (30% compared to 7%), as well as an improvement on the inclusion of individuals who had an African language as a first language (53% compared to 34%). As the sample was clearly different from the sample that the WLQ was standardised on, the reliability of the WLQ could be affected. The reliability statistics showed to be good and acceptable in the present study, thus it appears as if the sample had little effect on the reliability of the WLQ. However, Scale C2 and C3 achieved a fair reliability score and therefore could be subjected to item bias. Item bias occurs when there is a significant difference in the manner in which respondents from different demographic groups answer the items (Foxcroft, 2011). The Employment Equity Act requires that a psychometric assessment must not be biased against any group (Dugard, 2008). Differences in scale reliabilities with regard to different cultural groups can be considered a preliminary indication of construct bias and should be further investigated (Van de Vijver & Leung, 1997)

It is important to establish or confirm the reliability before validity is established. According to Loewenthal (2001) and Tavakol and Dennick (2011), reliability is closely related to validity; thus if an assessment is not reliable it cannot be valid. Yet an assessment can be proven to be reliable but not valid (Tavakol & Dennick, 2011; Tonsing, 2013; Robbins & Judge, 2007).

5.2.2 The dimensionality and the factor structure of the Scales

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5.2.3 The dimensionality and the factor structure of the scales

The validity of an instrument pertains to the meaningfulness of the assumptions that can be made from the results (Slocum-Gori & Zumbo, 2011); thus it determines the degree to which the assessment measures what it aims to measure (Foxcroft & Roodt, 2005). The present study aimed to determine the validity of the assessment by focusing on determining the dimensionality of the scales and its second-order structural validity.

The developers created the WLQ under the assumption that level of stress (Scale A) and causes outside of work (Scale B) consisted of one dimension and that causes within the working environment consists of six dimensions (Scale C1-C6). The results from the EFA and bi-factor analysis showed that all the scales of the WLQ are unidimensional except for Scale B and C2 that indicate little evidence of unidimensionality. If a scale is multidimensional, it shows that there is more than one underlying factor that the items load onto. The developers may then have to remove or adapt some of the items or decide whether there are enough items to create a new dimension all together (Nazim & Ahmad, 2013). In some cases a scale may appear multidimensional due to its measuring of a general factor (Wolff & Preising, 2005).

In the case of the presence of a general factor, the different dimensions within the scale measure different aspects of a general factor but in essence still measure the same construct or general factor (Wolff & Preising, 2005). This is the case with Scale A and Scale C6 in which the general factor explained a significant amount of the variance (62% and 60% respectively), supporting the opinion that the scales are unidimensional.

In the case of Scale A, there are two underlying factors that measure level of stress (general factor). The first factor in Scale A pertains to conflict, aggression, frustration and work overload. The second factor in Scale A relates to feelings of uncertainty, fear, inferiority and loneliness. According to Van der Merwe (2004), the above factors both relate to things that can cause personal stress.

Furthermore, problematic items were identified that had a negative influence on the dimensionality of Scale A. The results illustrated in Table 4.4.2.3.b show that the problematic items in Scale A might have a minor negative effect on the dimensionality of Scale A.

The following items were identified as problematic items:

- A7 – “How often in work do you feel bored?”
- A13 – “How often in work do you feel that you merely accept things as they are?

Item A7 and A13 appear to be related to feelings of depression. According to Van der Merwe (2004), feelings of a depressed mood are often associated with someone who is experiencing or susceptible to stress. Therefore, the items might require refinement to ensure that they adequately load onto the general factor.

It appears, however, as if the two underlying factors and the potential sub-dimension of depression could relate to certain personality characteristics, with specific focus on how over-used personality strengths could result in derailers under pressure. According the Hogan Development Survey (HDS), there are a number of derailers to performance in the workplace and they are grouped according to the following behaviours: moving away from people, moving against people and moving towards people (Hogan et al., 2007). Factor 1 in scale A appears to relate to potential derailers that cause behaviours of moving against people – increasing conflict with others. Factor 2 seems to pertain to derailers that cause behaviours of moving away from people, thus isolating self from others. The potential sub-dimension of a depressed mood seems to pertain to the derailers that cause behaviour of moving towards people. If there is a link between the factors in Scale A and the derailers found in the HDS, Scale A could provide valuable information with regard to understanding the drives that result in certain behaviours.

The other scale that had a presence of a general factor was Scale C6. This implied that C6 can be considered an essentially unidimensional scale that should yield univocal scale scores. However, there was some evidence of multidimensionality because more than one interpretable factor was prevalent due to parcels of items that tapped similar content domains. This is not an uncommon phenomenon according to Reise et al. (2010) because measures can represent a single dimension and at the same time present evidence of multidimensionality. This resembles the vexing position noted by Reise et al. (2010) of instruments designed to measure one thing while simultaneously measuring diverse aspects of this same thing. The first factor in Scale C6 is clearly related to the monetary aspect of work, such as remuneration and fringe benefits. The second factor in Scale C6 is related to the personnel policies and procedures that govern the employee's interaction with the work environment. Both of these factors measure the *remuneration, fringe benefits and personnel policy* dimension as stated by Scale C6. There are aspects of work that affect the intrinsic and extrinsic reward derived from work. The intrinsic rewards associated with work are personal growth, self-expression, success and status (Luthans, 2011). The extrinsic reward derived from work pertains to the dimensions that scale C6 measures: remuneration, fringe benefits and personnel policy (Robbins & Judge, 2007).

Remuneration and fringe benefits are focused on the monetary extrinsic reward for working while personnel policy is related to the rules that govern certain behaviours in the organisation. It appears to be two separate dimensions even though they measure the same general factor. If it is two separate dimensions, they could provide valuable information to organisations with regard to satisfaction with remuneration and fringe benefits and personnel policy respectively. It is useful for organisations to be able to pinpoint where a problem can be found because it affects the intervention used by the organisation to remedy the situation.

If the source of stress can be identified as remuneration or fringe benefits, the organisation can embark on a salary and benefit benchmarking exercise to assist with resolving the cause of stress for its employees. If the stress is due to personnel policies and practices, the organisation can decide on HR-specific interventions to remedy the cause of stress.

As mentioned previously, the other reason for multidimensionality could be that there is an appearance of more than one factor in the scale that does not ultimately measure the same dimension. This is the case with Scale B and Scale C2.

Scale B was shown to have two underlying factors. The purpose of Scale B is to identify certain events in the individual's personal life that could potentially be stressful. The WLQ manual illustrates that Scale B comprises questions that relate to family, finance, health, social situations and transport. These are different dimensions that measure the same general factor of causes of stress outside of the work environment (Luthans, 2008; Van der Merwe, 2004).

If the purpose of Scale B is taken into consideration, it could be expected that the items in Scale B can be related to items that are found in the Daily Hassles and Major Life Events scale. Daily hassles refer to any occurrence that causes frustration or anxiety to a person on a daily basis (Lapierre & Boyer, 2012). Daily hassles include an individual's interaction with their work (whether they are over- or under-loaded), interactions with people, their personal status, and so on. Major events are events that happen rarely but could potentially be traumatic to an individual (Lapierre & Boyer, 2012). Major life events include getting married or divorced, having a baby, moving to a different region, contracting a life-threatening illness, a loved one dying or ill, outbreak or involvement in a war, accidents and being a victim of a crime (Delongis, Coyne, Dakof, Folkman & Lazarus, 1982). Daily Hassles and Major Life

events describe events or circumstances in a person's personal life that could be potentially stressful.

It appears as though the following items are related to daily hassles:

- B17 – "Your background (i.e. your past life/where you come from) causes you embarrassment?"
- B20 – "There is something wrong with your spiritual life?"

Item B16, "Your health does not allow you to do what you like to do", appears to be related to major life events and it is suggested that items B16, B17 and B20 be refined to ensure that they measure the factor that they seem to currently measure to a slight extent.

The latest research on stress and burnout suggests that a person's ability to disengage from work during leisure time is a predominant factor that renders a person susceptible to work-related stress (Akerstedt et al., 2007; Sonnetag, 2012). Studies conducted by Akerstedt et al. (2004), Akerstedt et al. (2007) and Sonnetag (2012) showed that an inability to disengage from work resulted in insomnia, which then resulted in lack of focus, mood swings, anxiety and depression. It is recommended that items that measure a person's ability to disengage from work be included in the WLQ as this is a good determinant of how work-related stress is experienced by the individual. The following items appear to be related to the individual's ability to disengage from work:

- B12 – "Rapidly changing technology poses a problem for you?"
- B18 – "Your home life is affected adversely owing to the fact that you have to spend too much time on activities at work?"

The ability to disengage from work is currently a factor that relates to the experience of stress for the individual outside of the work environment and therefore it is suggested that the developers add items that measure this construct in order to improve the dimensionality of Scale B.

Scale C2 is the other scale that showed little evidence of unidimensionality. The WLQ manual illustrates that Scale C2 pertains to task characteristics and specifically measures the extent to which an employee has control over his or her work; the level of rewarding challenges experienced from his or her work; the quality of instructions received about a task; level of autonomy; reasonable deadlines; and enough and a variety of work to keep busy with. According to Luthans (2008), the aforementioned aspects all contribute to the employee's experience of task characteristics. Hence it would appear as if Scale C2 should measure 6 underlying dimensions that load onto the general factor of task characteristics. The results, however, showed that Scale C2 was made up of a 3-factor model measuring a general factor that explained 48% of the variance, which is not sufficient to establish unidimensionality.

Factor 1 in Scale C2 appears to measure *level of control* within the work environment. Factor 2 appears to relate to the *reasonable deadlines* and *quality of instructions* dimensions defined by the manual. Factor 3 seems to measure *quantity of work* and *variety of work* according to the manual. The three factors appeared to be indicative of a general factor and thus further attention was given to the construction of the items. The reliability score for Scale C2 was found to be fair (0.72), which indicates that the construction of the items might lead to item bias.

The results further showed that Scale C2 has four insignificant items:

- CC2I- “You have sufficient knowledge and information available to do your work?”
- CC2L- “You have enough work to keep busy?”
- NCC2- “You are dissatisfied about the nature (content) of your work (for example it is not interesting and challenging or it does not correspond with your aptitude)?”

The wording of the items appears to be ambiguous. Items CC2I and CC2L appear to ask the respondent to quantify their availability of resources but do not provide a unit of measurement. For example, item CC2I refers to sufficient knowledge and information at the individual’s disposal to perform his or her job – what is sufficient? The world of work currently operates in the information age and access to vast amounts of knowledge and information are freely available (Akerstedt et al., 2007). The current need of employees is more focused on knowledge transfer in the form of coaching or mentorship than their ability or liberty to access information (Twenge & Campbell, 2008). According to Twenge and Campbell (2008), younger generations in the workforce (generation X and Y) have a greater yearning for knowledge and informational support from their superiors than learning or accessing new knowledge independently. It is therefore suggested that these items focus on the informational support and guidance provided by an individual’s superior or co-workers rather than the availability of knowledge and information.

Item CC2L appears to be ambiguous as it aims to determine the individual’s experience of “enough work.” It appears as though the item aims to measure work under-load, which occurs when a person experiences stress due to lack of challenge or boredom in their job

(Luthans, 2008). The item should thus be rephrased to focus on work under-load instead of a person's perception of how much work is enough work.

Scale C1, C3, C4 and C5 were found to be unidimensional. Problematic items were absent in each of the scales (except for Scale C3) but some of the items had a low but acceptable factor loading (above 0.30 but below 0.40). The identified items are as follows:

- NCC1 – "The organisation as a whole does not function satisfactorily (for example owing to poor organisation, little confidence and incorrect leadership styles)?"
- CC4G – "Your post is essential and will be retained."
- NCC5 – "You find it difficult to deal with social matters (such as socialising in a group and/or maintain good interpersonal relationship)?"

Item NCC1 seems to be a double-barrelled question as the example given with the question refers to three independent aspects of organisational functioning. It is therefore suggested that the item be divided into three items that determine the extent of organisation within the organisation, the confidence level of the leadership and the leadership style of the management respectively.

Item CC4G seems to be related to career matters but appears to be a double-barrelled item. The item determines whether the employee's job is essential and whether he or she believes that it will be retained. This could be a cause of confusion for respondents and therefore the item should be refined to ask either whether their position is essential or whether they believe their position will be retained.

Item NCC5 also appears to be a double-barrelled question as the one section of the question focuses on socialising and the other focuses on building relationships with others. These are two independent aspects of socialising and therefore the item needs to be divided into two items that determine the difficulty with socialising and difficulty with maintaining good relationships respectively.

Scale C3 had the presence of one problematic item, namely:

- CC3F - “Your job equipment (for example computer, stationery and tools) is in working order.”

Item CC3F pertains to the resources used to perform the work by the employee and therefore appears to be more related to Scale C2 (task characteristics). The resources identified in the item content relate to the degree to which the employee is enabled by the resources to perform his or her tasks. It is therefore suggested that the item be included in Scale C2 or removed from Scale C3.

5.2.4 Evaluation of the second order factor model of the WLQ

The results from the confirmatory factor analysis (CFA) showed that even though some of the scales have little evidence of unidmensionaltiy, the proposed theoretical model has a good fit with the model derived from the data and therefore the WLQ has a good second-order structural validity (SRSR 0.045; NFI 0.992; NNFI 1.029; CFI 1.000 and RMSEA 0.000). Hence, the concept that all the factors contribute significantly to an overarching construct of stress appears to be valid. Adding all the subscale scores to form a single higher order overall stress score would therefore be justified.

The overall construct of stress was illustrated as a second-order latent variable onto which each of the scales had a good factor loading (0.50 or higher). This indicates that each of the scales is a good measurement of the stress construct. Interestingly, when Cohen's Kappa was calculated there was a moderate correlation between how the sample answered items in Scale A and Scale B and Scale A and Scale C. Yet, there is a low correlation between Scale Scale B and Scale C. This could be expected as the assessment is interpreted in terms of the person's level of stress (Scale A) and whether the cause of stress is as a result of factors within the work environment or outside of the work environment. The results further illustrate that causes inside and outside the work environment are not related in any way and that a high score outside of the work environment does not necessarily make the work environment more stressful but does affect the person's level of stress. The same is the case for causes inside the work environment.

Furthermore, Scale B and Scale C are moderate predictors of stress. In other words, Scale B and Scale C appear to identify circumstances that could render a person susceptible to stress, whereas Scale A identifies the person's current behaviours and feelings that are associated with someone who is experiencing stress. The fact that Scale B and Scale C are largely influenced by residual error could indicate that a person's ability to cope or perception of the stressor could influence his or her susceptibility to become stressed. Coping is defined as a person's ability to endure through hardships without being negatively affected either emotionally or physically (Van der Merwe, 2004). Persons with a good ability to cope would indicate a low stress level even if their environment could be a great source of stress. Thus, a person's environment or circumstances might not be as directly related to overall stress as the person's level of stress that he or she experiences.

Each of Scale C's subscales had a good factor loading except for C3 (V3 – Physical Work Environment). It had the weakest loading onto Scale C (0.53) and is greatly influenced by residual error (0.85). The higher residual error indicates that C3 is more influenced by error than by Scale C. Scale C3's Cronbach Alpha resulted in a fair score (0.735), which is a further indication that the respondents might have experienced some confusion with regard to the items. This could suggest that the physical work environment or the ergonomic aspects of work might not be a cause of work-related stress as suggested in the model.

The Cox and McKay model of stress suggests that stress is a result of the person's perception of the stressor (Van Zyl & Van der Walt, 1991). Stress associated with ergonomics is physical strain and is not necessarily dependent on the person's perception of the stressor. Theory suggests that ergonomics can cause fatigue which then influences a person's concentration, judgement and mood (Akerstedt et al., 2004). Thus, the physical work environment may not necessarily be an indication of work-related stress but could potentially exacerbate the effects of work-related stress for a person.

5.3 Recommendations for Future Research

The assessment proved to have quite a number of unidimensional scales (Scale A, C1, C3, C4, C5 and C6) and therefore the researcher recommends that the construct validity of the WLQ be established by conducting a correlation study with other stress assessments to determine whether the unidimensional scales measure the construct that they aim to measure.

After investigating the results, it appears as if Scale A not only measures level of stress but could potentially measure deconstructive work behaviours as a result of stress, as suggested

by the Hogan Development Survey (HDS). The researcher thus recommends that the developers of the WLQ conduct a correlation study with Scale A and an assessment such as the HDS or any other assessment that measures deconstructive behaviour in the workplace.

Scale B showed little evidence of unidimensionality and there appears to be potential for an additional sub-dimension that could improve its dimensionality. The results showed that Scale B currently measures factors similar to daily hassles and major life events and it was suggested that the items are adapted to ensure that they measure the presence of an event instead of the person's perception of this event. Current research studies emphasise that an employee's inability to disengage from work during leisure time is a great cause of stress outside of the work environment and for this reason it is suggested that a sub-dimension be developed for scale B that measures this construct.

The results from the item analysis showed that the majority of problem items appeared to be double-barrelled questions. The problematic items in Scale A appear to measure a sub-dimension of a depressed mood and it is thus suggested that these items are correlated with an assessment that measures a depressed mood. It is suggested that the problematic items identified in Scale C1, C3, C4 and C5 are removed and that the problematic item identified in Scale C6 be divided into more items to ensure that the item is no longer a double-barrelled item.

The legislative requirements governing psychometric assessments used on employees require an assessment to be scientifically proven to be reliable, valid and not biased against any group. The study showed that the WLQ currently upholds two of the legislative requirements as set out in the Employment Equity Act, namely reliability and second-order

structural validity, to some extent. There appears to be presence of item bias in Scale C2 and C3 and therefore construct equivalence and item bias studies are recommended.

It is also recommended that confirmatory factor analysis be conducted on an independently drawn sample to confirm the unidimensionality. Reise et al. (2010) suggest that bi-factor models can also be tested using confirmatory factor analysis.

5.4 Limitations to the Study

The predominant limitation to the study revolves around the sample which consisted out of employees who voluntarily completed the questionnaire. This could result in a sample that is not representative of the population and this affect the external validity of the results (Babbie, 2013). Furthermore, the industry is male dominated and therefore the results obtained are largely based on males, which could limit the generalisability to females.

Currently there are a number of assessments that are completed online and in the comfort of the participant's home or office and are more convenient for respondents to complete. The limitation to the study is that the WLQ is a paper-and-pen-based assessment with a list of requirements (the assessment location has to adhere to certain standards, the test administrator must be qualified) and could be quite time-consuming. This is a limitation because some of the departments did not want to participate due to the high-pressure time frame in which the assessment was administered.

The type of English used in the questionnaire could be confusing to respondents with English as their 2nd or 3rd language and the English used in the assessment might be different from how English is used today (Foxcroft, 2011). This poses a limitation to the study because the

statements could be misunderstood by the respondents and be rated incorrectly by them (Foxcroft, 2011).

Some of the statements are phrased negatively which could be confusing and affect the manner in which the respondents rated certain statements (Foxcroft & Roodt, 2005). The items might be too repetitive which could result in a higher discriminant validity due to the respondent realising which items measure the same factor and answering them accordingly (instead of built-in mechanism to check consistency) (Foxcroft & Roodt, 2005).

5.5 Conclusion

The WLQ was developed in 1989 and has not been adapted since it was registered as a psychometric assessment by the HPCSA in 1991. Since then the country has undergone major socio-political changes and therefore the purpose of the study was to determine whether the psychometric properties of the WLQ adhere to the requirements as set out by the Employment Equity Act.

The study specifically focuses on the reliability, dimensionality of the scales and the second-order structural validity of the assessment. It was found that even though the WLQ was administered on a sample that contrasted with the sample used for standardisation in 1989, the scales of the WLQ are reliable and Scale C2 and C3 should be further investigated to detect potential item bias.

The dimensionality of the WLQ is good overall as Scale A, C1, C3, C4, C5 and C6 were proven to be unidimensional and Scale B and Scale C2 showed little evidence of unidimensionality. The problematic items in Scale A appear to measure a sub-dimension of a depressed mood and Scale A could potentially measure deconstructive behaviours in the

workplace, similar to the Hogan Development Survey. The discussion illustrated that the appearance of multidimensionality could be as a result of double-barrelled or loaded items – in other words the items ask for the person's experience about a stressor assuming that the person is currently faced with the stressor. It was emphasised in the discussion that Scale B should be adapted to ensure that its focus is on the presence of a stressor outside of the work environment instead of on the experience of a stressor. It was further suggested that Scale B include items that measure an individual's ability to disengage from work during leisure time as this is a predominant cause of stress in current literature. Scale C2 seems to be affected by bias and the discussion illustrated that the bias could be due to the item construction. It was thus suggested that the items in Scale C2 be adapted instead of removed as the items further reduce the reliability of Scale C2 if removed.

It was suggested that the problematic items in Scale C1, C3, C4 and C5 be removed from the questionnaire as the removal of these items improves the reliability of the scales. It was suggested that the problematic item in Scale C6 be divided into more than one item to refine the item.

The CFA proved that the theoretical structure of the WLQ represents the data well (SRSR 0.045; NFI 0.992; NNFI 1.029; CFI 1.000 and RMSEA 0.000). Cohen's Kappa illustrated that there is a strong correlation between Scale A and Scale B and Scale A and Scale C respectively in measuring the overall construct of stress, but an insufficient correlation between Scale B and Scale C in measuring the construct of stress. It is thus concluded that Scale B and Scale C are related to events that may be stressful, whereas Scale A relates to the individual's experience of stress which could also be an indication of a person's

resiliency. Hence, it is suggested that the WLQ be correlated to assessments that measure an individual's coping ability.

In conclusion, the psychometric properties of the WLQ appear to adhere to the requirements as set out by the Employment Equity Act in terms of reliability and validity taking into consideration the limitation of the study. Future research should include multi-cultural studies to determine construct equivalence and CFA on an independent sample to confirm the dimensionality results.

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ANNEXURE A – Spss Syntax For Parallel Analysis

```
set mxloops=9000 printback=off width=80  seed = 1953125.

matrix.

GET raw / FILE = * / missing=omit / VAR = A1 TO A40 .

compute ndatsets = 1000.

compute percent  = 95.

compute kind = 1 .

compute randtype = 2.

****************** End of user specifications. ******************

compute ncases   = nrow(raw).

compute nvars    = ncol(raw).

do if (kind = 1 and randtype = 1).

compute nm1 = 1 / (ncases-1).

compute vcv = nm1 * (sscp(raw) - ((t(csum(raw))*csum(raw))/ncases)).

compute d = inv(mdiag(sqrt(diag(vcv)))).

compute realeval = eval(d * vcv * d).

compute evals = make(nvars,ndatsets,-9999).

loop #nds = 1 to ndatsets.

compute x = sqrt(2 * (ln(uniform(ncases,nvars)) * -1) ) &*
```

```
            cos(6.283185 * uniform(ncases,nvars) ).

compute vcv = nm1 * (sscp(x) - ((t(csum(x))*csum(x))/ncases)).

compute d = inv(mdiag(sqrt(diag(vcv)))).

compute evals(:,#nds) = eval(d * vcv * d).

end loop.

end if.

do if (kind = 1 and randtype = 2).

compute nm1 = 1 / (ncases-1).

compute vcv = nm1 * (sscp(raw) - ((t(csum(raw))*csum(raw))/ncases)).

compute d = inv(mdiag(sqrt(diag(vcv)))).

compute realeval = eval(d * vcv * d).

compute evals = make(nvars,ndatsets,-9999).

loop #nds = 1 to ndatsets.

compute x = raw.

loop #c = 1 to nvars.

loop #r = 1 to (ncases -1).

compute k = trunc( (ncases - #r + 1) * uniform(1,1) + 1 )  + #r - 1.

compute d = x(#r,#c).
```

```
compute x(#r,#c) = x(k,#c).

compute x(k,#c) = d.

end loop.

end loop.

compute vcv = nm1 * (sscp(x) - ((t(csum(x))*csum(x))/ncases)).

compute d = inv(mdiag(sqrt(diag(vcv)))).

compute evals(:,#nds) = eval(d * vcv * d).

end loop.

end if.

compute num = rnd((percent*ndatsets)/100).

compute results = { t(1:nvars), realeval, t(1:nvars), t(1:nvars) }.

loop #root = 1 to nvars.

compute ranks = rnkorder(evals(#root,:)).

loop #col = 1 to ndatsets.

do if (ranks(1,#col) = num).

compute results(#root,4) = evals(#root,#col).

break.

end if.
```

```
end loop.

end loop.

compute results(:,3) = rsum(evals) / ndatsets.

print /title="PARALLEL ANALYSIS:".

do if (kind = 1 and randtype = 1).

print /title="Principal Components & Random Normal Data Generation".

else if (kind = 1 and randtype = 2).

print /title="Principal Components & Raw Data Permutation".

end if.

compute specifs = {ncases; nvars; ndatsets; percent}.

print specifs /title="Specifications for this Run:"

 /rlabels="Ncases" "Nvars" "Ndatsets" "Percent".

print results

compute root      = results(:,1).

compute rawdata = results(:,2).

compute percntyl = results(:,4).

save results /outfile= 'screedata.sav' / var=root rawdata means percntyl .
```

```
end matrix.

* plots the eigenvalues, by root, for the real/raw data and for the random data;

  This command works in SPSS 12, but not in all earlier versions.

GET file= 'screedata.sav'.

TSPLOT VARIABLES= rawdata means percntyl /ID= root /NOLOG.
```

ANNEXURE B – Spss Syntax For Bi-factor Analysis

```
matrix Data Var= I1 I2  /N=217/CONTENTS=CORR.

Begin Data



1.000   .559

.559     1.000

End Data.



FACTOR

   /Matrix =in (COr=*)

/ ANALYSIS i1 i2

  /PRINT INITIAL DET EXTRACTION ROTATION

/PLOT EIGEN

  /CRITERIA Factors(1) iterate (100)

  /EXTRACTION Paf

 /ROTATION promax (4)

  /METHOD=CORRELATION.
```

ANNEXURE C – Informed Consent

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Economic and Management Sciences

Department of Human Resource Management

Informed consent for participation in an academic research study

Dept. Of Human Resource Management

The Psychometric properties of the Experience of Work and Life Circumstances Questionnaire (WLQ)

Research conducted by:

Mrs. EA Kekana (28017341)

Cell: 083 380 1738

Dear Respondent

You are invited to participate in an academic research study conducted by Esli Amarja Kekana, Masters student from the Department of Economic and Management Sciences at the University of Pretoria.

The purpose of the study is to evaluate the psychometric properties of the Experience of Work and Life Questionnaire (WLQ).

Please note the following:

- This study involves an anonymous questionnaire. Your name will not appear on the questionnaire and the answers you give will be treated as strictly confidential. You cannot be identified in person based on the answers you give. The only personal information that will be used in the study is your basic biographical details such as your race, gender and age.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- Please answer the questions in the attached questionnaire as completely and honestly as possible. This should not take more than 30 minutes of your time
- The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.

- Please contact my study leader, Prof. P Schaap 012 420 3304/ Pieter.schaap@up.ac.za if you have any questions or comments regarding the study.
-

Please sign the form to indicate that:

- You have read and understand the information provided above.
- You give your consent to participate in the study on a voluntary basis.

_____ _____

Respondent's signature **Date**