The well-being of employees in a South African agricultural research organisation

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Thesis submitted in fulfilment of the requirements for the degree Philosophiae Doctor in Industrial Psychology at the North-West University, Potchefstroom Campus

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September 2014

DECLARATION

I, Doris Nkechiyem Asiwe, hereby declare that the thesis titled "The well-being of employees in a South African agricultural research organisation", is my own work and that the views and opinions expressed in this research are those of the author and of relevant literature references as indicated in the references. I further declare that the content of this research will not be handed in for any other qualification at any other tertiary institution.



DORIS NKECHIYEM ASIWE **SEPTEMBER 2014**

REMARKS

The reader is reminded of the following:

- The editorial style follows the format prescribed by the Publication Manual (6th edition) of the American Psychological Association (APA).
- The revised research proposal forms the first chapter of the thesis. Therefore, this chapter is presented in a different voice when compared to subsequent chapters which report on actual results.
- The thesis is submitted in the form of five chapters, which include three research articles. Chapter 1 and 5 have numbered sections according to the formatting followed in the research unit, WorkWell.
- The reference list is presented after the last chapter of the thesis.

DEDICATION

I would like to dedicate this work to the praise of my Heavenly Father who made it possible for me to write this thesis. Father, I thank you for your grace which was more than sufficient for me.

Commit your works to the Lord, and your thoughts will be established

Proverbs 16: 3 (NKJV)

ACKNOWLEDGEMENTS

I feel fulfilled that I have learnt many life-long virtues (inclusive patience, diligence and perseverance) throughout the period of this study. My heartfelt appreciation is extended to all those who assisted in making this study possible. In particular, I would like to express my heart-felt gratitude to:

- Prof Sebastian Rothmann, for his valuable input and for always willingly sharing his wealth of experience. I will remain eternally grateful.
- My promoters, Prof Lené Jorgensen and Dr Carin Hill, whose support, detailed perusals, and feedback contributed tremendously to the successful completion of this work.
- Prof Sebastian Rothmann, for his help with the statistical analyses and review of the third article.
- Prof Johnny Fontaine, whom fate brought my way when I was in dire need of some explanations on structural equivalence statistical analysis procedures.
- My husband, Prof Joseph Asiwe, whose love for academia greatly motivated me to see this study through, in spite of all odds.
- My husband, Joseph, and my boys, Daniel, Victor, and David, for their moral support, and for doing their bit around the house, especially when I needed to work on this study.
- My beloved sisters in the Lord, Mrs Grace Djan and Sophia Sekati, who continuously held me up in prayer.
- My friends, Dr Shingarai Chigeza, Dr Dupe Olurombi, and Mrs Mercy Kutu, for moral support throughout this study.
- Cecile van Zyl for the language editing of the thesis.
- Dr Douglas R. May for granting me permission to use the Psychological Conditions Questionnaire for the purpose of this research.
- Prof L. T. B. Jackson for giving me permission to use the JDRS.
- The human resource practitioners of the organisation who were continuously willing to assist me during data collection.
- All employees of the organisation who took time out of their busy schedules to complete the questionnaires.

- All those who assisted me financially in the course of the study. These include Prof Lené Jorgensen for financial assistance through funds from the National Research Foundation (NRF), the NWU through the NWU bursary, Prof Jaco Pienaar and my husband, Joseph.
- South African Journal of Industrial Psychology for accepting a revised version of article 2 for publication and South African Journal of Human Resources management for considering a revised version of article 1 for publication.

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SUMMARY

Topic: The well-being of employees in a South African agricultural research organisation.

Keywords: Job demands, job resources, demographic variables, burnout, work engagement, psychological meaningfulness, psychological availability, psychological safety, well-being, structural equation modelling, mediation, employees, agricultural research organisation, South Africa

It is important that organisations are aware of factors that might affect the levels of well-being of employees, as employees are instrumental to the achievement of organisational goals. Well-being of employees can be conceptualised in terms of burnout and engagement. Studies have shown that different factors contribute to the employee experience of burnout and engagement. These factors include job demands and resources and psychological conditions (psychological meaningfulness, psychological availability and psychological safety). Although various studies regarding burnout and engagement can be found in literature, three research gaps have been identified from the studies. First, a reliable and valid instrument is needed to measure job demands and resources in a specific organisation. Second, given the cost of some measures of burnout, inadequacies in conceptualisation of the burnout construct and the inadequate psychometric properties of others, an inexpensive measure is needed which can be used to measure burnout in a valid and reliable way. Third, no studies seem to be found which focus on the effects of job demands and resources on burnout and engagement via specific psychological conditions (i.e. psychological meaningfulness, availability and safety).

The general objective of this research therefore was to investigate the well-being of employees in a South African agricultural research organisation. It focused on job demands, job resources, burnout, work engagement and psychological conditions.

The objective of the first study was to investigate the job demands and resources of employees in a South African agricultural research organisation. The study specifically examined the validity and reliability of a scale adapted to measure job demands and resources of the employees and established the prevalent job demands and resources of the employees.

Differences that may exist based on the employees' demographic variables were also investigated.

The aim of the second study was to provide an overview of current burnout measures that are used in the literature. From the literature, gaps were identified and used to develop a new Burnout Scale for use with employees within a South African agricultural research organisation. The research then examined the construct validity, reliability, construct equivalence and item bias of the newly-developed Burnout Scale. The research also investigated whether any differences in burnout existed in relation to the employees' demographic variables.

The third study investigated the relationships between specific job demands, job resources, psychological conditions, burnout, and work engagement by testing a structural model of burnout and engagement in a sample of employees within a South African agricultural research organisation.

The research method for each of the three articles consisted of a brief literature review and an empirical study. A non-probability availability sample of 443 agricultural employees was used. A cross-sectional design, with a survey as the data collection technique, was used. Measuring instruments that were utilised included an adapted Job Demands-Resources scale (AJDRS), a self-developed Burnout Scale (BS), a self-developed Work Engagement Scale (WES), an adapted Psychological Conditions Questionnaire (PCQ), and a biographical questionnaire. The statistical analyses were carried out with the help of the SPSS programme (IBM SPSS statistics, version 21) and MPLUS version 7.11 (Muthén, & Muthén 1998-2013). The statistical methods utilised in the three articles included descriptive statistics, Cronbach alpha coefficients, principal factor analysis, Pearson product-moment correlation coefficients, MANOVA, ANOVA, differential item functioning (DIF), and structural equation modelling.

Evidence was established for the factorial validity and reliability of the AJDRS. The results indicate that the job demands experienced by employees in an agricultural research organisation are: overload and job insecurity; while job resources were: organisational support, growth opportunities, control, rewards, and physical resources (equipment). It was furthermore found that there were differences in the perceived job demands and resources of employees.

In addition, the BS was found to consist of three reliable factors, i.e. fatigue, emotional exhaustion/withdrawal, and cognitive weariness. The results also showed construct equivalence for the Burnout construct, and no item bias for the language groups examined. Age was found to affect the level of perceived burnout of the employees.

Furthermore, job resources (growth opportunities, control, and organisational support) were found to be positively associated with engagement, while lack of resources and job demands (overload) are positively associated with burnout of employees. Psychological meaningfulness, safety and availability are positively associated with work engagement, and negatively associated with burnout.

The psychological conditions of availability, safety, and meaningfulness mediated the relationship between job resources and work engagement, as well as between lack of job resources and burnout. Psychological availability and meaningfulness mediated the relationship between job demands and burnout; however, the mediation effect of psychological safety on the relationship between job demands and burnout could not be established.

Recommendations are made for practice, as well as future research.

OPSOMMING

Onderwerp: Welstand van werknemers in ’n Suid-Afrikaanse landbou-navorsingsorganisasie

Sleutelwoorde: Werkvereistes, werkshulpbronne, demografiese veranderlikes, uitbranding, werksbegeestering, psigologiese betekenisvolheid, psigologiese beskikbaarheid, psigologiese veiligheid, welstand, strukturele vergelykingsmodellering, mediasie, werkers, landbou-navorsingsorganisasie, Suid-Afrika

Dit is belangrik vir rolspelers om bewus te wees van die faktore wat die welstandsvlakke van werknemers kan beïnvloed, aangesien werknemers instrumenteel is tot die bereiking van organisasies se doelstellings. Welstand word gekonseptualiseer in terme van uitbranding en werksbegeestering. Navorsing bewys dat verskillende faktore bydrae tot die werknemer se ervaring van werkverwante welstand (uitbranding en werksbegeestering. Hierdie faktore sluit in die eienskappe van die werk (werksvereistes en werkshulpbronne) en psigologiese kondisies (veiligheid, betekenisvolheid en beskikbaarheid). Verskeie studies rakende uitbranding en werksbegeestering kan in die literatuur gevind word, drie navorsingsgapings kan egter hieruit afgelei word. Eerstens, die assessering van werksvereistes en werkshulpbronne behoort met geldige en betroubare meetinstrumente plaas te vind vir ’n spesifieke organisasie. Tweedens, die hoë koste van meetinstrument wat uitbranding meet, die onvoldoendheid in die konseptualisering van die uitbrandingskontruk en die onvoldoendheid van die psigometriese eienskappe van ander instrumente, lei daartoe dat ’n koste effektiewe instrument nodig is om uitbranding te meet in ’n geldige en betroubare manier. Derdens, dit blyk dat daar nie studies in die literatuur te vinde is nie wat slegs fokus op die effek van werksvereistes en werkshulpbronne deur spesifieke psigologiese kondisies (naamlik psigologiese veiligheid, betekenisvolheid en beskikbaarheid).

Die algemene doelstelling van hierdie navorsing was dus om die welstand van werknemers in ’n Suid-Afrikaanse landbou-navorsingsorganisasie te ondersoek. Dit fokus op werksvereistes, werkshulpbronne, uitbranding, werksbegeestering en psigologiese kondisies.

Die doelstelling van die eerste studie was om die werksverpligtinge en -hulpbronne van werknemers in ’n Suid-Afrikaanse landbou-navorsingsorganisasie te ondersoek. Die studie het spesifiek die validiteit en betroubaarheid van ’n skaal, wat aangepas is om werksverpligtinge

en -hulpbronne van die werknemers te meet, ondersoek, en het die heersende werksverpligtinge en -hulpbronne van die werknemers bepaal. Verskille wat mag voorkom, gebaseer op die werknemers se demografiese veranderlikes, is ook ondersoek.

Die doelwit van die tweede studie was om ŉ oorsig van huidige uitbrandingsmaatstawwe wat in die literatuur gebruik word, te verskaf. Vanuit die literatuur is gapings geïdentifiseer en gebruik om ŉ nuwe Uitbrandingskaal vir gebruik met werknemers in ŉ Suid-Afrikaanse landbou-navorsingsorganisasie, te ontwikkel. Die navorsing het voorts die konstrukgeldigheid, betroubaarheid, konstrukekwivalensie en itempartydigheid van die nuut-ontwikkelde Uitbrandingskaal ondersoek. Die navorsing het ook ondersoek ingestel om te bepaal of enige verskille bestaan in uitbranding ten opsigte van die werknemers se demografiese veranderlikes.

Die derde studie het ondersoek ingestel na die verhouding tussen werksvereistes en werkshulpbronne, psigologiese kondisies, uitbranding, werkbegeestering en het ŉ strukturele model van hul verhoudinge met lede van ŉ Suid-Afrikaanse landbou-navorsingsorganisasie getoets.

Die navorsingsmetode vir elk van die drie artikels bestaan uit ŉ literatuuroorsig en ŉ empiriese studie. ŉ Nie-waarskynlikheidsbeskikbaarheidsteekproef van 443 landbou-werkers is gebruik. ŉ Kruissnit-ontwerp, met ŉ opname as die data-insamelingstegniek, is gebruik. Die meetinstrumente wat gebruik is, het die volgende ingesluit: ŉ aangepaste skaal van werksverpligtinge en -hulpbronne (AJDRS), ŉ self-ontwikkelde Uitbrandingskaal, ŉ self-ontwikkelde Werkbegeesteringskaal, ŉ aangepaste Psigologiese Kondisies-vraelys, en ŉ biografiese vraelys. Die statistiese analises is uitgevoer met die hulp van die IBM SPSS-program (IBM SPSS statistics, weergawe 2) en MPLUS, weergawe 7.11 (Muthén & Muthén, 1998-2013). Die statistiese metodes wat in die drie artikels gebruik is, sluit in beskrywende statistiek, Cronbach se alfakoëffisiënte, prinsipiële faktoranalise, Pearson se produk-moment-korrelasiekoëffisiënte, MANOVA, ANOVA, differensiële item-funksionering (DIF) en strukturele vergelykingsmodellering.

Bewyse is vasgestel vir die faktorgeldigheid en betroubaarheid van die AJDRS. Die resultate toon dat die werksvereistes wat deur werknemers in diens van ŉ landbou-

navorsingsorganisasie ervaar word, werksoorlading en werksonsekerheid behels; terwyl werkshulpbronne organisasie-ondersteuning, groeigeleenthede, beheer, belonings, en fisiese hulpbronne (toerusting) was. Verder is gevind dat daar verskille in die waargenome werksvereistes en hulpbronne van werknemers was.

Verder is ook gevind dat die Uitbrandingskaal bestaan uit drie betroubare faktore, naamlik fisiese moegheid, emosionele uitputting/onttrekking en kognitiewe tamheid. Die resultate het ook konstrukekwivalensie vir die Uitbrandingskonstruk getoon, sowel as geen itempartydigheid vir die taalgroepe wat ondersoek is nie. Daar is vasgestel dat ouderdom die vlak van ervaarde/waargenome uitbranding van die werknemers affekteer.

Daar is ook bevind dat werkshulpbronne (groeigeleenthede, beheer en organisasie-ondersteuning) positief geassosieer is met werksbetrokkenheid, terwyl ’n tekort aan hulpbronne en werksvereistes (oorlading) positief geassosieer is met die uitbranding van werknemers. Psigologiese betekenisvolheid, veiligheid en beskikbaarheid is positief met werksbetrokkenheid geassosieer, en negatief met uitbranding geassosieer.

Daar is gevind dat die psigologiese kondisies van beskikbaarheid, veiligheid en betekenisvolheid die verhouding tussen werkshulpbronne en werksbetrokkenheid sowel as tussen ’n tekort aan werkshulpbronne en uitbranding medieer. Psigologiese beskikbaarheid en betekenisvolheid medieer die verhouding tussen werksvereistes en uitbranding; tog kon die mediasie-effek van psigologiese veiligheid op die verhouding tussen werksvereistes en uitbranding nie bepaal word nie.

Aanbevelings vir die praktyk sowel as toekomstige navorsing is gemaak.

CHAPTER 1

INTRODUCTION

This thesis deals with the well-being of employees in a South African agricultural research organisation. More specifically, it focuses on job demands, job resources, burnout, work engagement and psychological conditions. In this chapter, the background to the study and the problem statement are discussed. The research objectives, the significance of the study and the research method are also presented. Finally, an overview of the chapters is presented.

1.1 PROBLEM STATEMENT

The workplace has undergone tremendous changes over the last few decades (Dewe & Cooper, 2012). Organisations must survive in highly competitive local and global economies. Management of organisations is now aware that employees play an important role in the attainment of organisational success with regard to innovativeness, competition and the attainment of organisational goals and objectives (Bakker & Schaufeli, 2008). This is especially true of agricultural research organisations that are primarily saddled with the responsibility to conduct research, develop technology and to transfer technology that promotes agriculture and related fields (Agricultural Research Council, ARC, 2007). Innovation improves organisational productivity and provides a competitive advantage. The application of innovative new technology could have a negative effect on employees (Knani, 2013). The introduction of new technology to perform tasks more quickly results in employees reporting an increase in job demand perception, exhaustion, and presenteeism, among others (Knani, 2013). Furthermore, employees' negative experience is heightened as a result of a lack of support and recognition. Knani (2013) stresses the importance of support at work to reduce the negative effects of the implementation of new technology on employees.

Management of organisations is aware that it is their responsibility to maximise the efforts of their staff members towards achieving organisational objectives. Though a high workload

may be needed to realise these goals, possible side effects include exhaustion and negative work attitudes. It is imperative that organisations are aware of what to do to ensure employee well-being (Bakker, van Veldhoven, & Xanthopoulou, 2010). This is of paramount importance as the well-being of employees is essential for the successful practice of organisations (Dewe & Cooper, 2012; Wright 2006).

Well-being

Studies on well-being have increased in recent years (Dodge, Daly, Huyton, & Sanders, 2012). "There are still questions of how well-being should be defined (or spelt), which has given rise to blurred and overly broad definitions of well-being" (Forgeard, Jayawickreme, Kern, & Seligman 2011, p. 81). Dodge et al. (2012) proposed a definition of well-being as "the balance point between an individual's resource pool and the challenges faced" (p. 230). "Each time an individual meets a challenge, the system of challenges and resources comes into a state of imbalance, as the individual is forced to adapt his or her resources to meet this particular challenge" (Kloep, Hendry, & Saunders, 2009, p. 337).

In essence, stable well-being is when individuals have the psychological, social and physical resources they need to meet a particular psychological, social and/or physical challenge. When individuals have more challenges than resources, the see-saw dips, along with their well-being, and *vice versa* (Dodge et al[1]., 2012). Applying Dodge et al's definition of well-being to the Job Demands-Resources (JD-R) model, this research investigates the relationships as specified by the JD-R model between job characteristics (demands and resources) and employee well-being (burnout and engagement). As pointed out by Mostert (2011), the Job Demands-Resources model can be used to examine the effect of job characteristics on work-related outcomes. A core assumption of the JD-R model is that job characteristics affect employee well-being (Bakker & Demerouti, 2007; Levi, 2010). Job characteristics act as antecedents to well-being (burnout and work engagement. The JD-R presupposes that an individual's working conditions consist of two broad elements, namely job demands and job resources. Job demands refer to those physical, social or organisational aspects of the job that require sustained physical or mental effort and are therefore associated

[1] The abbreviation et al. is used consistently as normal case (and not in italics) throughout the manuscript.

with certain physiological and psychological costs (Bakker & Demerouti, 2007; Demerouti & Bakker. 2011; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2004). Job resources refer to those physical, psychological, social or organisational aspects of the job that may be functional in achieving work goals, reducing job demands and the associated physiological and psychological costs, and stimulating personal growth and development (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004).

To elucidate the effects of job demands and job resources, the JD-R model proposes two fundamental psychological processes (Demerouti & Bakker, 2011). The first process – the health impairment process – suggests that job demands drain employees' physical and psychological resources and may consequently result in a state of exhaustion. This draining of energy may ultimately affect the health of employees and result in unwell-being (Hakanen, Schaufeli & Ahola, 2008; Hu, Schaufeli & Taris 2011). The second process – the motivational process – suggests that job resources are inherently or extrinsically gratifying and as a result play a motivational role. Due to their motivational potential, job resources may have a beneficial effect on employee health and well-being (Hakanen et al., 2008; Hu et al., 2011). Demands and burnout are positively related, whereas resources and burnout are negatively related (Rich, Lepine, & Crawford, 2010). Job resources are considered to enhance employees' well-being, i.e. they are assumed to stimulate employees' work engagement and prevent burnout (Van den Broeck, Vansteenkiste; De Witte, & Lens, 2008).

Research has shown that job resources such as autonomy/control, learning opportunities and social support from colleagues and supervisors are positively associated with engagement (Halbesleben, 2010; Schaufeli & Salanova, 2007). Job control refers to the control over the work process, the ability to make decisions, and the opportunity to exercise a degree of control over the work to be accomplished (Huang, Chen, Du, & Huang, 2012). Autonomy, especially in decision-making (Salanova, Agut, & Peiro, 2005), also leads to safety (Bakker & Demerouti, 2008, May, Gilson, & Harter, 2004) and consequently increased engagement (Rothbard & Patil, 2012).

Challenging demands necessitate that employees are more attentive and absorbed, and direct more energy to tasks. These high demands can be an energising force themselves, by helping

employees achieve their goals and by stimulating their personal growth (Bakker & Demerouti. 2008). Such energy will, however, be depleted if the employees perceive that they do not have enough control to tackle these challenging demands (Karasek, 1979). Perceived control is increased with the granting of sufficient resources such as support from organisations and colleagues. The JD-R model suggests that job demands force employees to be attentive and absorbed and could be depletive if the employee lacks adequate resources. Both demands and resources can increase engagement if employees perceive that they have sufficient resources to deal with their work demand (Rich et al., 2010).

Work engagement: The concept of work engagement emerged from burnout research as an attempt to cover the entire continuum running from employee *unwell*-being (burnout) to employee *well*-being (Schaufeli, Taris, & van Rhenen, 2008*).* Kahn's (1990, 1992) forerunner study of work engagement set the path to the background for current studies on work engagement as a psychological state (Rich, et al., 2010). Rothbard and Patil (2012) define engagement as "the degree to which employees are focused in and present in their roles" (Rothbard & Patil, 2012, p.56). Individual work engagement is defined as "an employee's psychological presence in a role or being there" (Rothbard & Patil, 2012, p.56). It can therefore be deduced that work engagement is mostly conceptualised as a manner or process in which work is done and not as a behavioural outcome (Saks, 2008; Macey & Schneider, 2008). Moreover, engagement is linked to performance (Schaufeli, Taris, & Bakker, 2006; Macey & Schneider, 2008), which translates to increased productivity and efficiency in increasing competitive global work environments (Mason, Royal, Agnew, & Fine, 2008). Research studies indicate that employees who are engaged are better performers than those who lack energy and other resources (Demerouti, Bakker, & Leiter, 2014). One can conclude that engaged workers are more productive than non-engaged workers are; they experience positive emotions and better health (Bakker & Xanthopoulou, 2013).

Burnout: Burnout represents an experience of insufficient energetic resources (of energy and motivation) (Bakker & Demerouti, 2007; Hobfoll, 2002). Burnout is a psychological syndrome involving chronic emotional and interpersonal stressors that individuals experience at work and their subsequent responses to their tasks, organisations, co-workers, clients, and themselves (Maslach & Leiter, 2008). It is a psychological response to on-going work stress

with exhaustion as a common symptom. Qiao and Schaufeli (2011) contend that the core content of this affective reaction is the gradual depletion over time of individual intrinsic energetic resources leading to feelings of emotional exhaustion, physical fatigue and cognitive weariness (Shirom, 2011; Shirom & Melamed, 2005). Physical fatigue refers to feelings of tiredness and low levels of energy in carrying out daily tasks at work or in relation to work, such as getting up in the morning to go to work (Shirom & Melamed, 2005). Emotional exhaustion refers to feeling too weak to display empathy to clients or co-workers and lacking the energy needed to invest in relationships with other people at work. Finally, cognitive weariness refers to feelings of slow thinking and reduced mental agility (Shirom & Melamed, 2005). Burned-out workers are unable and unwilling to expend effort, leading to suboptimal functioning (Leiter & Maslach, 2005).

People's psychological relationships to their jobs have been conceptualised as a continuum between the negative experience of burnout and the positive experience of engagement (Leiter & Bakker, 2010; Maslach & Leiter, 2008). Contemporary organisations need employees who are psychologically connected to their work and who are willing and able to invest themselves fully in their roles (Bakker & Leiter, 2010; Breevaart, Bakker, Demerouti, & Hetland, 2012).

Psychological conditions

There are three ways one can invest oneself into one's work (Kahn, 1990). These psychological conditions that are associated with engagement and disengagement at work are meaningfulness, safety and availability. Meaningfulness is defined as the value of a work goal or purpose, judged in relation to an individual's own ideals or standards (Hackman & Oldham, 1980). Psychological safety is defined as "feeling able to show and employ one's self without fear of negative consequences to self-image, status, or career" (Kahn, 1990, p. 708). Kahn (1990) defined psychological availability as an individual's belief that he/she has the physical, emotional or cognitive resources to engage the self at work. Psychological availability assesses the readiness or confidence of a person to engage in his/her work role, given that individuals are engaged in many other life activities (May et al., 2004).

Psychological safety: "a key factor for increasing work engagement is psychological safety. When employees perceive psychological safety, they are less likely to be distracted by negative emotions such as fear which stems from worrying about controlling perceptions of managers and colleagues. Psychological safety decreases distractions and allows the employee to expend his or her energy towards being absorbed and attentive to work tasks" (Rothbard & Patil, 2012, p. 63).

Meaningful work "emerges from the pursuit of important purposes in the context of understanding one's self one's organisation and how one fits with the purposes and operations of one's organisation" (Steger & Dik, 2010, p. 136). When one realises one's limits, one is not only able to understand better the kind of work at which one can succeed, but also to have a stronger sense of self efficacy for the tasks one is expected to perform (Steger & Dik, 2010).

In order for employees to experience enhanced meaningfulness, work environments should include policies that invest in training employees and assisting their proficiency development, delegating responsibilities for decisions, recruiting people on the basis of fit to the organisation, and implementing an incentive structure that will enhance performance (Steger & Dik, 2010). Human beings have a strong need to create meaning and it is this need that helps them to manage the demands and pressures, and sometimes the repetitiveness of the workplace (Singh, Jain, & Bhandarker, 2006). There are indications that people engaged in meaningful work report greater well-being (Arnold, Turner, Barling, Kelloway, & McKee, 2007).

Psychological availability has been referred to as self-efficacy (Bandura, 1997). Albert Bandura has defined self-efficacy as one's belief in one's ability to succeed in specific situations. Self-efficacy is the extent or strength of one's belief in one's own ability to complete tasks and reach goals (Ormrod, 2006). Self-efficacy affects every area of human endeavour. Determining the beliefs that a person holds regarding his or her ability to affect situations, strongly influences the ability a person actually has to face challenges competently as well as the choices a person is most likely to make. Self-efficacy is enhanced by increasing employees' general confidence in their abilities (Rich et al., 2010), which, in turn,

assists in making them feel secure about themselves and less self-conscious about how others perceive them (Kahn, 1990). Employees also gain increased control and efficacy when they perceive that they are receiving important returns on their physical, emotional and cognitive investments (Kahn, 1990). One's sense of self-efficacy can play a major role in how one approaches goals, tasks, and challenges (Luszczynska, & Schwarzer, 2005).

Self-efficacy may be an important determiner of an individual's psychological availability as evident in the attention, absorption and energy directed towards their work (Rothbard & Patil, 2012). An important characteristic of individuals who are high in efficacy is their tenacity and persistence, motivated by their conviction of future success (Sonenteng, Dormann, & Demerouti, 2010), while low efficacy has been found to predict burnout (Gonzalez-Roma, Schaufeli, Bakker & Lloret, 2006). In spite of the importance of the psychological conditions with regard to well-being (burnout and work engagement), there is not much literature on their mediational effect in the relationship between job demand and burnout or job resources and engagement.

Many research studies have been published in which the JD-R model serves as the main theoretical framework (Demerouti & Bakker, 2011). Many of these studies have provided ample evidence for the main effects of job demands and job resources on employee health and well-being, and considerable evidence for the buffer effect of job resources on the relationship between job demands and health and well-being (Bakker & Demerouti, 2007; Demerouti & Bakker, 2011). However, only a few studies have expanded the JD-R model by including mediating variables and especially the role of psychological states as mediators. A few South African studies, such as Rothmann, Diedericks, and Swart (2013), have been theoretically based on the Self-determination Theory (Deci & Ryan, 2000, 2008), but the effects of other psychological states have not been studied in relation to the JD-R model. Furthermore, the researchers could hardly find any literature on South African studies that included burnout or psychological safety. Most of the studies have focused on work engagement and the mediational effect of psychological meaningfulness and availability (see Beukes 2011; Olivier & Rothmann 2007; Phale 2008; Rothmann & Buys, 2011; Rothmann & Joubert 2007; Rothmann & Rothmann 2010; Rothmann & Welsh, 2013).

Furthermore, only a few researchers (such as (Brenninkmeijer, Demerouti, Le Blanc, & van Emmerik 2010; Demerouti, Bakker & Fried 2012; Xanthopoulou, Bakker, Demerouti, &

Schaufeli, 2007). have investigated the mediating effects of psychological conditions using the JD-R model as framework. The current study investigates and addressed this gap in research studies.

Measuring well-being

As the assessment of well-being receives greater research focus, it becomes of paramount importance to be clear about what is being assessed, and how to interpret the data so as to have a fair and valid assessment (Dodge et al., 2012). Because well-being is subjective, it is typically measured by means of self-reports (Larsen & Eid, 2008) through the use of psychological measurements such as questionnaires and interviews. In the literature on the JD-R model, numerous cross-sectional studies found evidence for the core assumptions of the model within various samples and different countries (e.g. Fourie, Rothmann, & Van de Vijver, 2008; Hakanen, Bakker, & Schaufeli, 2006; Lewig, Xanthopoulou, Bakker, Dollard, & Metzer, 2007; Llorens, Schaufeli, Bakker, & Salanova, 2007, Marais, 2006; Rothmann & Jorgensen, 2007; Van de Ven, Vlerick, & De Jonge, 2008); while longitudinal survey designs have also been used by researchers such as Mauno, Kinnunen, and Ruokolainen (2007), Salanova and Schaufeli (2008) and Schaufeli, Bakker, and Van Rhenen (2009). Three waves longitudinal studies were used by researches such as Hakanen, Bakker, and Jokisaari (2011) and Hakanen et al. (2008). Furthermore, Barkhuizen and Rothmann (2008), Buys and Rothmann (2009), and Jackson and Rothmann (2005b) used interviews in the development of questionnaires.

Engagement measures: Extending on the earlier work of Kahn (1990), May et al. (2004) introduced a three-dimensional concept of engagement, distinguishing between a physical component (e.g. "I exert a lot of energy performing my job"), an emotional component (e.g. "I really put my heart into my job"), and a cognitive component (e.g. "I am rarely distracted when performing my job") in their Work Engagement Scale (WES). However, South African studies have obtained discordant results with the use of this instrument (see Olivier & Rothmann, 2007; Phale, 2008) indicating the need for an instrument that effectively measures engagement from the perspective of Kahn's engagement model.

Burnout measures: The constant search for improved burnout measures can be considered a feature of burnout research over the last few years (Qiao & Schaufeli, 2011). The instruments most commonly used to assess burnout for research purposes focus mainly on measuring exhaustion, cynicism, professional efficacy and disengagement from a general job perspective. These measures include the Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli, Leiter, Maslach, & Jackson, 1996), the Oldenburg Burnout Inventory (OLBI) (Demerouti, Bakker, Vardakou, & Kantas, 2003), the Copenhagen Burnout Inventory (CBI) (Kristensen, Borritz, Villadson, & Christensen, 2005), the Burnout Measure (BM) (Pines & Aronson, 1988) the later, shorter version of the BM (BMS) (Malach-Pines, 2005) and the Shirom-Melamed Burnout Measure (SMBM) (Shirom, 2003; Melamed, Shirom, Toker, Berliner, & Shapira, 2006).).

However, a number of problems have been identified with these instruments. One major problem with the MBI-GS is that it is copyrighted and expensive. Other identified limitations is that the original burnout model used in the MBI-GS does not cover the entire range of symptoms observed among employees with severe burnout, since the measurement of distress symptoms has been omitted (Schaufeli, 2003). Although most of the studies on burnout use the Maslach Burnout Inventory (Schaufeli et al., 2008), it is expensive and usually not accessible to the general public (Kristensen et al., 2005). Furthermore, the reduced personal accomplishment dimension has been found to be problematic and has the weakest empirical support of the three suggested burnout dimensions (Shirom, 2011). A further problem is the interpersonal nature of the burnout syndrome that was lost when the concept of burnout was extended beyond the human services (Borgogni, Consiglio, Alessandri, & Schaufeli, 2012). Interpersonal strain represents a feeling of discomfort and disengagement in the relationships with people at work resulting from excessive social requests and pressures. Interpersonal strain at work seems to be a promising construct to recapture (Borgogni et al., 2012). Armon, Shirom, Shapira, and Shappira (2008) gave support for the inclusion of the interpersonal aspect in the measurement of the burnout measure when they renamed the emotional exhaustion subscale of the SMBM as Emotional /Interpersonal exhaustion. South African studies have shown support for the inclusion of both the depersonalisation and cynicism dimension of burnout in the same study by adapting the MBI-GS (see Rothmann & Barkhuizen, 2008; Rothmann & Jackson, 2005a). With regard to the OLBI, South African studies have found problems with consistency in construct validity and phrasing of items (see

Brand, 2006; Pretorius, 2007). The BM have been mostly critiqued for its factor structure and deviating from the conceptualisation of burnout on which the instrument is constructed (see Enzmann, Schaufeli, Janssen, & Rozeman, 1998; Shirom & Melamed, 2005). With regard to the SMBM, it has mostly been critiqued for its conceptualisation of burnout as basically relating to energetic resources and excluding other resources (such as social resources), which cannot be overlooked in work settings (Qiao & Schaufeli, 2011).

Psychological conditions measures: The Psychological Conditions Questionnaire (PCQ) was developed by May et al. (2004) and includes subscales designed to measure the psychological constructs of meaningfulness, safety and availability. However, previous studies (see Olivier & Rothmann, 2007; Phale, 2008; Rothmann & Buys, 2011) have not been able to study the mediational role of psychological safety with regard to engagement, because of either a low alpha coefficient or a poor factor loading. Phale (2008) attributed the insufficient loading and poor communality to misinterpretation or poor item construction. There is therefore a pertinent need to adapt the PCQ by developing a subscale that could be used to measure the psychological safety of employees in South Africa. This recommendation has been made by previous South African researchers (Olivier & Rothmann, 2007; Phale, 2008) and will further be addressed in this current study by the addition of more items in this subscale as well as rewording of certain items.

Job demands and resources measure: A common approach in organisational research is to measure job demands and job resources with validated self-reporting scales (ten Brummelhuis, ter Hoeven, Bakker, & Peper, 2011). The Job Demands Resources Scale (JDRS) was developed by Jackson and Rothmann (2005b) to measure job demands and resources based on literature regarding organisational causes of burnout and work engagement. The scale was initially developed for educators and consists of 42 items. The scale measures seven reliable factors: organisational support, growth opportunities, overload, job insecurity, relationships with colleagues, control, and rewards (Jackson & Rothmann, 2005b). Marais (2006) adapted the instrument for use in her study on police members in the North West Province of South Africa and found it reliable. The scale needs to be adapted for use in the agricultural research sector. Adaptation may be applied to the content, format, response options, or visual presentation of any part of a question, questionnaire, or

instrument. The purpose of adaptation is to better fit the needs of a new study population (Harkness, 2008, 2010; Harkness, Villar, & Edwards, 2010).

Given the above identified challenges facing the world of work, the issue of perceived job demands and resources of employees is still a serious concern that needs to be addressed. Different organisations experience different job demands and resources (Hakanen & Roodt, 2010; Rothmann et al., 2006) and employees also experience job demands and resources differently depending on their specific demographic variables (Antoniou, Polychroni, & Vlachakis, 2006). More research seems needed to identify job demands and resources in different occupations and organisations in South Africa as well as to investigate differences that may exist among employees based on demographic variables. One such a sector where well-being research in South Africa is lacking is the agricultural research sector.

The agricultural research sector

The agricultural sector contributes immensely to the economy of any nation as it provides sustenance and revenue for the populace and production materials for industries. Agriculture is the mainstay of rural economies in South Africa, and indeed throughout most of Africa (Blignaut, Ueckermann, & Aronson, 2009). Prioritising agriculture within a country results in food security for the poor (Blignaut et al., 2009; Zuma, 2008) and contributes towards lowering the rate of inflation (Zuma, 2008). It is therefore important that the agricultural sector functions effectively to ensure economic development not only in South Africa, but also globally.

The agricultural sector comprises farmers and farmworkers, allied industries as well as agricultural institutes that aim to promote agricultural and related sectors through research, technology development and technology transfer (Agricultural Research Council, 2012). Agricultural research has an important role to play to solve poverty in Africa (ARC, 2005; Forum for Agricultural Research in Africa (FARA), 2006.) and to feed the world's growing population (ARC, 2005; FARA, 2006; Hawkins et al., 2009). Research and development efforts within agricultural research are continuously contributing towards the scientific excellence within South Africa's National System of Innovation (ARC, 2013). To achieve sustainable economic growth in a developmental society requires a competitive agricultural

sector capable of creating employment among the rural, poor communities. The agricultural research institutes continue to contribute towards enhancing the competitiveness of the agricultural sector through innovation and technology transfer initiatives. The capacity of agricultural research to successfully disseminate the outcomes of its research and development is critical for successful agricultural development, food security, economic growth and competitiveness of the agricultural sector (ARC, 2012).

Agricultural research institutes are, however, faced with a number of challenges. A major challenge facing agricultural research institutes in South Africa is the incidence of unanticipated emergency situations. Case in point, in the process of carrying out their research activities on plants and animals, employees in agricultural research organisations may experience some problematic incidences usually in the form of climatic variables (excessive or insufficient rain), pests, weeds and diseases (Saayman-du Toit, 2002). In fact, on-going changes in climatic conditions have an adverse effect on agricultural production in Africa (Maddison, Manley, & Kurukulasuriya, 2006; Stern, 2006).

Another challenge facing agricultural research is insufficient funding. Agricultural research in South Africa is funded 40-45% through the parliamentary grants while the rest is sourced through core project funds obtained from the private sector or trusts. It is currently becoming difficult for agricultural organisations to generate external funds due to poor economic conditions and poor agriculture sector performance (ARC, 2013). With declining funding rates from both private and government, it is becoming increasingly difficult for agricultural research institutes to carry out research activities, as they are being forced to perform mainly through cost control and reprioritising projects (ARC, 2013). This could result in employees experiencing job insecurity as the employees are not sure whether their projects will receive funds or will be considered of a lower priority. Job insecurity entails the employee's perception of threat of his current job, and the associated concerns (De Witte, 2005; Sverke et al., 2004). The negative effect of job insecurity on employees has widely been studied in the stress literature.

Budgetary allocations are not usually sufficient for the development of agricultural research (FARA, 2011). The agricultural research sector's insufficient funds to sustain its mandatory function, coupled with its technological setback with obsolete equipment in some research

laboratories waiting for renewal or replacement for too long, capital replacement and maintenance costs as well as capital equipment investments could impede the agricultural research from effectively delivering on its mandate (ARC, 2013).

Equally tied to the problem of a lack of funds is the associated turnover of employees who are leaving for better opportunities where they have a comparative cost of living advantage. The vacancies created by employees leaving are difficult to fill as the field of agricultural research in South Africa is still lacking a significant number of employees who are adequately skilled despite development initiatives from research organisations. Consequently, any resignation of a skilled employee is likely to considerably affect the organisation's performance. The employees left behind are striving with great difficulty and stress to cope with the daily tasks. Furthermore, some projects are delayed owing to the resignation of the primary researcher (ARC, 2013). The main factors contributing to difficulties in recruiting and retaining employees include: pay (low pay levels in contrast to other science councils), universities, government departments and private sector, rivalry from other employers, retention policy, insufficient recognition and appreciation, lack of fit with organisational culture, and inappropriate fit for the role (ARC, 2008).

However, despite these agriculture institutes' key role in the agricultural process in South Africa, there is currently no information available concerning factors that contribute to the well-being of employees in these agricultural institutes. According to Deshpande and Shah (2007), research on distress in the agricultural sector has focused mainly on farmers and farm sectors, thereby neglecting the employees in agricultural research organisations.

In conclusion, well-being is a positive outcome that is important for individuals and for various sectors (Center for Disease Control & Prevention, 2013). Developing a practical approach to understanding employee well-being has therefore become an important concern for both employers and researchers (Fourie, Rothmann, & Van de Vijver, 2008; Phale, 2008). However, in order to address these concerns, well-being has to be well defined within a specific work environment. Therefore, it is important that ways to ascertain the prevalence of these concerns should not only be generated, but should also be applied scientifically. Relationships between various well-being constructs should also be determined so that employers and researchers are able to take practical measures to address well-being concerns.

There is therefore a need to investigate the well-being of employees in the agricultural research sector.

From the above discussion, the following gaps can be identified in literature:

(1) There is no available information on the job demands and resources experienced by employees in an agricultural research organisation.
(2) There is no available instrument that has been proven to be reliable and valid to measure different job demands and resources of employees in an agricultural research organisation.
(3) There is no information on demographic variables that may account for differences in the perceived job demand and resources of employees in agricultural research organisations.
(4) There is no current single, reliable and valid instrument to effectively measure the burnout instrument as consisting of physical, emotional, and cognitive dimensions. Some measures that have been adapted for use within South Africa are equally very expensive. So it is difficult to do research with large samples if instruments (copyrighted) have to be bought for every study.
(5) There is no information on demographic variables that may account for differences in the burnout of employees in an agricultural research organisation.
(6) There is no information on the relationship between job demands, job resources, burnout, work engagement and psychological conditions of employees in an agricultural research organisation.
(7) There is no information on variables that could constitute a structural model of well-being (investigating the role of psychological conditions as mediators within the JD-R framework) of employees in an agricultural research organisation.

The following research questions are formulated based on the description of the research problem provided above:

- What are the job demands and resources experienced by employees in a South African agricultural research organisation?

- Is the adapted Job Demands and Resources Scale a valid and reliable instrument to measure different job demands and resources in a group of employees in a South African agricultural research organisation?
- Are there differences in the perceived job demands and resources of employees in agricultural research organisations based on different demographic variables?
- Does the burnout construct consist of three reliable components: Fatigue, Cognitive Weariness and Emotional Exhaustion/Withdrawal in a sample of employees in an agricultural research organisation?
- What demographic variable could account for differences in the burnout of employees in an agricultural research organisation?
- What is the relationship between job demands, job resources, psychological conditions, burnout and work engagement in a sample of employees in an agricultural research organisation?
- What variables could be used to constitute a structural model of well-being of employees in an agricultural research organisation?
- What recommendations can be made concerning the predictors of well-being in an agricultural organisation in South Africa?

The research project will make the following contributions to the field of industrial psychology:

- Add to the body of literature in the industrial psychology field on the job demands and resources of employees in an agricultural research organisation in South Africa;
- Add to the availability of reliable assessment measures in the industrial psychology field by providing a valid and reliable instrument for the measurement of job demands, job resources, burnout and psychological safety in a sample of employees in an agricultural research organisation.
- Add to the body of literature available in industrial psychology research on what is known about the relationship between job demands, job resources, psychological conditions, burnout, and work engagement, and more specifically for a sample of employees in an agricultural research organisation.
- Provide a structural model of well-being consisting of psychological meaningfulness, psychological safety, psychological availability, job demands/resources, burnout, and

work engagement that will be available for employees in an agricultural research organisation in South Africa.

- Provide recommendations for future research in the field of industrial psychology regarding the predictors of well-being in an agricultural research organisation in South Africa.

1.2. RESEARCH OBJECTIVES

1.2.1 General objectives

This general objective of this research was to investigate the well-being of employees in a South African agricultural research organisation. It focused on job demands, job resources, burnout, work engagement and psychological conditions.

1.2.2 Specific objectives

The specific objectives of the study are (provided in terms of the specific article in which it is investigated):

Article 1: Job demands and resources of employees in a South African agricultural research organisation

- To adapt an existing job demands and resources scale for use among employees in a South African agricultural research organisation.
- To determine the specific job demands and resources of employees in an agricultural research organisation in South Africa.
- To determine the differences in the perceived job demands and resources of employees in an agricultural research organisation in South Africa.

Article 2: The psychometric properties of a new scale to measure burnout

- To provide an overview of burnout measures that are currently in use.
- To identify potential gaps and problem areas in instruments that are currently available to measure burnout.
- To address these gaps and problem areas in the conceptualisation of burnout as measured by current burnout measures through the development of the Burnout Scale.
- To investigate the psychometric properties of a newly developed Burnout Scale on a South African sample of employees in an agricultural research organisation.

- To examine the construct equivalence of the newly-developed measure for usage on a diverse range of employees within a South African agricultural research organisation.
- To explore whether demographic variables influenced the degree of burnout within South African employees.

Article 3: A model of well-being of employees in a South African agricultural research organisation

- To investigate the relationship between job demands, job resources, psychological conditions, burnout and work engagement among employees in an agricultural research organisation.
- To develop and test a structural model of well-being of employees in an agricultural research organisation. (This model needs to include psychological meaningfulness, psychological safety, psychological availability, job demands/resources, burnout, and work engagement of employees in an agricultural organisation).

1.3 RESEARCH DESIGN

The research design consists of the research method and research approach which will be discussed according to the three articles the work has been presented in.

1.3.1 Research method

The research method consists of a literature review and an empirical study.

1.3.1.1. Literature review

The literature review for the thesis will include a complete review of relevant literature on job characteristics and employee well-being in order to provide a framework for the study. The intention of the literature review is to bring to light how job characteristics (job demands and job resources) as well as the psychological conditions experienced by an individual relate to well-being (burnout and work engagement). The research propositions were specifically formulated to address gaps identified in literature.

Literature search procedure

A literature search from electronic research platforms such as EBSCOhost and databases such as JSTOR, Emerald, Psych Info, Science Direct, Sabinet Online, SA Publications, A-Z Journal List, and Google Scholar was conducted. Specifically, journals within the field of social sciences and psychology were targeted. The search was based on a keyword search, namely job demands, job resources, demographic variables, burnout, work engagement, psychological meaningfulness, psychological availability, psychological safety, work-related well-being, structural equation modelling, mediation, employees, agricultural organisation, South Africa. The Ferdinand Postma Library (NWU, Potchefstroom Campus) was also used to assess relevant doctoral theses, master's dissertations and books. The literature search was conducted from the writing of the proposal in 2009 to the completion of the research study in 2014.

1.3.1.2 Empirical study

The empirical study consists of a research design, research participants, research procedure, measuring instruments, and statistical analysis and is presented according to the three phases of the research project.

Phase 1 (Article 1):

Research design

Research approach

In the first step of this article, an exploratory research design will be utilised to generate speculative insights, new questions and hypotheses as stated in Durrheim (2007). Interviews will be used to gain insight into the job demands and resources experienced by employees in an agricultural research organisation. For the second step, the information from the interviews will be used to adapt a questionnaire for their use (which is a quantitative design methodology to adapt the JDRS (Jackson & Rothmann, 2005b). As part of this quantitative research design, the researcher is concerned with the development of new questionnaires, scales and tests based on data gathering (Mouton, 2001). Finally, this study also makes use of a cross-sectional survey design (Shaughnessy, Zechmeister, & Zechmeister, 2006) to achieve the research objectives. This type of survey design involves drawing a sample from the population at a specific point in time (Shaughnessy et al., 2006).

Research participants

The first step of the research study consists of a sample of employees of an agricultural research organisation who will be interviewed. The sample in the second step (as with phases 2 and 3 (i.e. Articles 2 and 3) consists of employees from a South African agricultural research organisation. The primary mandate of the organisation under study is to act as the main agricultural research institution in South Africa with the objective to carry out research, drive research and development, drive technology development, and the transfer of technology. The organisation operates under the same organisational policy and mandate and is under the leadership of one CEO with general managers who manage the divisions, and report to the CEO. However, most of the organisation's divisions (institutes) are located in different localities and provinces based on the climate and the crops produced in the area, while those that do not fall into these categories are located in urban cities for its closeness to clients. Participation is voluntary and employees from all job groups and educational levels will be included.

Research procedure

A South African agricultural organisation is approached to participate in the study. The research procedure consists of two phases: (1) interviewing employees to determine relevant job demands and resources that are used to adapt the JDRS for (2) quantitative data collection.

Semi-structured interviews based on the phenomenological paradigm are conducted during the first phase of the adaptation process in order to obtain information concerning the job characteristics of employees within the organisation. Semi-structured interviews provide the opportunity to clarify and explore possible vague responses given by participants, which makes semi-structured interviews an effective method of data collection for this phase of the research project. The following questions are asked to participants during data collection:

- Could you please tell me about your job?
- What are the most demanding aspects of your work?
- What resources enable you to do your work effectively?

The results (themes) obtained from the interviews are used to adapt the Job Demands Resources Scale (JDRS; Jackson & Rothmann, 2005b) by rephrasing words to better fit the

organisation under investigation. The Adapted Job Demands Resources Scale is then used to measure the job demands and resources. Convenience sampling is used to collect data. Participants from different positions within the organisation are asked to take part in the research. A letter requesting participation is given to each individual prior to the administration of the measuring instrument. Ethical issues such as informed consent, confidentiality and deception are addressed to ensure that the study is conducted in an ethical manner (Struwig & Stead, 2001). The questionnaires are handed to individuals to be completed within a six-week interval. Completed questionnaires are collected by the researcher.

Measuring instruments

Initially, interviews are used in order to obtain information concerning the job characteristics of employees within the organisation. Next, data is collected using the adapted scale, labelled *The Adapted Job Demands and Resources Scale (AJDRS)*. Jackson and Rothmann (2005b) obtained seven reliable factors with alpha coefficients ranging from .71 to .90 in the original version (JDRS). The AJDRS consists of 48 items measuring eight dimensions of job demands and resources on a seven-point Likert-type scale ranging from 1 (never) to 7 (always). The dimensions that are measured are Organisational support (13 items; e.g. "Is it clear whom you should address within the organisation/institute for specific problems?"; α = .92), Insecurity (4 items; e.g. "Do you need to be more secure that you will still be working in one year?"; α = .87), Rewards (4 items; e.g. "Do you think you are paid enough for the work that you do?"; α = .89), Overload (11 items; e.g. "Do you have too much work to do?"; α = .80), Physical resources/equipment (3 items; e.g. "Do you have all the equipment/implements you need to accomplish your work?"; α = .84), Growth opportunities (3 items; e.g., "Does your work offer you opportunities for personal growth and development?"; α = .78), Control (6 items; e.g. "Do you have freedom in carrying out your work activities?"; α = .83) and Relationship with colleagues (4 items; e.g. "Do you talk with your colleagues regarding work-related matters?"; α = .77).

A biographical questionnaire is used to determine the biographical characteristics of the participants. Characteristics such as gender, race, home language, age, marital status, education, position, years in position and years in the organisation will be measured with this questionnaire.

Data analysis

Data analysis of the first phase of the study initially deals with transcribing the interviews verbatim and then coded using content analysis. Similar statements and themes will be extracted (Taylor-Powell & Renner, 2003).

Data analysis in the second step is conducted by means of the SPSS program (IBM SPSS statistics, 2012). Descriptive statistics (e.g. means, standard deviations, skewness and kurtosis) are first used to analyse the data in order to examine the distribution pattern of the data. Exploratory factor analysis is used to determine the dimensionality underling the responses to the AJDRS scale. The exploratory factor analysis involves several steps. First, a simple principal component analysis is conducted on the items of the scales. The eigenvalues and scree plot are studied to determine the number of factors. Maximum Likelihood Factor analysis with a direct Oblimin rotation are conducted if factors are related ($r > .30$), while Varimax rotation is conducted if the obtained factors are not related (Tabachnick & Fidell, 2001). Items that load highly on the scales and that had communalities above .32 are retained. The following criteria are considered when deciding which factors to retain: (1) an item must not load onto more than one factor; (2) a factor must have at least three substantive item loadings; and (3) the retained factor must make theoretical sense (Field, 2009; Tabachnick & Fidell, 2001). The scale's internal consistency is investigated using the Cronbach alpha coefficient. Nunnally and Bernstein (1994) recommend a guideline of .70 as an acceptable guideline. Pearson's product moment correlation coefficient is used to assess the relationships between variables.

Multivariate analysis of variance (MANOVA) is used to assess whether there are differences between the groups regarding their job demands and resources. The demographic variables that are used to assess possible differences include gender, race, home language, age, marital status, education, position, years in position and years in the organisation. MANOVA is a statistical procedure used to determine whether there are any differences between groups (Salkind, 2009). The Bonferroni adjustment is used to prevent inflated type 1 errors. Analysis of variance (ANOVA) is subsequently used to determine differences for each dimension. If significant differences are found between the demographic groups, *post hoc* analysis is then used in order to establish the variables that were affected.

Article 2

Research design

Research approach

The second phase of the study makes use of a quantitative research methodology in order to develop a new burnout scale (Mouton, 2001). A cross-sectional field survey method is used to gather the data required to achieve the aims of the study. In cross-sectional methods, samples are chosen from the population at a specific point in time (Shaughnessy et al., 2006).

Research participants

The data is collected by means of convenience sampling from participants from a South African agricultural research institution (refer to the research approach of Article 1 where the research institution was discussed).

Research procedure

The first step of this article involves developing a scale to measure the physical, affective and cognitive components of burnout. The items are written based on a theoretical consideration of the conceptualisation of the burnout construct as consisting of physical, emotional and cognitive components. Once a pool of items is generated, this pool is subjected to review by three experts in the field who have worked extensively on burnout constructs.

A letter requesting participation is given to employees and consent obtained from the participants prior to the administration of the instrument. Ethical aspects and the motivation for the research are also discussed with the participants before the questionnaire is administered. The participants are given six weeks in which to complete the questionnaires. Once the questionnaires are completed, the researcher collects them from the participants.

Measuring instruments

Data is collected using the newly-developed Burnout Scale. The scale consists of 17 items measuring three reliable factors: Cognitive weariness (6 items; e. g. "I cannot concentrate while at work"; .α = .88), Fatigue (5 items; e.g. "I feel weak while at work"; α = .84) and Emotional exhaustion/Withdrawal (6 items; e.g. "I am not emotionally affected by how other

people at work feel"; α = .82). The items are scored on a seven-point frequency scale ranging from 1 (never) to 7 (always).

A biographical questionnaire is used to determine the participants' biographical characteristics. Biographic characteristics such as gender, race, home language, age, marital status, education, position, years in position and years in the organisation are assessed using this questionnaire.

Data analysis

Data analysis in the second step is conducted by means of the SPSS program (IBM SPSS Statistics, 2012). Descriptive statistics (e.g. means, standard deviations, skewness and kurtosis) are used to analyse the data and explore the distribution pattern of the data. Exploratory factor analysis is used to determine the dimensionality underlying responses to the burnout scale. This exploratory factor analysis consists of several steps. First, a simple principal component analysis is conducted on the items of the scales. The eigenvalues and scree plot are studied to determine the number of factors. A direct Oblimin rotation is then conducted for the different groups. Items that load highly on the scales are retained (Dawis, 1987). Other criteria used to determine whether or not an item should be retained in a factor include: (1) an item must not load onto more than one factor; (2) a factor must have at least three substantive item loadings; and (3) the retained factor must make theoretical sense (Field, 2009; Tabachnick & Fidell, 2001). Construct equivalence is investigated using the Cronbach alpha coefficient. Nunnally and Bernstein (1994) recommend a cut-off of .70 as an acceptable guideline. The relationship between variables is assessed by means of Pearson's product moment correlation coefficients. Construct equivalence is investigated for racial and linguistic groups. This is done first by conducting factor analysis for the different racial and linguistic groups and then using the obtained pattern matrices as inputs in target rotation. The agreement between the groups is then evaluated by a factor congruence coefficient, i.e. Tucker's phi (Van de Vijver & Leung 1997). Values above .90 are taken to point to essential agreement between cultural groups, while values above .95 are taken to point to very good agreement (Van de Vijver & Leung 1997, 2011).

Conditional analysis of variance (ANOVA) (Van de Vijver & Leung, 1997, 2011) is used to test for differential item functioning (item bias). Two effects are tested: (1) the main effect of

language, and (2) the interaction effect of score level and language. When the main effect of language is significant, the item is taken as having uniform bias. When the interaction of score level and culture is significant, the item is taken as having non-uniform bias (Van de Vijver & Leung, 1997). When any item is statistically significant for uniform or non-uniform bias, the effect size is examined to determine whether or not the obtained results were of practical importance. A cut-off point of .50 (medium effect) is set for practical significance (Cohen, 1988).

MANOVAs are used to determine whether there are differences between the demographic groups regarding their burnout. The demographic variables that are used to assess possible differences included gender, race, home language, age, marital status, education, position, years in position and years in the organisation. MANOVA is a statistical procedure used to determine whether there are differences between groups (Salkind, 2009). The Bonferroni adjustment is used to prevent inflated type 1 errors. ANOVA is subsequently used to determine differences for each dimension. If significant differences are found between the demographic groups, *post hoc* analysis is then used in order to establish which variables are affected.

Article 3

Research design

Research approach

This article makes use of a descriptive research design. Descriptive research aims to describe phenomena (Durrheim, 2007). The descriptive research design is deemed appropriate for this study as the study aims to describe relationships between variables within a correlational study. In order to reach its objectives, this study makes use of a cross-sectional research design and a survey as its data collection technique. In a cross-sectional design, one or more samples are drawn from the population(s) at one point in time (Shaughnessy et al., 2006). Survey research describes a data collection technique that involves the use of questionnaires to gather data about an identified population. This design is ideally suited to the descriptive and predictive functions associated with correlational research, which involves the examination of relationships between variables (Shaughnessy et al., 2006).

Research participants

The data is collected by means of convenience sampling. The participants consist of employees from all employment categories and educational levels within a South African agricultural research organisation. The participants were sufficiently literate to complete the survey.

Research procedure

Each participant receives a paper-and-pencil questionnaire to complete. Each questionnaire is accompanied by a letter explaining the rationale of the study. Ethical aspects of confidentiality and anonymity are addressed. The participants are given six weeks to complete the questionnaire. The researcher personally collects the completed questionnaires after the time for the employees to complete the survey.

Measuring instrument

The following questionnaires are used in this study:

Burnout Scale: The newly developed Burnout Scale is used to assess participants' levels of burnout. The scale, which consists of 17 items, is used to assess three reliable factors: Cognitive weariness (6 items; e. g. "I cannot concentrate while at work"; .α = .88), Fatigue (5 items; e.g. "I feel weak while at work"; α = .84) and Emotional exhaustion/withdrawal (6 items; e.g. "I am not emotionally affected by how other people at work feel"; α = .82). The items are scored on a seven-point frequency scale ranging from 1 (never) to 7 (always).

AJDRS: An adapted version of the Job Demands Resource Scale (AJDRS) (Jackson & Rothmann, 2005b) is used to measure job demands and resources. The items are rated on a seven-point Likert-type scale ranging from 1 (never) to 7 (always). The variables that are measured included: Job resources 3 variables: Organisational support (e.g. "Is it clear whom you should address within the organisation/institute for specific problems?"; α = .92), Growth opportunities (3 items; e.g. "Does your work offer you opportunities for personal growth and development?"; α = .78), Control (e.g. "Do you have freedom in carrying out your work activities?"; α = .83), and Overload (e.g. "Do you have too much work to do?"; α = .80).

PCQ: An adapted version of May et al.'s (2004) Psychological Conditions Questionnaire (PCQ) is used to measure the psychological conditions of meaningfulness, safety and availability. The Psychological meaningfulness subscale is measured by six items (e.g. "the work I do is very important to me"). The Psychological safety subscale consists of three items (e.g. "I am not afraid to be myself at work"). Psychological availability is measured by 5 items (e.g. "I am confident in my ability to think clearly at work"). May et al. obtained alpha coefficients that varied between .71 and .90. In a South African study, Olivier and Rothmann (2007) concluded that only Psychological meaningfulness (6 items) and Psychological availability (5 items) factors should be retained. These authors decided to exclude Psychological safety as the subscale yielded an alpha coefficient of .41 (which is lower than the guideline of .70 recommended by Nunnally and Bernstein, 1994). Despite the non-inclusion of the Psychological safety subscales in the study by Olivier and Rothmann (2007), all three subscales are included in the present study because the scale has not previously been used in studies focusing specifically on an agricultural research organisation. However, more items (e.g. "Mistakes I make at work are held against me") were added (after a careful literature study) to the Psychological safety subscale based on recommendations made by Olivier and Rothmann (2007). These authors commented on the need for possible item improvement and modification of the wordings of certain items to make the scale more appropriate for the South African context.

Work engagement: A scale is developed to measure the work engagement of employees. This scale is constructed for the purpose of this research based on theoretical consideration of the work engagement construct consisting of physical, emotional and cognitive components. The scale consisted of 13 items measuring physical, emotional and cognitive dimensions of engagement.

A *biographical questionnaire* is used to gather information about the biographical characteristics of the participants. The biographical information that is required includes age, gender, marital status, language, race, education, position, years in position and years in the organisation.

Data analysis

Initial statistical analysis is performed using the SPSS Program (IBM SPSS statistics, 2012). Exploratory factor analysis is carried out to determine the construct validity of the instruments. This process involves several steps. First, a simple principal component analysis is conducted on the items of the scales. The eigenvalues and scree plot are studied to determine the number of factors. Principal component factor analysis with a direct Oblimin rotation is then conducted if factors were related ($r > .30$). Principle component actor analysis with a Varimax rotation is used if the obtained factors are not related (Tabachnick & Fidell 2001). Next, cconfirmatory factor analysis (CFA) is done with MPUS version 7.11 (Muthén & Muthén, 2013) so as to investigate whether individual measurement items loaded significantly onto the scales with which they are associated.

Structural equation modelling, as implemented by MPUS version 7.11 (Muthén & Muthén, 2013), is used to test a structural model of well-being. The fit indices produced by the MPLUS program include a Chi-square statistic, which is a test of the absolute fit of the model. However, because the Chi-square is sensitive to sample size, additional goodness-of-fit indices such as the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA) are also used in this study.

Items of the questionnaires were defined as categorical and the weighted least squares with corrections to means and variances (WLSMV) were used as estimator. Latent variable modelling with a categorical estimator (instead of maximum likelihood estimation which is vulnerable to multivariate skewness and kurtosis) was used (Wang & Wang, 2012). Considering that the calculation of latent variable scores violates the assumption of tau equivalence (required for alpha coefficients), reliabilities (ρ) of scales were computed by means of a formula based on the sum of squares of standardised loadings and the sum of standardised variance of error terms (Wang & Wang, 2012).

Standardised path coefficient sizes and their significance were considered to investigate the theoretical paths in the model. The model indirect function of MPLUS with the bootstrapping procedure explained by Hayes (2009) is used to determine and evaluate the indirect effects; bias-corrected 95% confidence intervals (Shrout & Bolger, 2002) are also used for this purpose. Kappa squared values (k^2) (Preacher & Kelley, 2011) were calculated

as a basis to determine the degree of the mediating effect sizes. This was done according to the guidelines of Cohen (1988, pp. 79-81), where values indicate the following effect sizes: .01 (small effect), .09 (medium effect) and .25 (large effect).

1.4 OVERVIEW OF CHAPTERS

Chapter 1: Introduction

Chapter 2: Article 1: Job demands and resources of employees in a South African agricultural research organisation.

Chapter 3: Article 2: The psychometric properties of a new scale to measure burnout

Chapter 4: Article 3: A model of well-being of employees in a South African agricultural research organisation.

Chapter 5: Conclusions, limitations and recommendations.

1.5 CHAPTER SUMMARY

In this chapter, the problem statement was discussed and the research objectives and research design were explained. An overview of the chapters to follow was provided as well as a summary of this chapter.

CHAPTER 2: ARTICLE 1

Job demands and resources of employees in a South African agricultural research organisation

ABSTRACT

Orientation: Understanding the job demands and resources experienced by employees in an agricultural research organisation is important for practitioners and researchers in Industrial/Organisational Psychology.

Research purpose: The objective of this study was to investigate the job demands and resources of employees in a South African agricultural research organisation, and examine the validity and reliability of a scale adapted to measure job demands and resources of this group of employees. Differences that may exist based on the employees' demographic variables were also investigated.

Motivation of the study: The agricultural sector of any national economy plays a very important role in the overall welfare of the country. Identifying the prevalent job demands and resources in an agricultural organisation is therefore of paramount importance, since the negative consequences of employees experiencing very demanding jobs with few resources have been well documented in stress literature.

Research design, approach and method: A cross-sectional survey design was used as the data collection technique. The sample consisted of 443 employees in an agricultural research organisation. The measuring instruments included an adapted job demands resources scale (AJDRS) and a biographical data form.

Main findings: The findings of this research indicated that evidence for the factorial validity and reliability of the AJDRS existed. Statistical differences were found with regard to the job demands and resources experienced by employees in different positions.

Practical/managerial implications: Interventions to improve the perceived job demands and resources in the organisation should focus on physical resources (equipment).

Contribution/value-add: This study contributes to knowledge concerning the job demands and resources that are prevalent in an agricultural research organisation in South Africa.

Keywords: job demands, job resources, adapted job demands and resources scale, valid, reliable, agricultural organisation

INTRODUCTION

Work is commonly defined as "purposeful and meaningful activities which people execute in order to meet and fulfil various physical and psychosocial needs" (Bergh, 2006, p. 433). Work therefore plays an important role in people's everyday lives. It provides a forum for employees to use their talents, and promotes learning, growth and development of people's individuality. It also provides employees with a sense of belonging and meaning (Morin, 2004). However, work produces different feelings in individuals. Some employees feel that they need to put a great deal of effort into their work and may experience adverse feelings, such as limited freedom in the workplace, while other employees may feel invigorated, receive opportunities for development and generally have positive feelings regarding the workplace (Rothmann, 2003). In essence, the characteristics of a job can have either a positive or negative effect on individual employees (Bergh, 2006).

The work environment has changed dramatically over the past few decades (Rothmann, Mostert, & Strydom, 2006). One important factor worthy of note is the marked increase in the use of information and communication technology (Patterson, 2001), which has created a shift from manual demands in the place of work to more mental and emotional demands (Patterson, 2001; Turner, Barling, & Zacharatos, 2002). The current extremely competitive global economy has also resulted in most organisations expecting employees to adjust the amount of time they work, the amount of work they do, and the hours they work. This increase in work demands has been accompanied by a corresponding decrease in career growth opportunities, as well as continued employment and job security (Cooper, Dewe, & O'Driscoll, 2001).

Previous studies have found that such an imbalance between experienced job demands and available resources impacts negatively on workers' energy and motivational levels (Rothmann & Jordan, 2006; Schaufeli & Bakker, 2004) as well as on their physical health and well-being (Bakker & Demerouti, 2007; Nelson & Simmons, 2003). Furthermore, it is important to identify the job resources that the employee or workplace needs in order to accomplish goals and thrive in the face of challenges. This could further be used as a basis to develop intervention programmes on well-being variables such as engagement (see Hakanen & Roodt, 2010).

The above discussion suggests that it is therefore of paramount importance to investigate employees' experiences of the demands and resources in their work (Rothmann et al., 2006). This is especially important as every occupation has its own unique stress-related risk factors (Demerouti & Bakker, 2011). However, there is currently little literature found on the job demands and resources experienced by employees in an agricultural research organisation. Furthermore, recognising the unique nature of job demands and resources that is experienced in different occupations, previous researchers have either developed or adapted instruments in order to effectively measure job demands and resources in specific occupations (see Buys & Rothmann, 2009; Marais, 2006; Rothmann & Jordan, 2006; Rothmann & Joubert, 2007). However, there is currently no literature on the job demands and resources experienced by employees in an agricultural research organisation. Furthermore, there is no available instrument that has been proven to be valid and reliable to measure the job demands and resources experienced by employees in this sector in South Africa.

The objective of this study was to investigate the job demands and resources of employees in a South African agricultural organisation. Specifically, the study aimed to (1) assess the validity and reliability of the adapted Job Demands and Resources Scale, (2) to establish the prevalent job demands and resources of employees in an agricultural organisation, as well as to (3) investigate differences in employees' job demands and resources that may exist based on the employees' demographic variables.

Job demands and job resources

Different models have been propounded to explain the interactive effect between the demands of a job and the resources available to the employee. These models include the Job Characteristics model (Hackman & Oldham, 1976, 1980), the Job Demands Control model (Karasek, 1979), the Person-Environment Fit model (Lazarus & Folkman, 1984), as well as the Job Demands-Resources model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001), to name a few.

The Job Characteristics model (JCM) of Hackman and Oldham (1976, 1980) suggests that enriched or complex jobs are principally linked with employees' positive disposition to work and the work environment. These positive dispositions result in positive organisational outcomes, such as increased job satisfaction, motivation, and work performance. According

to Theron (2006), the model is based on the identification of five central job characteristics that influence outcomes such as internal work motivation, growth satisfaction, overall job satisfaction, work effectiveness, and absenteeism. The first of these characteristics is skill variety, which focuses on the number of skills and talents a job requires. The second is task identity, which focuses on the extent to which a job is identifiable with an obvious outcome or whether the worker is responsible for the whole task. Task significance is the third characteristic and focuses on the effect the job has on other people. The fourth characteristic, autonomy, includes freedom, discretion and independence. The fifth characteristic, feedback, involves an employee receiving information concerning his or her work performance and three vital psychological states (experienced meaningfulness of the job, the experienced accountability for results on the job, and knowledge of the actual results of the activities involved in the job).

Karasek (1979) developed the Job Demands Control model in order to better understand job stress. The central assumption of this model is that the negative consequences of job stress could be moderated by an employee's total control over all aspects of his/her job, especially with regard to decision-making (Karasek & Theorell, 1990). According to this model, job control refers to the control over the work process, the ability to make decisions, and the opportunity to exercise a degree of control over the work to be accomplished (Huang, Chen, Du, & Huang, 2012). This model therefore suggests that increasing job control could subsequently reduce the incidence of job strain. In other words, jobs that combine high levels of demand with low levels of independence, control or decision-making are likely to lead to high levels of stress (Häusser, Mojzisch, Niesel, & Schulz-Hardt, 2010). A lack of job resources, as identified by Karasek, (1979), includes inadequate staffing with subsequent increases in the individual employee's workload, co-workers failing to perform their jobs, a lack of recognition for work done, lack of supervisory support, inadequate or poor quality equipment and a lack of career growth and advancement.

Another model of work-related stress is the Person-Environment Fit model, which was developed by Lazarus and Folkman (1984). This model views stress as resulting from a misfit between the requirements of the job (e.g. demands and resources) and the values, skills and traits of the individual (Cooper et al., 2001; Winefield et al., 2003). Implicit in this model is the assumption that such misfit may or may not take place depending on the

person's ability to handle or cope with the situation. The extent to which stress is experienced is therefore largely determined by the individual's subjective perception of the encounter. However, aspects such as the values, resources, demands and skills that are available to the individual will help to determine the individual's response to the perceived misfit (Cooper et al., 2001).

A fourth model of job stress is the Job Demands-Resources model (JD-R). This model extends on demand-control (Bakker, Van Veldhoven, & Xanthopoulou, 2010) by incorporating ideas regarding different demands and resources, irrespective of the professional group being considered (Bakker & Demerouti, 2007; Demerouti & Bakker, 2011). According to the earlier developers of the JD-R model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001), every working condition can be categorised into two broad components, labelled job demands and job resources.

Job demands refer to aspects of the job that could possibly cause strain in situations where they surpass the individual's adaptive skills (Rothmann et al., 2006). Job demands are therefore those physical, social, or organisational aspects of the job that require sustained physical or mental effort and are associated with certain physiological and psychological costs (Demerouti & Bakker, 2011; van den Tooren & de Jong, 2013). Quantitative job demands refer to the amount of work required and the available time frame, while qualitative workload concerns the employees' affective responses to their jobs (Cooper et al., 2001). Work overload or high demands may also occur if an individual does not have the necessary skills, abilities and support to meet these demands. Therefore, individuals who are overloaded with work and lack the resources to buffer the effect of excessive overload will develop burnout (van den Tooren & de Jong, 2013). Examples of excessive quantitative job demands that employees may be exposed to include feeling overwhelmed by perceived time pressures and deadlines, excessive work demands and informational overload (Montgomery, Peeters, Schaufeli, & Den Ouden, 2003).

Job resources refer to the degree to which individual employees are offered career or growth opportunities by their jobs (Rothmann et al., 2006). Job resources refer to those physical, psychological, social and/or organisational aspects of the job that may be functional in achieving work goals, reducing job demands and the associated physiological and

psychological costs, and stimulating personal growth and development (Bakker & Demerouti, 2007; Demerouti & Bakker, 2011, Hakanen, Schaufeli, & Ahola, 2008). Job resources include social support (supervisory and collegial), job enhancement opportunities in the form of increased control, participation in decision-making, reinforcement (Burke & Richardsen, 1993), as well as recognition, opportunities for growth and rewards (Rothmann, 2002).

Job resources exist at the following levels within an organisation: (1) at the organisational level (growth opportunities, remuneration, job security); (2) at the level of the organisation of work role (role clarity, participation in decision-making); (3) at the interpersonal level (team climate, supervisory and collegial support); and (4) at the task level (task significance, task performance feedback, task identity) (Bakker & Demerouti, 2007; Rothmann et al., 2006).

The agricultural sector: The agricultural sector of a country is important with regard to the provision of food and revenue for its population as well as raw materials and fibre for industries. Agriculture also provides the opportunity for assured food security for the poor masses and to contribute to a climate of low inflation (Zuma, 2008). According to The Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA, 2013), it is vital for the agricultural sector of South Africa to function optimally in order to contribute to the economy of the nation (2013). Apart from farmers and farm workers, the agricultural sector also includes agricultural research organisations whose primary objectives are to promote all agricultural dependent sectors through research and technological development (Agricultural Research Council, 2012).

Employees in agricultural research continue to strive to achieve excellence in their pursuit of scientific solutions aimed at improving people's quality of life (Moephuli, 2008). However, they also face many challenges, such as the fact that the recruitment and retention of skilled employees have become increasingly difficult across research institutes. The main factors contributing to difficulties in recruiting and retaining skilled employees include remuneration (the agricultural institutions offer low pay levels in comparison with other science councils, universities, government departments and the private sector), competition from other employers, poor retention policy, inadequate recognition and appreciation, as well as a lack of tight fit of company culture with strategic objectives (ARC, 2008).

Another challenge includes the presence of unforeseen crisis situations. For example, in the process of carrying out their research activities on plants and animals, employees in agricultural organisations may encounter some crisis situations in the form of vulgarities of weather variables (too much rain or drought) and biotic stresses such as weeds, pests and diseases (Saayman-du Toit, 2002). Finally, in terms of resources, there are challenges involved in attempting to modernise some of the laboratories and equipment so that new crops, animals and new techniques can be researched (ARC, 2005). According to Guest (2004), advances in technology lead to the speeding up of the world of work. Therefore, speed and flexibility of response form a vital basis for having a competitive advantage (Guest, 2004). In order to achieve organisational goals, teams or work groups need adequate equipment (Robbins, 2005). Lack of adequate equipment could place high levels of physical and psychological demands on workers, which may potentially predispose them to strain and consequently affect their performance on the job. Agricultural employees, like other employees in other economic, social and political sectors, work hard to sustain their jobs and livelihood. However, little or no information is available concerning the job demands and resources experienced by employees in these agricultural organisations. Most of the literature available on stress-related studies in the agricultural sector is mostly on farmers (Deshpande & Shah 2007).

Measuring job demands and resources

South African studies have reported results in support of the Job Demands Resources model (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker 2004). These results suggest that different work characteristics can be grouped into two categories, corresponding to the theoretical categories of job demands and job resources in different organisations. Studies by Fourie (2003), Jackson, Rothmann, and Van de Vijver (2006), Koekemoer and Mostert (2006), Rothmann and Jordan (2006), Rothmann et al. (2006), Rothmann and Jorgensen (2007), and Barkhuizen and Rothmann (2008) all yielded two-factor structures, suggesting that job demands and job resources are characteristics of work environments.

However, Rothmann et al. (2006) stated that more research is needed in order to develop a valid measure that could be used within a wide variety of contexts. This research needs to focus specifically on job demands and resources in different occupations and organisations in

South Africa and is necessary in order to allow for comparisons between different occupations and organisations (Rothmann et al., 2006). Jackson and Rothmann (2005b) developed the Job Demands and Resources Scale for educators. The scale (which was adapted for use in this study) consists of seven reliable factors, namely: Organisational support, Insecurity, Reward, Overload, Growth opportunities, Control and Relationship with colleagues (Jackson & Rothmann, 2005b). Marais (2006) adapted the instrument for use in her study on police members in the North West Province and found it to be reliable.

The following definitions of the factors provided by Jackson and Rothmann (2005b) were adopted for this study: (1) Organisational support is defined as the employee's relationship with his or her supervisor, receiving information on his or her work, communication, and participation in decisions about the nature of his or her work. (2) Insecurity refers to a person's uncertainty about the future. (3) Reward refers to whether the employee can live comfortably on his or her pay, whether the employee thinks s/he is paid enough for the work, and whether the job offers opportunities for the employee to progress financially. (4) Overload refers to physical, mental and emotional demands, time pressure, pace and amount of work. (5) Growth opportunities refer to having access to opportunities for personal growth and development, including learning on the job. (6) Control implies having opportunities for independent thought and action, taking part in planning activities, freedom in carrying out work and making a significant contribution to the organisation. (7) Relationship with colleagues refers to availability of colleagues to help, contact possibilities with colleagues, whether the employee can count on colleagues and whether the employee gets on well with colleagues.

Other South African studies have obtained similar results to those reported by Jackson and Rothman (2005b). These studies provide support for the following constructs: Organisational support (Barkhuizen & Rothmann, 2006; Phale 2008; Rothmann & Jordan, 2006; Rothmann et al., 2006; Rothmann & Jorgensen, 2007), Reward (Jackson & Rothmann, 2005b), Growth opportunities (Barkhuizen & Rothmann, 2006; Jackson & Rothmann, 2005b; Phale 2008; Ribeiro, Bosch, & Becker, 2013; Rothmann & Jordan, 2006; Rothmann et al., 2006; Rothman & Jorgensen, 2007), Control (Jackson & Rothmann, 2005b), Overload (Barkhuizen & Rothmann, 2006; Bosch, Ribeiro, & Becker, 2012; Phale, 2008; Rothmann et al., 2006) and Job insecurity (Barkhuizen & Rothmann, 2006; Bosch et al., 2012; Rothmann et al., 2006).

In order to determine the nature of the job demands and resources experienced in the agricultural research organisation, the JDRS was adapted specifically for the agricultural sector. Subsequently, the following hypotheses were formulated regarding the adapted JDRS scale (AJDRS):

Hypothesis 1a: The AJDRS) is a valid instrument for use in a sample of employees in an agricultural research organisation in South Africa.

Hypothesis 1b: The AJDRS is a reliable instrument for use in a sample of employees in an agricultural research organisation in South Africa.

Job demands, job resources and demographic variables

Employees in an agricultural organisation (similar to employees in other organisations) consist of different categories of employees with regard to their demographic makeup as well as their positions and responsibilities**.** It would therefore be inappropriate to examine the job demands and resources of the employees in an agricultural organisation without taking cognisance of their demographic variables. Vokic and Bogdanic (2007) have drawn attention to the fact that the stress process is not a simple phenomenon, but rather a complex process that results from the interaction of various variables.

Previous researches have examined the differences between various demographic groups in terms of how they perceive their job-related occupational stressors. Variables that have been studied include: (1) gender (e.g.; Fotinatos-Ventouratos & Cooper, 2005; Sverke et al., 2004; Vakola & Nikolaou, 2005; Van Zyl, 2005); (2) age (e.g. Antoniou et al., 2006; Buitendach, 2004; Buitendach, Oosthuyzen, & Van Wyk, 2005; Rannona, 2003; Vakola & Nikolaou, 2005); (3) race/nationality/ethnic background (e.g. Bosch et al., 2012; Buitendach et al., 2005; Pienaar & Rothmann, 2006; Lu, Cooper, Kao, & Zhou, 2003; Ribeiro et al., 2013); (4) hierarchical level/rank (e.g. Barkhuizen, 2005; Coetzer & Rothmann, 2006; Naude & Rothmann, 2003; Pienaar & Rothmann, 2006; Ribeiro et al., 2013; Winefield et al., 2003; Winter, Taylor, & Sarros, 2000); (5) educational level (e.g. Barkhuizen & Rothmann, 2008; Buitendach, 2004; Buitendach et al., 2005; Näswall & De Witte, 2003; Vakola & Nikolaou, 2005); (6) marital status (e.g. Bosch et al., 2012; Ribeiro et al., 2013); and (7) number of years in a position (e.g. Buitendach et al., 2005; Winefield et al., 2003).

With regard to gender, researchers have found that males and females working in the same job level differ significantly in their perception of work stressors. Antoniou et al. (2006) and Fotinos-Ventouratos and Cooper (2005) found that female employees experienced higher levels of occupational stress than their male counterparts. There have been conflicting findings concerning the perceived job insecurity of men and women. Van Vuuren (1990) distinguished between affective insecurity, which refers to the employee's subjective interpretation of a situation, and cognitive insecurity, which refers to uncertainty about the future. Sverke et al. (2004) found that women experienced higher levels of job insecurity than men. In addition, Sverke et al. (2001) reported a stronger correlation between the resultant stress due to insecurity and its adverse effects on men than women. Sverke et al. (2001) attributed this to the fact that men are likely to experience more strain in relation to job insecurity because they traditionally bear the burden of supporting their families financially. However, Buitendach et al., (2005) and Van Zyl (2005) found no difference in the insecurity levels of women and men.

In relation to age, De Witte (1999) found that employees between the ages of 30 and 50 years are more likely to experience strain due to the likelihood of job loss than younger and older employees. This may be because younger employees have fewer financial obligations and better chances of finding alternative employment than their older colleagues. In relation to older employees, it is possible that employees over the age of 50 are already preparing for retirement and are therefore less concerned with job security. However, research by Rannona (2003), Buitendach (2004), and Buitendach et al. (2005) found that older employees do experience high levels of job insecurity, frequently related to the fact that they are often the first victims of downsizing in any organisation.

Pienaar and Rothmann (2006) found that race had an impact on the experience of occupational stress. In their study on the SAPS, race impacted significantly on the experience of occupational stress with white and Indian employees experiencing stress more intensely than their black and coloured counterparts. In their study of the mining industry, Buitendach et al. (2005) found evidence of differences in the job insecurity of white and black employees, with white employees experiencing higher levels of cognitive job insecurity than their black colleagues. These authors speculated that the differing levels may be due to

the implementation of the Employment Equity Act No. 55 of 1998 (Republic of South Africa, 1998), which created more employment opportunities for black employees than for their white and coloured counterparts. These findings differ from those reported by Manski and Straub (2000) and Elbert (2002), who found that fear of possible job loss was higher for black persons than white persons. According to Jacobson (1991), these conflicting findings may be because insecurity is a perceptual phenomenon (which varies between employees working in the same organisation, because of the different ways in which people perceive things due to circumstantial factors and personal traits) and that employees do not exist in isolation of each other, and so an employee's understanding of a situation will be shared by other employees in an organisation.

With regard to work overload, Bosch et al. (2012) found significant differences in the work overload experiences of female chartered accountants in relation to race, with white participants feeling the most overload, followed by Asian, black, coloured and Indian participants. However, in terms of reward and growth opportunities, female white chartered accountants reported higher levels of financial advancement and career growth opportunities than black female chartered accountants (Ribeiro et al., 2013). This may be because white qualified chartered accountants previously experienced advantages from exposure to client and job experience (Ribeiro et al., 2013). These previous experiences have primed them to exploit growth and development opportunities and consequently these employees rate their current and future earning potential in their organisation higher than their black counterparts. However, these black employees may be paid more as a result of motivational packages aimed at retaining them in the organisation (Ribeiro et al., 2013).

Barkhuizen (2005) and Winter et al. (2000) investigated the effects of rank on employees' perceived strain. They found that rank impacted significantly on job demands. In the study by Winefield et al. (2003), it was found that academics differed in terms of the level of job demands associated with rank, with associate professors experiencing higher levels of job demands than junior lecturers and lecturers. In addition, the study found that working hours for associate professors and professors increased in relation to occupational level (Winefield et al., 2003). Similarly, Pienaar and Rothmann (2006) found that rank impacted significantly on the experience of occupational stress in the police. Constables experienced lower degrees of stress in relation to job demands and a lack of support than other police members. Constables also experienced stress less often because they were not exposed to the demands

and lack of support to the same degree and duration as other police members (Pienaar & Rothmann, 2006). Other studies have found that, as people increase in age, experience and rank within their organisation, they tend to take on more responsibility and as a result experience an increase in job demands (Osipow, Doty, & Spokane, 1985). This is in keeping with the findings reported by Sager (1990), who suggested that the particular extra job responsibilities of managers in comparison to those of sales people should be considered stress factors.

Managers might react more negatively than their employees to the threat of job loss, because they are more likely to feel guilt, self-doubt and despair when they experience career setbacks (Roskies & Louis-Guerin, 1990). With regard to growth opportunities, trainee chartered accountants reported lower levels of opportunity for growth than qualified chartered accountants (Ribeiro et al., 2013). In explaining this finding, Ribeiro et al. (2013) suggested that trainees are functioning in apprentice roles and are therefore likely to be overcome by feelings of lack of confidence in their ability to grow, possibly as a result of the amount of work they have to complete. In addition, trainees have limited opportunities for promotion while in training, and only qualified chartered accountants are able to attain senior management positions. Coetzer and Rothmann (2006) found that, when compared with professional and managerial staff, clerical staff scored significantly higher on stressors associated with resources and communication, work relationships, control, overload and job characteristics. Naude and Rothmann (2003) also found that emergency workers and management reported higher levels of job demands than medical specialists and support services.

In relation to the connection between education and workers' perception of stress, Dua (1994) reported that academics with a five- to seven-year degree experienced higher levels of job demands than their colleagues with lower qualifications. These results suggest that level of education is related to the level of perceived job demands. However, this finding was not supported in a study by Barkhuizen and Rothmann (2008). According to Näswall and De Witte (2003), educational level plays a vital role in an employee's perception of job insecurity as it may determine the employee's chance of finding alternative employment. Employees with higher levels of education are considered better equipped with the necessary expertise needed for employment. Buitendach et al. (2005) also found that level of education could impact perception of job insecurity, with employees with lower than Grade 12

certificates showing higher levels of affective job insecurity than those with at least a degree. However, employees with a degree experienced higher levels of cognitive job insecurity. This result was confirmed in a study conducted by Buitendach (2004). These results may be because highly educated employees may struggle to find alternative employment due to being overqualified or expecting high levels of remuneration (Buitendach et al., 2005).

Marital status has also been found to be significantly related to perceived occupational stress levels. Married people, possibly because of their work/home conflict, experience higher levels of stress than single people (Vokic & Bogdanic, 2007). This was confirmed in a research study conducted by Bosch et al. (2012), who found significant differences in the work overload levels of employees based on marital status. In this study, female accountants who were either married or in a relationship experienced more work overload than their single colleagues. Ribeiro et al. (2013) found that qualified chartered accountants who were in a relationship reported greater satisfaction with their remuneration than what was reported by their single colleagues. This may be because individuals in a relationship share costs with their partners (Ribeiro et al., 2013). In addition, chartered accountants in relationships reported higher levels of growth opportunities than those reported by their single colleagues.

The number of years an employee has spent in a workplace could also be an important variable in relation to the individual employee's perceptions of stress. This is because new employees first have to understand the organisational structures and ethics then understand the organisational expectations in relation to performance and then find a balance between various workplace demands (Sorcinelli, 1994). Based on the age of employees, Osipow et al. (1985) concluded that younger academics are less likely to cope with occupational stressors than their older counterparts. However, older academics tend to have more responsibilities and frequently report increasing pressure and work overload (Winefield et al., 2003). A study by Buitendach et al. (2005) however found no evidence for differences in insecurity based on tenure among employees in the mining industry.

Based on the aforementioned, the following hypothesis is presented:
Hypothesis 2: No significant difference exists in the perceived job demands and resources of employees in an agricultural research organisation based on differences in demographic variables.

METHOD

The research consisted of an empirical study in the form of quantitative research, the methodology of the study follows.

RESEARCH DESIGN

Research approach

This research study made use of an explorative research design in the first phase of the study. Exploratory studies generate speculative insights, new questions and hypotheses (Durrheim, 2007). The exploratory research approach was deemed relevant to this study because it allowed for the generation of insight (through interviews) into the job demands and resources of employees in an agricultural research organisation, which was subsequently used in adapting a questionnaire for the employees. For the purposes of the adaptation phase of the JDRS (Jackson & Rothmann, 2005b, JDRS), a quantitative methodological design was used. In this approach, the researcher is interested in the development of new methods (such as questionnaires, scales and tests) of data collection (Mouton, 2001). A survey design, specifically a cross-sectional design, where a sample is drawn from the target population at a particular time (Shaughnessy, Zechmeister, & Zechmeister, 2006), was used to achieve the research objectives.

Participants

For the first phase, a sample of 26 employees of an agricultural research organisation was interviewed. In the second phase, the sample consisted of 443 employees from a South African agricultural research organisation based in various locations across South Africa. Participation was voluntary. Employees from all job groups and educational levels were included.

The biographical characteristics of the participants who were interviewed during the first phase were 57.7% males, 69.9% of the participants were married, 34.6% were between 41 and 45 years. The highest level of education and position was certificate/diploma with 26.9% and researchers 38.5%, respectively.

Table 1

Biographical information of participants (N = 443)

Item	Category	Frequency	Percentage
Gender	Male	221	49.9
	Female	217	49.0
	Missing values	5	1.1
Race	African	247	55.8
	Coloured	19	4.3
	Indian	3	7
	White	170	38.4
	Missing values	4	.9
Marital status	Single	124	28.0
	Engaged	18	4.1
	Married	232	52.4
	Living together	16	3.6
	Separated/Divorced	24	5.4
	Widow/Widower	16	3.6
	Other	5	1.1
	Missing values	8	1.8
Language	Afrikaans	165	37.2
	English	21	4.7
	IsiNdebele	5	1.1
	IsiXhosa	6	1.4
	IsiZulu	26	5.9
	Sepedi	64	14.4
	Sesotho	59	13.3
	Setswana	38	8.6
	SiSwati	14	3.2
	Tshivenda	18	4.1
	Xitsonga	8	1.8
	Other	14	3.2
	Missing values	5	1.1
Age	20-25	28	6.3
	26-30	53	12.0
	31-35	73	16.5
	36-40	60	13.5
	41-45	72	16.3
	46-50	71	16.0
	51-55	37	8.4
	+55	44	9.9
	Missing values	5	1.1
Education	Grade 9-11	59	13.3
	Grade 12	60	13.5
	Certificate/Diploma	70	15.8
	Bachelor's degree	44	9.9
	Honour's degree	42	9.5
	Master's degree	86	19.4
	PhD	51	11.5
	Other	24	5.4
	Missing values	7	1.6
Position	Research assistant	124	28.0
	Research technician	122	27.5
	Researcher	110	24.8
	Programme manager/Specialist scientist	17	3.8
	Support staff	62	14.0
	Missing values	8	1.8
Years in Position	1-5	195	440
	6-10	79	17.8
	11-15	48	10.8
	16-20	37	8.4
	21-25	33	7.4
	26-30	35	7.9
	30+	12	2.7
	Missing values	4	.9
Years in organisation	1-5	152	34.6
	6-10	75	16.9
	11-15	49	11.1
	16-20	51	11.5
	21-25	51	11.5
	26-30	39	8.8
	30+	22	5.0
	Missing values	4	.9

Table 1 illustrates that an almost equal number of males (49.9%) and females (49.0%) participated in the survey. More than half of the participants (55.8%) were Africans and 52.4% were married. Most of the participants' first language was an African language (53.8%), while 37.2% indicated Afrikaans as their first language. 62.3% of the participants were between the ages of 31 and 50, and 19.4% had a master's degree. The majority of the sample (n = 356) were employed as research assistants, research technicians or researchers, and had been in their current position as well as in the organisation for between 1 and 20 years. There were some missing values as not all of the participants completed the biographical questionnaire in full. However, because it was a biographical questionnaire, the missing values were not replaced with average values.

Procedure

A South African agricultural organisation was approached and asked to participate in the study and permission was obtained to conduct the study. Once the researcher received written permission from the director of human resources of the organisation to conduct the research, the research procedure commenced. The research procedure consisted of two phases: (1) interviewing employees to determine relevant job demands and resources, which were then used to adapt the JDRS for (2) quantitative data collection.

In order to adapt the JDRS that Jackson and Rothmann(b) used in 2005, interviews (n = 26) were conducted with employees in the organisation. The goal of these interviews was to obtain information concerning the job characteristics of employees within the organisation. This information was used to adapt the JDRS items and to write additional, context-relevant items to add to the JDRS. Following the adaptation of the JDRS, a letter requesting participation in the survey was emailed to the employees within the organisation. The letter explained the objective of the survey, which was to investigate work-related well-being in the agricultural sector with specific reference to levels of wellness and the ways in which employees personally evaluate different aspects of their work and work environment.

The data was collected by means of convenience sampling. Convenience sampling involves selecting participants primarily on the basis of their willingness and availability to participate in the research (Fink, 2009). Paper-and-pencil questionnaires were distributed to 511 participants who indicated their willingness to participate in this project after obtaining a

written consent from the participants. The participants were given a six-week period to complete the questionnaires. At the end of this period, the questionnaires were collected by the researcher. A total of 472 questionnaires were collected, indicating a 92% response rate. However, 29 of the 472 questionnaires collected were either not properly completed or were incomplete. Subsequently, 443 questionnaires were used for statistical analysis.

Measuring instruments

A semi-structured interview based on the phenomenological paradigm was used during the first phase of the research study. The phenomenon was studied without any predetermined expectations of categories, but rather the researcher tried to understand the data from the responses of the interviewees. The researcher started with a main question "Could you please tell me about your job?" Thereafter, the participants were asked other questions such as: "What are the most demanding aspects of your work?", "What resources enable you to do your work effectively?" Furthermore, because the items of the JDRS were formulated based on a literature review of the organisational causes of burnout and work engagement as well as interviews by educators (Jackson & Rothmann, 2005b; 2006), questions were also asked to determine how the employees in the agricultural sector experienced these job demands and resources. Themes from the interviews were used to adapt the Job Demands Resources Scale (JDRS; Jackson & Rothmann, 2005b), which was hereafter referred to as the AJDRS (Adapted Job Demands Resources Scale).

The AJDRS was used in this study to measure the job demands and resources of employees in an organisation within the agricultural research sector. The JDRS was originally developed to measure the job demands and resources of educators (Jackson & Rothmann, 2005b). The original scale consists of 48 items measuring pace and amount of work, mental load, emotional load, variety in work opportunities to learn, independence in work, relationships with colleagues, relationships with immediate supervisor, ambiguities about work, information, participation, contact possibilities, remuneration, and career possibilities. Jackson and Rothmann (2005b) found that the dimensions of the JDRS consisted of seven reliable factors, namely Organisational support (α = .88), Growth opportunities (α = .80), Overload (α = .75), Job insecurity (α = .90), Relationship with colleagues (α = .76), Control (α = .71), and Rewards (α = .78).

The dimensions of the AJDRS in this study included eight reliable factors, namely: Organisational support (α = .92), Growth opportunities (α = .78), Overload (α = .80), Job insecurity (α = .87), Relationship with colleagues (α = .77), Control (α = .83), Rewards (α = .89) and Physical resources (α =.84).

A biographical questionnaire was used to gather information regarding the participants' gender, race, marital status, home language, age, education, unit, position, number of years in the present position and number of years in the organisation.

Adaptation of the JDRS: A semi-structured interview was conducted on employees in an agricultural research organisation. Interviewees were asked questions such as "Could you please tell me about your job? Facilitation skills (such as paraphrasing, reflecting, probing, summarising and silence) and non-directive dialogue techniques (such as "mm-mm, I see, yes") were used to help the participants to share with the researcher concerning the job demands (the physical social or organisational aspects of the job that require effort from the employees and may potentially cause them strain) (Hakanen & Roodt, 2010) and job resources (i.e. the physical psychological and organisational aspects of their job that reduce job demands and the associated physiological and psychological cost, are functional to the employees achieving their work goals and stimulate personal growth, learning and development (Demerouti et al., 2001, p. 501) that they experience.

The interviews were then transcribed word for word and subsequently coded by the researcher by means of content analysis. In adapting the JDRS for the purposes of the current study, the word 'children' was consistently replaced by the word 'clients', because the organisation deals with clients and not children, as is the case in educational settings. In addition, the word 'Education Department' was replaced by 'organisation/institute/division' and 'school' was replaced by 'organisation/institute'. Four of the original JDRS items (items 11, 14, 17, and 47) were rephrased to better suit the sample environment by using the exact words of the interviewees. An additional 12 items, such as "Do you have all the equipment/implements you need to accomplish your work?" were added based on the themes from the interview in order to access more information concerning job demands and resources within the agricultural research sector (items 3, 4, 5, 16, 19, 20, 44, 50, 56, 58, 59, 60). Furthermore, a decision was made to retain the items assessing pay. This decision was

made because although the interviewees did not directly indicate their experience of pay as a resource that could potentially reduce job demands and the associated physiological and psychological cost, some of the participants, however, expressed that their pay was lower than their counterparts in other organisations. ARC (2013) indicated that more attractive remuneration offers were responsible for the retention of staff members. Furthermore, pay and benefits are identified as a reason why employees in most organisations leave or remain in their organisations (Harter & Blacksmith, 2010). Furthermore, research studies have found that pay is a significant inverse predictor of burnout (Font, 2012) and engagement. The final instrument consisted of 60 items and the questions were rated on a seven-point scale ranging from 1 (never) to 7 (always) to ensure better validity of the instrument (Foxcroft & Roodt, 2011).

Statistical analysis

Firstly, the interviews were transcribed verbatim and afterwards coded by the researcher using content analysis. The various steps recommended by Giorgi (1985) and Kerlinger (1986) were followed. The first step was to universalise, define and categorise the content analysis. The second step was to determine the sub-units, which included words and themes of the analysis. During this stage, the researcher read the response notes so as to get an overall picture. Thereafter, the researcher read them once again in order to determine the themes. Sub-themes are usually sentences that that are more difficult, but also more useful to analyse. The identified sub-themes were pooled together to establish the themes. The researcher continued the analysis of the information until recurring themes were identified. The third step was to remove unnecessary information from the data and to determine the meaning of the rest of the sub-units by relating them to the overall picture. The last step was to convert the substantial language of the interviewees into scientific language and concepts. The exact words of the interviewees were used in support. Objects were counted per category and then placed according to preferential order. A literature-control was conducted to ascertain the comparativeness and uniqueness of the present study (Krefting, 1991).

Next, the statistical analysis was carried out with the SPSS program (IBM SPSS statistics, 2012). Descriptive statistics (e.g. means, standard deviations, skewness and kurtosis) were used to determine the distribution pattern of the data. To ensure that the data was normally

distributed, a cut-off point of 2.00 was set for skewness and 4.00 for kurtosis. A skewed variable is a variable whose mean is not in the centre, while a kurtosed variable indicates the presence of clustering of scores (Tabachnick & Fidell, 2001). Tabachnick and Fidell (2001) stated that it is necessary to examine the skewness and kurtosis of scores before analysis as "solutions from analysis are usually degraded if the variables are not normally distributed" (p. 73).

Exploratory factor analysis was conducted to determine the construct validity of the AJDRS. An exploratory factor analysis approach (rather than confirmatory factor analysis) was used because, after the adaptation, a relatively new instrument (the AJDRS) resulted with additional items. Byrne (2010) stated that CFA is the best factor analysis method to use for an instrument when adequate research has been conducted on its psychometric properties over a considerable period of time. Firstly, a simple principal component analysis was conducted on the items of the AJDRS and the Eigenvalues and scree plot were studied to determine the number of factors to extract. Kaiser (1960) recommended extracting factors with Eigenvalues higher than 1.00. Additionally, the scree plot can also be used to determine the number of factors. Cattell (1966) advised that the point of inflection of the scree plot be considered. Pallant (2010) also recommends the use of Parallel analysis to determine the final valid factors to be retained. Secondly, a maximum likelihood analysis with a direct Oblimin rotation was conducted and the pattern matrix was inspected to analyse the possible factor solutions. The following criteria were considered in deciding which factors to retain: (1) as a rule of thumb, item loadings had to be more than .32; (2) an item was not allowed to load onto more than one factor as this was considered to indicate that the item either tapped more than one factor (poor item) or that there was an overlap of factors or components; (3) a factor needed to have at least three substantive item loadings; and (4) the retained factor needed to make theoretical sense (Field, 2009; Tabachnick & Fidell, 2001).

The reliability of the obtained factors was investigated using the Cronbach alpha coefficient. Nunnally and Bernstein (1994) recommended a guideline of .70 as an acceptable cut-off point. The obtained factors were consequently used as input in a second-order factor analysis. Varimax rotation was used in extracting the factors because the factors were not correlated ($r < .30$).

Multivariate analysis of variance (MANOVA) was used to determine differences between demographic groups with regard to job demands and resources. The demographic variables included were gender, race, marital status, language, age, education, unit, position, years in organisation and years in position. MANOVA is the multivariate equivalent of analysis of variance (ANOVA) methods, and is used in instances where there is more than one dependent variable and where the dependent variables cannot simply be combined. It is also used to ascertain whether changes in the independent variables have a significant effect on the dependant variables. According to Pallant (2010), when conducting a MANOVA, preliminary assumption testing should be conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance and multicollinearity. It is best to use MANOVA when these assumptions are met and also when there is a substantial correlation between the dependent variables (Kerlinger & Lee, 2002). Wilk's Lambda was used to test the likelihood of the data under the assumption of equal population mean vectors for all groups, against the likelihood under the assumption that the population mean vectors are similar to those of the sample mean vectors for the different groups. When an effect was significant in MANOVA, one-way analysis of variance was used to discover which dependent variables had been impacted.

The Bonferroni adjustment was used to prevent inflated type 1 error, which is the possibility of finding a significant difference when there is actually none (Pallant, 2010). According to Pallant (2010, p. 295), "a Bonferroni adjustment in its simplest form, involves dividing your original alpha level of .05 by the number of analysis that you intend to do." Therefore, because there were eight dependent variables in this study, the level of significance was set at .006. The Games-Howell procedure was used to determine whether there were any statistical differences between the groups. This procedure was chosen because sample sizes were different (Field, 2009). According to Cohen (1988), when determining statistical significance, the following guidelines should apply: .10 to .50 indicates a small effect; .50 to .80 indicates a medium effect; and above .80 indicates a large effect. In terms of the current research, a cut-off point of .50 (medium effect) was set for the practical significance of the differences between group means.

Ethical considerations

Ethical aspects attended to included obtaining written permission from the organisation as well as from the individual participants. Participation in the study was voluntary and participants were assured of confidentiality. The objectives of the study were explained to the participants at their place of work and each questionnaire and consent form were accompanied by a letter explaining the rationale of the study and indicating the participant's voluntary participation in the research.

RESULTS

First, the results of the interviews used in the qualitative study will be discussed, followed by the discussion of the distribution pattern of the scores.

Following, the results of the interviews will be explained by means of reporting on the themes, and subthemes that emerged from the interviews. The employees in the agricultural research institution experienced the following job demands and resources:

Task-related demands: Participants indicated that the task-related demands they experienced included pace and amount of work. This is often experienced during peak seasons such as planting and harvesting when the employees usually have many activities to carry out, which ultimately impacts on the physical and mental demands of the employees. This may also be compounded by climatic conditions (such as rain), which may shorten the time scheduled to accomplish the tasks. Furthermore, they are required to be accurate during their tasks so as not to mix up samples of materials.

Client-related demands: Another demand experienced by the participants related to clients. This is usually experienced when dealing with difficult clients (such as commercial farmers) who require information or services. This does not only increase the amount of work to be done by the employees, but also mounts pressure as some clients would require the services or information urgently. At times, the clients may not be cooperative to provide all the information that the employee requires.

Support: The employees in an agricultural organisation experience support as a resource to perform their jobs through the following ways; (1) support from the organisation, which is usually in the form of providing information on responsibilities of employees, furnishing employees with information about the organisational or institutional structure, keeping the employees up to date about important issues in the organisation; (2) Support from colleagues usually being able to ask for help and getting on well with colleagues help the employees to accomplish work effectively; (3) Support from supervisors; having a good relationship with the supervisor, being appreciated by the supervisor as well as getting enough information on performance from the supervisor are an important resource being experienced by employees.

Planning of work: Participants reported that taking part in the planning and decisions about work activities as well as being able to schedule when to carry out the work activities assist employees to perform their job to the best of their abilities.

Learning/growth opportunities: Learning on the job as well as opportunities to attend conferences/workshops or further training is another resource that assists the participants in performing their jobs.

Security: Participants reported that when they feel secure about their jobs they can concentrate on performing their jobs.

Communication: Participants indicated that being able to have contact with and talking to colleagues about work-related matters assist them to do their jobs better.

Significance of work: Participants reported that they do their jobs to the best of their ability when they feel that their work adds or creates value to the organisation and to people who are benefitting from the results of their research

Equipment: Participants indicated that, in order to perform their jobs effectively, they need tangible resources such as equipment, e.g. planters, harvesters, laboratory machines and computers.

In order to examine the distribution pattern of the scores, descriptive statistics (means, standard deviation, skewness and kurtosis) were used next to explore the data on the initial 60 items of the AJDRS (see Table 2).

Table 2

Descriptive statistics of the initial 60 AJDRS items (N =443)

Item	Mean	Std. deviation	Skewness	Kurtosis
JDRS_1	4.99	1.52	0.52	0.09
JDRS_2	4.79	*1.49*	0.48	0.01
JDRS_3	4.84	1.49	0.19	0.57
JDRS_4	5.59	1.26	0.82	0.63
JDRS_5	4.38	1.65	0.26	0.42
JDRS_6	2.65	1.66	0.85	0.05
JDRS_7	4.83	1.49	0.35	0.27
JDRS_8	5.63	1.34	0.99	0.90
JDRS_9	5.52	1.49	0.99	0.56
JDRS_10	3.53	1.58	0.17	0.53
JDRS_11	3.21	1.75	0.45	0.55
JDRS_12	3.11	1.49	0.39	0.33
JDRS_13	4.24	1.79	0.27	0.77
JDRS_14	4.15	1.69	0.20	0.60
JDRS_15	4.80	1.75	0.60	0.48
JDRS_16	6.20	1.19	1.95	**4.26**
JDRS_17	5.09	1.51	0.56	0.20
JDRS_18	4.64	1.86	0.39	0.88
JDRS_19	5.67	1.43	1.13	0.88
JDRS_20	6.14	1.14	1.70	3.38
JDRS_21	5.46	1.42	0.83	0.18
JDRS_22	5.46	1.43	1.04	0.99
JDRS_23	5.77	1.40	1.29	1.44
JDRS_24	5.36	1.58	0.90	0.18
JDRS_25	5.27	1.46	0.56	0.16
JDRS_26	5.62	1.36	0.84	0.40
JDRS_27	6.00	1.16	1.79	**4.40**
JDRS_28	5.75	1.41	1.35	1.69
JDRS_29	6.05	1.13	1.41	2.40
JDRS_30	5.49	1.55	0.99	0.57
JDRS_31	6.07	1.20	1.81	**4.14**
JDRS_32	5.93	1.26	1.48	2.32
JDRS_33	5.05	1.70	0.78	0.15
JDRS_34	5.35	1.39	0.72	0.33
JDRS_35	5.32	1.55	0.85	0.15
JDRS_36	4.92	1.77	0.55	0.59
JDRS_37	4.59	1.64	0.24	0.49
JDRS_38	4.09	1.72	0.04	0.77

JDRS_39	5.04	1.66	0.60	0.41
JDRS_40	5.52	1.63	1.08	0.45
JDRS_41	5.04	1.69	0.67	0.31
JDRS_42	3.11	1.86	0.59	0.66
JDRS_43	5.74	1.34	1.02	0.70
JDRS_44	5.79	1.31	1.08	0.83
JDRS_45	5.08	1.41	0.46	0.13
JDRS_46	5.43	1.40	0.79	0.43
JDRS_47	4.62	1.99	0.36	1.03
JDRS_48	4.77	2.05	0.50	1.03
JDRS_49	4.48	1.97	0.27	1.07
JDRS_50	4.51	1.94	0.27	1.01
JDRS_51	3.05	1.74	0.42	0.72
JDRS_52	3.06	1.70	0.45	0.60
JDRS_53	2.84	1.75	0.64	0.51
JDRS_54	2.78	1.73	0.79	0.19
JDRS_55	4.50	1.80	0.35	0.66
JDRS_56	4.85	1.62	0.40	0.39
JDRS_57	2.89	1.80	0.80	0.23
JDRS_58	4.75	1.63	0.38	0.49
JDRS_59	4.84	1.60	0.40	0.38
JDRS_60	4.56	1.75	0.34	0.68

Table 2 displays the descriptive statistics of the initial 60 AJDRS items. The results indicated that three items (16, 27 and 31) had kurtosis that exceeded 4.00. This suggested that these items deviated from the normal distribution and indicated the presence of clustering of scores. These items were therefore removed from further analysis. The remainder of the items presented data that was fairly normally distributed with the kurtosis ranging from .01 to 3.38.

A principal component analysis was then conducted on the remaining 57 items to determine the number of factors that could be extracted. The results are displayed in Table 3.

Table 3

Eigenvalues of items (N = 443)

	Total variance explained					
Component	Initial Eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	11.93	20.93	20.93	11.93	20.93	20.93
2	4.40	7.73	28.66	4.40	7.73	28.66
3	3.85	6.76	35.42	3.85	6.76	35.42
4	3.28	5.75	41.17	3.28	5.75	41.17
5	2.14	3.76	44.93	2.14	3.76	44.93
6	2.12	3.72	48.65	2.12	3.72	48.65
7	1.74	3.06	51.71	1.74	3.06	51.71
8	1.64	2.87	54.58	1.64	2.87	54.58
9	1.53	2.69	57.27	1.53	2.69	57.27
10	1.39	2.44	59.72	1.39	2.44	59.72
11	1.27	2.24	61.95	1.27	2.24	61.95
12	1.26	2.21	64.16	1.26	2.21	64.16
13	1.14	2.01	66.16	1.14	2.01	66.16
14	1.09	1.91	68.08	1.09	1.91	68.08
15	0.98	1.73	69.80			
16	0.95	1.66	71.46			
17	0.87	1.52	72.99			
18	0.83	1.46	74.45			
19	0.79	1.39	75.84			
20	0.77	1.35	77.19			
21	0.72	1.26	78.45			
22	0.71	1.25	79.70			
23	0.69	1.21	80.91			
24	0.62	1.09	82.00			
25	0.56	0.99	82.99			
26	0.55	0.97	83.96			
27	0.52	0.91	84.87			
28	0.51	0.90	85.76			
29	0.47	0.83	86.59			
30	0.47	0.83	87.42			
31	0.46	0.81	88.22			
32	0.43	0.76	88.98			
33	0.42	0.74	89.72			
34	0.40	0.70	90.42			
35	0.39	0.69	91.11			
36	0.36	0.64	91.75			
37	0.36	0.63	92.37			
38	0.34	0.60	92.98			
39	0.33	0.58	93.55			
40	0.30	0.53	94.08			
41	0.29	0.51	94.59			
42	0.28	0.50	95.09			
43	0.25	0.44	95.52			

44	0.24	0.42	95.95
45	0.24	0.41	96.36
46	0.23	0.41	96.77
47	0.22	0.39	97.15
48	0.22	0.38	97.53
49	0.20	0.36	97.89
50	0.18	0.32	98.20
51	0.17	0.30	98.51
52	0.17	0.30	98.80
53	0.16	0.28	99.08
54	0.15	0.27	99.34
55	0.15	0.25	99.60
56	0.13	0..22	99.82
57	0.10	0.18	100.00

The scree plot is presented in Figure 1.

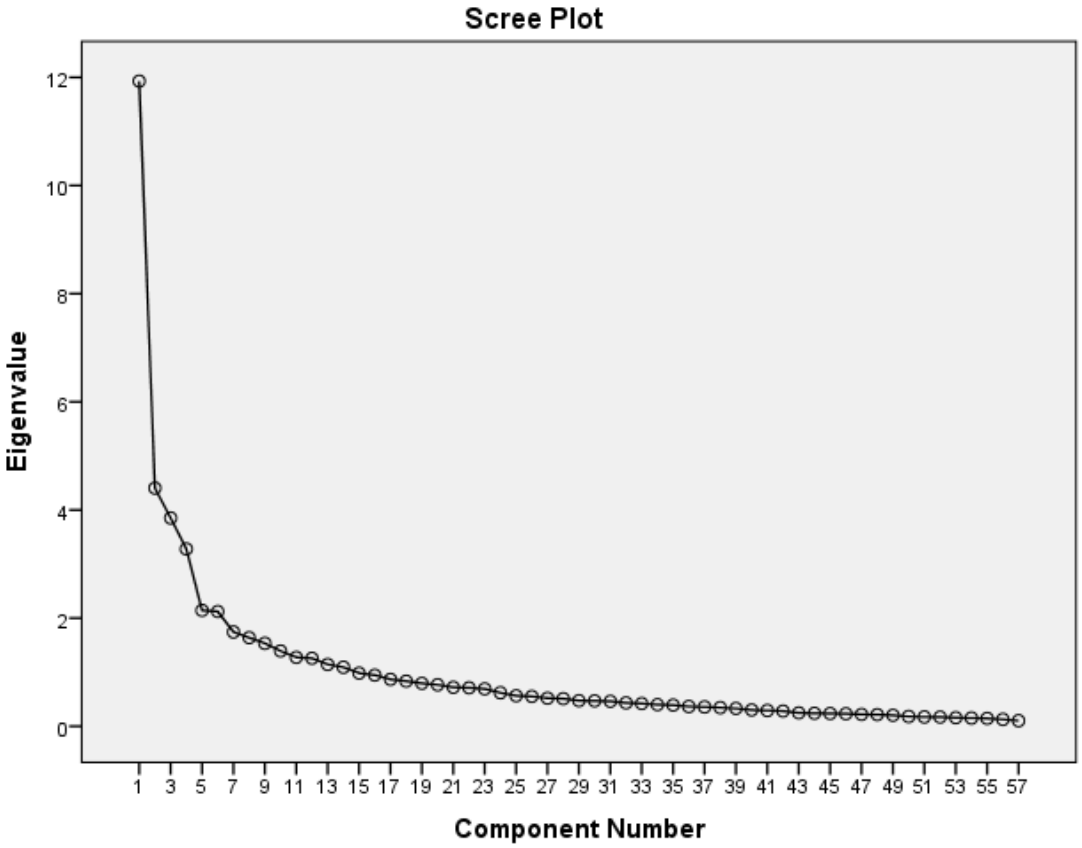


Figure 1: Scree plot of the JDRS items

According to Table 5, an initial analysis of the Eigenvalues (larger than 1) showed that 14 factors could be extracted. However, the scree plot suggested that only seven factors should

be extracted. A maximum likelihood factor analysis with a direct Oblimin rotation was then conducted on the proposed 14-factor solution. After investigating various factor solutions, a decision was taken to retain eight factors. This was further tested using the parallel analysis test that the Eigenvalue of the SPSS output must be higher than the Eigenvalue from the parallel analysis (Pallant, 2010) and the recommendations of Tabachnick and Fidell (2001). The eight factors were retained based on the following criteria: (1) the item loadings were more than .32; (2) the items did not load onto more than one factor, as this was considered indicative of the fact that the item either tapped more than one factor (poor item) or that there was an overlap of factors or components; (3) each factor had at least three substantive item loadings; and (4) the retained factor made theoretical sense. Furthermore, the Eigenvalue of the SPSS output for the eight-factor extraction (1.64) was higher than the value of the obtained Eigenvalue of the parallel analysis (1.46). The results of the parallel analysis and factor loadings are presented in Tables 4 and 5.

Table 4

Parallel analysis of JDRS items (N = 443)

Eigenvalues			
1	1.77		0.04
2	1.71	.	0.03
3	1.65		0.03
4	1.61		0.03
5	1.57		0.03
6	1.53		0.02
7	1.49		0.02
8	1.46		0.02
9	1.43		0.02
10	1.41		0.02
11	1.37		0.02
12	1.34		0.02
13	1.31		0.02
14	1.29		0.02
15	1.26		0.01
16	1.24		0.01
17	1.21		0.01
18	1.19		0.01
19	1.17		0.01
20	1.15		0.01
21	1.12		0.01
22	1.10		0.01
23	1.08		0.01
24	1.06		0.01

25	1.04	0.01
26	1.02	0.01
27	1.00	0.01
28	0.98	0.01
29	0.96	0.01
30	0.94	0.01
31	0.92	0.01
32	0.90	0.01
33	0.88	0.01
34	0.86	0.01
35	0.84	0.01
36	0.83	0.01
37	0.81	0.01
38	0.79	0.01
39	0.77	0.01
40	0.76	0.01
41	0.74	0.01
42	0.72	0.01
43	0.71	0.01
44	0.69	0.01
45	0.67	0.01
46	0.65	0.01
47	0.64	0.01
48	0.62	0.01
49	0.60	0.01
50	0.58	0.01
51	0.57	0.01
52	0.55	0.01
53	0.53	0.01
54	0.51	0.01
55	0.49	0.01
56	0.46	0.01
57	0.43	0.02

Table 5

Factor loadings and communality of items (N = 443)

Factor	**Item**	***F***	**h^2**
F1	Do you feel appreciated by your supervisor?	.74	.68
	Does your direct supervisor inform you on how well you are doing your work?	.72	.73
	Can you discuss work problems with your direct supervisor?	.71	.68
	Do you receive sufficient information on the results of your work?	.68	.72
	Can you count on your supervisor when you come across difficulties in your work?	.67	.68
	Do you know exactly what your direct supervisor thinks of your performance?	.66	.62
	Do you get on well with your supervisor?	.60	.65
	Do you receive sufficient information on the purpose of your work?	.58	.71
	Are you kept adequately up to date about important issues in your organisation/institute/division?	.64	.66
	Is it clear whom you should address within the organisation/institute for specific problems?	.49	.59
	Can you participate in decisions about the nature of your work?	.36	.57

	Do you know exactly for what you are responsible and what not?	.42	.60
	Is the organisation's/institute's decision-making process clear to you?	.33	.72
F2	Do you need to be more secure that you will keep your current job next year?	.95	.83
	Do you need to be more secure that you will keep the same function level next year?	.84	.76
	Do you need to be more secure that you will still be working in one year?	.83	.78
	Do you need to be more secure that you will be working on a funded project after the current one ends?	.62	.52
F3	Do you think that you are paid enough for the work that you do?	.89	.74
	Can you live comfortably on your pay?	.88	.76
	Do you think your organisation pays good salaries?	.87	.73
	Does your job offer you the possibility to progress financially?	.66	.58
F4	Does your work put much demand on you mentally?	.62	.54
	Do you have to be attentive to many things at the same time?	.58	.46
	Do you work under time pressure?	.57	.43
	Do you have to remember many things in your work?	.54	.55
	Does your work put you in emotionally upsetting situations?	.52	.47
	Are you confronted in your work with many things that affect you personally?	.51	.47
	Does your work put much demand on you physically?	.48	.46
	Do you have to put in extra hours beyond your working time?	.48	.40
	Do you have contact with difficult clients in your work?	.44	.47
	Do you have too much work to do?	.44	.42
	Do you have to pay continuous attention to your work?	.43	.51
F5	Is/Are the equipment/implements you use in your work in good working condition?	.94	.71
	Do you have all the equipment/implements you need to accomplish your work?	.78	.67
	Do you have modern-day equipment/implements to do your work?	.67	.65
F6	Does your organisation/institute give you opportunities to follow training courses/workshops/conferences?	.84	.66
	Does your work offer you opportunities to learn on the job?	.68	.63
	Does your work offer you opportunities for personal growth and development?	.42	.58
F7	Does your job offer you the opportunities for independent thought and action?	.75	.67
	Do you take part in the planning of your work activities?	.74	.70
	Can you participate in decisions about when a piece of work must be completed?	.70	.61
	Do you have freedom in carrying out your work activities?	.63	.62
	Do you think you are doing important work people can benefit from?	.53	.54
	Does your work contribute significantly to the growth of your institute/organisation?	.35	.45
F8	Do you have enough contact with colleagues during working hours?	.68	.54
	Can you have a chat with colleagues during working hours?	.60	.48
	Do you talk with your colleagues regarding work-related matters?	.49	.62
	Do you have contact with colleagues as part of your work?	.41	.61

The results showed that three items did not load onto any of the factors (e.g. "Do you have enough time to complete your work?") and three items had double loadings (e.g. "Does your job give you the opportunity to be promoted?"). In addition, item 42 ("Do you have direct influence on your institute's/organisation's decisions?) was also removed as it lowered the Cronbach alpha of the factor and did not match the rest of the items on the scale. These items were all excluded from further analyses. The remaining 48 items represented the eight

extracted factors well. These items were labelled Organisational support (F1; 13 items), Insecurity (F2; 4 items), Rewards (F3; 4 items), Overload (F4; 11 items), Resources (F5; 3 items), Growth opportunities (F6; 3 items), Control, (F7; 6 items) and Relationship with colleagues, (F8; 4 items). The factor loadings for the eight AJDRS factors ranged between .33 and .95, with communalities ranging between average (.42) and high (.83).

The descriptive statistics, reliabilities and Pearson's product moment correlation coefficients of the obtained factors are presented in Table 6.

Table 6

Descriptive statistics, reliabilities and Pearson's correlations of the factors

Factor	Mean	SD	1	2	3	4	5	6	7	
1. Organisational support	68.15	14.33	.92							
2. Insecurity	18.37	6.85	.03	(.87)						
3. Rewards	11.73	6.04	. 23**	-.02	(.89)					
4. Overload	48.91	10.05	.03	.13**	.03	(.80)				
5. Resources	14.15	4.35	.46**+	.10*	.35**+	.02	(.84)			
6. Growth opportunities	14.00	4.41	.49**+	.04	.31**+	.09	.36**+	(.78)		
7. Control	33.86	6.19	.58**++	.04	.17**	.16**	.27**	.47**+	(.83)	
8. Relationship with colleagues	22.04	4.19	.39**+	.17**	.12**	.15**	.28**	.25**	.41**+	(.77)

* Correlation is significant at the .05 level (2-tailed)

** Correlation is significant at the .01 level (2-tailed)

+ Correlation is practically significant r> .30 (medium effect)

++ Correlation is practically significant r> .50 (large effect)

(Take note: Alpha coefficient indicated on the diagonal)

Table 6 shows that all the factors obtained from the AJDRS were reliable when using Nunnally and Bernstein's (1994) guideline of $\alpha > .70$. The Cronbach alpha results for the eight factors ranged between .77 and .92. The results also indicate that Organisational support was practically and significantly related to Resources, Growth opportunities, Relationship with colleagues (medium effect) and Control (large effect). Rewards was practically and significantly related to Resources and Growth opportunities (medium effect). Resources correlated practically and significantly with Growth opportunities (medium effect). Growth opportunities were practically and significantly related to Control (medium effect). Finally, Control was practically and significantly related to Relationship with colleagues (medium effect). All the reported correlations were statistically significant at the $p < .01$ level (2 tailed).

The obtained eight factors were then used as input for a second-order factor analysis in order to determine which of the factors were job demands and which were job resources. Principal component analysis showed that two factors, which accounted for 50.09% of variance, could be extracted. Oblimin rotation showed that the two factors were not related (r = .08) and Varimax rotation was therefore used to extract the factors.

Table 7

Factor loading of the obtained AJDRS dimensions

Factors	**Job resources**	**Job demands**
Organisational support	.80	
Insecurity		.68
Rewards	.54	
Overload		.65
Physical resources	.69	
Growth opportunities	.75	
Control	.70	
Relationship with colleagues	.51	.48

Table 7 shows that five factors (Organisational support, Rewards, Physical resources, Growth opportunities and Control) loaded onto the first factor, which was labelled Job resources. Two factors (Insecurity and Overload) loaded onto the second factor, which was labelled Job demands. The eighth factor, Relationship with colleagues, loaded substantially onto both Job resources and Job demands.

Preliminary assumption checking was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices and multicollinearity. No serious violations were noted with regard to the above criteria and MANOVA was then used to determine differences between demographic groups with regard to job demands and resources. The demographic groups included were gender, race, marital status, language, age, education, position, years in organisation and years in position. The results of the MANOVA analysis are presented in Table 8.

Table 8

MANOVAs: Differences in job demands and resources of demographic groups

Variable	**Value**	***F***	***Df***	***p***	**Partial Eta squared**
Gender	.94	1.10	8.00	.361	.03
Race	.93	1.05	24.00	.393	.03
Marital status	.85	.12	48.00	.268	.03
Language	.74	1.19	88.00	.119	.04
Age	.81	1.28	56.00	.079	.03
Education	.78	1.48	56.00	.013	.04
Position	.86	1.60	32.00	.019	.04
Years in position	.88	.92	48.00	.622	.02
Years in organisation	.85	1.15	48.00	.225	.03

An analysis of Wilks' Lambda showed statistically significant differences in education (*F* = 1.48, *p* =.012) and position (*F* = 1.60, *p* = .019). However, when the results for the dependent variables were examined separately using a Bonferroni adjusted level of .006, none of the dependent variables for education recorded a significance value less than the cut-off value. The *p* values for Organisational support (*p* = .028) and Growth opportunities (*p* = .039) exceeded the adjusted level of .006. This suggests that no significant difference exists with regard to the educational level of the workers. However, when the dependent variables for position were examined, the *p* value for resources was below the adjusted level (*p* = .002). This implies that there was a significant difference with regard to the position of the employees.

In Table 9, an ANOVA was then performed to further investigate the relationship between the dependent variable (Resources) with regard to the position of the employees.

Table 9

ANOVA: Differences in resources in relation to position

Item	Research assistant	Research technician	Researcher	Programme manager/ Specialist scientist	Support staff	*P*	Partial Eta squared
Resources	15.03	13.03	13.85	14.18	15.29	.001	.04

* The mean difference is significant at: $p < 0.05$.

A one-way between-groups ANOVA was conducted to explore the impact of position on the perceived resources as measured by the AJDRS. Participants were divided into five groups according to their position in the organisation (research assistants, research technicians, researchers, programme managers/specialist scientists and support staff). There was a statistically significant difference at the $p < .05$ level in Resources scores for the groups based on position (F (4.429) = 4.7, p = .001). However, despite the fact that the results were statistically significant, the actual difference in mean scores between the groups was relatively small. The effect size, which was calculated using Eta squared, was .04. A *post hoc* comparison using Games-Howell indicated that the mean score for research technicians (M = 13.85, SD = 4.13) was significantly different from that of research assistants (M = 15.03, SD = 5.14) and support staff (M = 15.29, SD = 3.46) with the score of the support staff being higher.

DISCUSSION

This study aimed to investigate the validity and reliability of the AJDRS as well as to identify the job demands and resources that are prevalent among employees in an agricultural research organisation. Additionally, the possible existence of differences related to various demographics was also investigated.

As a first step toward adjusting the JDRS, interviews were conducted with employees of the agricultural organisation. Content analysis of interviews showed that nine themes could be identified with regard to the job demands and resources experienced by employees in an agricultural research organisation. These included: task-related demands, client-related demands, support, employees being a part of the planning and decision-making process,

learning/growth opportunities, security, communication, significance of work, and equipment.

The results of the study showed that the AJDRS is a valid and reliable instrument. Factor analysis and Cronbach alpha test revealed that eight reliable factors could be extracted. In terms of demographics, significant differences were found with regard to position. The support staff reported higher availability of physical resources than research assistants and research technicians. This implies that the AJDRS has association with position (organisational structure breakdown), which is a common point of reference for recruitment of staff and classification of job descriptions. However, no significant differences were found with regard to gender, race, marital status, language, age, education, years in organisation and years in position. This is probably because staff's position was randomly determined and was not dependent on gender, race, marital status, language, age education, years in organisation and years in position.

With regard to the first objective of the study (which was to establish the factorial validity of the AJDRS within an agricultural research organisation in South Africa), the results indicated that an eight-factor solution fitted the data best, explaining 54.58% of total variance. The eight factors were labelled Organisational support (F1), Insecurity (F2), Rewards (F3), Overload (F4), Physical resources (equipment) (F5), Growth opportunities (F6), Control (F7) and Relationship with colleagues (F8).

The factors obtained were similar to those reported by Rothmann and Jackson (2005b). However, a noticeable difference was that the item on variety in work, which loaded onto the Growth opportunities factor in the study by Jackson and Rothmann (2005b), but did not load onto any factor in the current study. This may be because the majority of the participants in this study were employed in specialised positions and therefore do not experience a great deal of variety in their day-to-day work.

The main difference between this study and Jackson and Rothmann's (2005b) study was the identification of an additional factor in this study, which was labelled Physical resources (equipment). Although this factor was not identified in Jackson and Rothmann's (2005b)

initial study using a sample of educators, it has been identified in various subsequent studies, including studies by Rothmann and Malan (2007, 2011), which made use of samples of hospital pharmacists.

This finding may be because the majority of the participants in the present study (85.3%) were employed as research staff. In order to effectively discharge their duties, these categories of employees require specific equipment (such as planting, harvesting and storage implements and facilities) that needs to be both modern and functional (ARC, 2009). This finding clearly indicates that each organisation has its own unique job demands and resources, as pointed out by Rothmann et al. (2006).

A second-order factor analysis was carried out using the eight observed factors as input in a principal component analysis to determine which factors were job demands and which factors were job resources. The analysis showed that two factors, which accounted for 50.09%, could be extracted. The first factor was labelled Job resources (Organisational support, Rewards, Physical resources, Growth opportunities and Control), while the second factor was labelled Job demands (Overload and Job insecurity). These findings are in accordance with findings reported by research on the Job Demands Resources Model (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker 2004) as well as with the results of other South African studies (Barkhuizen & Rothmann, 2008; Fourie, 2003; Jackson, Rothmann, & Van de Vijver, 2006; Koekemoer & Mostert, 2006; Rothmann & Jordan, 2006; Rothmann et al., 2006; Rothmann & Jorgensen, 2007).

With regard to job demands, the results obtained in this study are similar to the findings of Bosch et al. (2012), who identified the factors of Work overload and Insecurity as the job demands experienced most frequently by women accountants in the workplace. This finding is unsurprising as previous research has highlighted the fact that both work overload (Demerouti et al., 2001; Karasek, 1979; Schaufeli & Bakker, 2004) and job insecurity (De Cuyper, & De Witte, 2010) can lead to employees experiencing strain. The resources identified in this study are also similar to factors that have been identified in previous studies, which include Organisational support (Jackson & Rothmann, 2005b; Rothmann & Jordan 2006; Rothmann & Jorgensen, 2007), Reward (Jackson & Rothmann, 2005b), Physical resources/equipment (Rothmann & Malan, 2007, 2011), Growth opportunities (Jackson &

Rothmann, 2005b; Rothmann & Jordan, 2006; Rothmann & Jorgensen, 2007) and Control (Jackson & Rothmann, 2005b).

In the current study, Relationship with colleagues loaded onto both the job demands and job resources factors. This dual finding is supported by the literature. Literature (Demerouti et al., 2001; Schaufeli & Bakker, 2004) suggests that support from a colleague, especially within a team climate (such as the one in the agricultural research organisation under investigation), could be instrumental in an employee achieving work goals. In this case, support from colleagues would be viewed as a job resource. However, Relationship with colleagues has also been identified as an interpersonal stressor (Basson & Van der Merwe, 1994), which could place demands on the employee. It appears that in the current study the participants perceived Relationship with colleagues to be both a job resource and a job demand.

The internal consistency of the AJDRS was assessed using the Cronbach alpha coefficient test for reliability. The items of each of the obtained eight factors were analysed for reliability. In previous research by Jackson and Rothmann (2005b), the JDRS showed good internal consistency for all the subscales. The results of the reliability tests suggest that the AJDRS is a reliable instrument.

Next, the differences within groups based on various demographic variables were examined. MANOVA was used to determine these differences with regard to job demands and resources. The demographic groups included were gender, race, marital status, language, age, education, position, years in organisation and years in position.

The results from the study provide partial support for the second objective, which was to examine differences in the perceived job demands and resources. No significant differences were found in the perceived job demands and resources of the employees based on gender, race, marital status, language, age, education, position, years in position and years in organisation. Although it initially seemed that there was significant difference in perceived Organisational support based on education, no statistically significant difference was observed when the results for the dependent variables were examined separately using a Bonferroni adjusted level of .006. This result indicates that all the employees perceived Organisational support in the same way. The mean score of the employees with regard to

Organisational support showed that the employees often experience Organisational support. The organisation under investigation communicates with its employees through a centralised email system and strives to ensure that employees are aware of all developments in the organisation as well as in the various institutes. Employees are also given written job descriptions, thereby ensuring that all employees are aware of their responsibilities. Finally, the management of the organisation places a premium on good employee relations and provides a good environment to bring out the best potential of all its employees.

However, the results of the MANOVA showed a significant difference in the perceived Physical resources (equipment) of research technicians, research assistants and support staff, with research technicians perceiving lower levels of Physical resources than research assistants and support staff. This may be because support staff generally have the resources they need to work (e.g. computer, printer, fax machines) and research assistants generally perform jobs that do not require sophisticated equipment. In contrast, research technicians require sophisticated equipment that may not be readily available or in good working condition. In terms of resources, the organisation faces challenges in relation to modernising some of the laboratories and equipment in order to effectively research new crops and animals as well as new techniques.

From the discussion, it seems clear that work characteristics within the agricultural research sector can be measured reliably and in a valid manner using the AJDRS. Furthermore, physical resources, i.e. equipment, are deemed to be very important within the agricultural sector and this should be taken into account when developing interventions aiming to improve the perceived job demands and resources in the organisation.

Limitations

The major limitation of this study is that it made use of a cross-sectional survey design for data collection. The disadvantage of this type of design is that it does not allow the researcher to examine how variables manifest over different occasions. The results were also obtained only from self-report questionnaires and this increases the probability of contamination of reported relationships.

Recommendations

Based on the results of this study, it is recommended that the AJDRS be used to measure Job Demands and Resources in agricultural research organisations in South Africa. It is also recommended that future research studies should further examine the reliability and validity of the AJDRS in other agricultural research organisations in South Africa. It is also recommended that research be conducted on the construct equivalence of the AJDRS, as this could not be undertaken in the present study because of the limitations in terms of the demographic makeup of the participants. Furthermore, it is recommended that the AJDRS be used in research studies with other samples of agricultural research organisations outside of South Africa in order to provide a point of reference for the comparison of the job demands and resources of agricultural research organisations worldwide. In addition, based on the fact that the items in the Relationship with colleagues subscale loaded onto both job demands and job resources, it is recommended that this factor be refined in future studies. These studies should examine the relationship between job demands and resources and other well-being variables such as burnout and work engagement. Refinement of the Relationship with colleagues subscale could involve rephrasing the items to better reflect the individual employee's experience of relationships with colleagues as either a demand or a resource. Future research studies should also involve a diary study of the job demands and resources of employees within a South African agricultural research organisation in order to establish how workers' experiences of job demands and job resources vary over time.

It is also recommended that the findings of this research study be utilised by agricultural research organisations and managers in relation to job design. The JD-R model suggests that two vital processes at work are caused by job demands and resources, which is of relevance in the industrial psychology profession, especially: (1) Jobs that are poorly designed (i.e. high demands including overload) could deplete mental and physical resources, which could ultimately result in exhaustion of energy and ill health in the workplace. (2) Jobs that have high job resources could reduce the experience of job demands and enhance goal achievement. The results of this study should therefore be used to assist managers in agricultural research organisations in ensuring that every category of employees has sufficient resources to cope with the job demands of their positions so as to ensure that all employees are engaged in their work.

CHAPTER 3: ARTICLE 2

The psychometric properties of a new scale to measure burnout

ABSTRACT

Orientation: Knowledge concerning the burnout of employees is important for practitioners and researchers in Industrial/Organisational Psychology in order to plan interventions to address burnout. Although burnout has been well documented within South Africa, researchers have adapted imported instruments. These imported instruments have a number of limitations. Therefore there is a need to develop a new instrument suitable for usage on South African employees.

Research purpose: The objective of this study was to give an overview of current burnout measures, being used in the literature. From the literature gaps will be identified and used to develop a new Burnout Scale for use with employees within a South African organisation. The research then intended to examine the construct validity, reliability, construct equivalence and item bias of the newly developed Burnout Scale. The research also investigated whether any differences in burnout existed in relation to the employees' demographic variables.

Motivation of the study: The negative consequences of employees' burnout on the well-being of both the individual and the organisation have been well documented in literature. The proper diagnosis of well-being constructs such as burnout is the most important step in facilitating well-being of employees. It is not only important to use reliable and valid instruments to measure burnout in a multicultural setting such as South Africa but also when burnout measures are applied to diverse cultural groups, issues of construct equivalence becomes important. This study aimed to address various limitations regarding existing burnout measures by developing a reliable and valid burnout measuring instrument that includes cognitive, physical and emotional (affective) components that can be used for assessing burnout in South African employees.

Research design, approach and method: This empirical, quantitative research study employed a cross-sectional, survey design among 443 employees of an agricultural research organisation that included the Burnout Scale and a biographical data questionnaire. Items for the Burnout Scale were written based on a literature review. Statistical analysis included exploratory factor analysis with target rotation as well as MANOVA and ANOVA.

Main findings: Exploratory factor analysis with target rotations resulted in a three-factor model of burnout. These factors were labelled Cognitive weariness, Fatigue and Emotional

exhaustion/withdrawal. Reliability analysis showed that all three scales (1) were sufficiently internally consistent and (2) showed construct equivalence for black and white members of a South African agricultural research organisation and for the Afrikaans and African speaking employees. A practically significant difference in the burnout levels of employees was found with regards to their age.

Practical/managerial implications: The Burnout Scale can be used to assess burnout within agricultural research institutions and based on the results for construct equivalence and differential item functioning (DIF), the researchers suggest that organisations could use the Burnout Scale comparatively for different cultural groups or employment decisions in other South African agricultural institutions or similar research based institutions.

Contribution/value-add: This study contributes to knowledge regarding the burnout of employees in an agricultural research organisation in South Africa and provides a new burnout scale that is developed specifically for the South African context and which can be utilised in assessing burnout within the agricultural sector and other research oriented institutions in south Africa.

Keywords: Burnout Scale; validity; reliability; agriculture; demographic variables

INTRODUCTION

The term 'burnout' was coined in the United States in the mid-1970s and relates to difficulties in the employee-work relationship (Maslach & Schaufeli, 1993). The association between employees and their working environment and the problems that result when this employee-work relationship does not function as expected have been acknowledged as important characteristics of the work context (Maslach, Schaufeli, & Leiter, 2001). The need therefore exists for research to focus on burnout as it has been linked to various job related behaviours such as ill-health related absences from work, work disabilities (Ahola, Toppinen-Tanner, Huuhtanen, Koskinen, & Väänänen, 2009; Bekker, Croon, & Bressers, 2005) and work related outcomes such as decreased motivation.

Burnout has initially been identified as a social issue by practitioners and social commentators with the highest level of interest, discussion and literature in people oriented professions (Maslach & Schaufeli, 1993). Another aspect worthy of note was that most of the initial burnout literature was non-empirical (Schaufeli & Enzmann, 1998; Schaufeli & Buunk, 2007). The emphasis was on symptoms of burnout, and these symptoms were derived from unstandardised examination and interpretation of case studies (Maslach & Schaufeli, 1993). The resultant consequence was therefore that despite the profusion of writing on burnout there was "not an early emphasis on developing theories of burnout, and there was no conceptual framework for integrating and evaluating the various findings and proposed solutions" (Maslach & Schaufeli, 1993, p. 5).

The nature of burnout research underwent a transformation during the subsequent developmental phases and the concept of burnout was extended to include occupations outside the human services. The move towards more empirical work was followed by both theoretical and practical contributions from the industrial-organisational field (Maslach et al., 2001). Burnout research therefore began to focus more on job factors rather than on other types of variables. Also the focus during the developmental phase was on empirical research and more productive, purposeful systematic and empirical research was produced and published (Maslach et al., 2001). This phase also offered different types of supporting evidence in the form of survey and questionnaire data, responses from interviewees and clinical case studies and furthermore standardised measures of burnout were developed. The

existence of these measures provided researchers with more clear-cut definitions as well as tools for studying the phenomenon (Maslach & Schaufeli, 1993).

Following the development of concepts and assessment tools for burnout, burnout research, which was hitherto conducted exclusively in the United States (US), was undertaken in various countries (Schaufeli & Enzmann, 1998). These countries did not go through the pioneer phase of development and instead made use of the established burnout concepts and measures developed in the US. The concept of burnout as operationalised by the Maslach Burnout Inventory (MBI) was therefore accepted in other countries (Maslach et al., 2001). The MBI dominated the field of burnout research to the extent where the definition of burnout that was implied in this instrument became the commonly accepted definition of burnout (Halbesleben & Buckley, 2004; Schaufeli, 2003). For researchers using the MBI, burnout was defined as a condition characterised by emotional exhaustion, depersonalisation and reduced personal accomplishment (Maslach & Jackson, 1981, 1986).

The consequence of this use of the MBI was that the early debate regarding the conceptualisation of burnout was rather narrow and alternative measures of burnout were rarely developed (Maslach & Schaufeli, 1993), hence the call by Schaufeli, Maslach, and Marek (1993) for researchers to equally focus on the development of alternative measures of burnout rather than focusing only on examining the psychometric properties of the MBI. According to Maslach and Schaufeli (1993, p. 16) "many questions and controversies remain and much theorising and research have yet to be done" concerning the concept of burnout. Since the call by Schaufeli et al. (1993) to expand burnout research, many more burnout measures have been developed. The most commonly used measures within burnout research focus on the dimensions of exhaustion, cynicism, professional efficacy and disengagement from a general job perspective.

Since the call by Schaufeli et al. (1993), many more burnout measures have been developed. The most commonly used measures within burnout research focus on the dimensions of exhaustion, cynicism, professional efficacy and disengagement from a general job perspective. These measures include the Burnout Measure (BM) (Pines & Aronson 1988) and the short version) (BMS) (Malach-Pines, 2005), the Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli, Leiter, Maslach, & Jackson, 1996), the Oldenburg Burnout Inventory (OLBI) (Demerouti et al., 2003), the Shirom-Melamed Burnout Measure

(SMBM) (Shirom, 1989, 2003) and the Copenhagen Burnout Inventory (CBI) (Kristensen, Borritz, Villadson, & Christensen, 2005).

However the concept of burnout still continues to attract much research attention in fields such as health psychology and work and organisational psychology. A large body of literature exists in relation to burnout and, according to Sonnentag (2005), in the past few decades much of this literature has focused on the search for improved burnout measures.

In light of the above mentioned, the main objectives of this research study were to (1) give an overview of the current burnout measures being used in literature, (2) identify potential gaps within these measures, (3) address these gaps through the development of a new Burnout Scale, (4) investigate the psychometric properties of the Burnout Scale on a South African sample of employees, (5) examine the construct equivalence of the newly developed measure for usage on a diverse range of employees within South Africa, and (6) explore whether demographic variables influenced the degree of burnout within South African employees.

Burnout defined

Burnout was initially conceptualised as occurring "exclusively in the human services among individuals who do 'people work' of some kind (Schaufeli & Enzmann, 1998, p. 36). However, research has found that people in any occupation can develop burnout (Maslach et al., 2001; Schaufeli & Greenglass, 2001).

Burnout can be defined as a persistent, negative, work-related state of mind in 'normal' individuals that is primarily characterized by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work (Schaufeli & Enzmann, 1998). Burnout is also defined as an erosion of engagement with the job (Maslach & Leiter, 1997) or as being disengaged (Kahn, 1990). Kahn (1990) describes personal disengagement as an individual's uncoupling from the work role, simultaneous withdrawal and defence of his or her preferred self through the manifestation of behaviours that promote a lack of connections, physical, cognitive, and emotional absence, and passive, incomplete role performances (Kahn, 1990). To withdraw preferred dimensions involves removing personal, internal energies from physical, cognitive,

and emotional labours (Kahn, 1990). Burnout is a metaphor that is also used to describe a state or process of mental exhaustion (Schaufeli & Enzmann, 1998).

Similarly, Schaufeli and Greenglass (2001) defined burnout as a state of physical, emotional and mental exhaustion that results from long-term involvement in work situations that are emotionally demanding. Maslach et al. (2001) pointed out that when people report burnout (whether in themselves or others) they often refer to the experience of exhaustion. Exhaustion has therefore been both the most commonly reported as well as the most comprehensively studied component of burnout (Maslach et al., 2001). However, according to Maslach et al. (2001) placing too much emphasis on the exhaustion component of burnout could lead to difficulties in the conceptualisation of burnout. This is because exhaustion is not merely experienced but also stimulates emotional and cognitive detachment from work. In fact, Rothmann (2003) stated that constant exhaustion can result in individuals detaching themselves emotionally and cognitively from their work to the extent that they are so preoccupied that they are no longer sensitive to the needs of others or to the demands of the job. According to Hobfoll and Shirom (2000), burnout therefore consists of three closely interrelated factors, which can be labelled physical fatigue, emotional exhaustion and cognitive weariness.

According to Qiao and Schaufeli (2011) although the concept of "burnout" was introduced over 30 years ago, its conceptualisation is still vehemently debated, for instance, as illustrated by a special issue of *Work & Stress* (Cox, Tisserand, & Taris, 2005). A conceptual controversy exists about whether burnout should be viewed as work-related exhaustion (Cordes & Dougherty, 1993; Shirom, 1989) or a multidimensional construct that goes beyond mere exhaustion (Maslach & Jackson, 1981; Schaufeli, Leiter, & Maslach, 2009). Burnout is currently defined as a psychological response to chronic work stress that is typically characterised by feelings of exhaustion (Qiao & Schaufeli, 2011). Although all the available burnout instruments measure exhaustion there are discrepancies of what dimensions it involves. Equally important is the fact that there is currently no single measure that assesses all the important dimensions of burnout identified in literature.

Measurement of burnout

While a large body of literature exists in relation to burnout, according to Sonnentag (2005), in the past few decades much of this literature has focused on the search for improved

burnout measures. This is a necessary focus in burnout research since, although all the available burnout measures measure exhaustion, there are discrepancies of what dimensions it involves as well as the absence of a single measure that assesses all the important dimensions of burnout identified in literature. The most commonly used measures within burnout research focus on the dimensions of exhaustion, cynicism, professional efficacy and disengagement from a general job perspective. These measures include the Maslach Burnout Inventory – General Survey (Schaufeli, Leiter, Maslach, & Jackson, 1996), the Burnout Measure (Pines & Aronson 1988, Malach-Pines, 2005), the Shirom-Melamed Burnout Measure (Shirom, 1989, 2003), the Oldenburg Burnout Inventory (Demerouti et al., 2003), and the Copenhagen Burnout Inventory (Kristensen et al., 2005).

The Maslach Burnout Inventory: The Maslach Burnout Inventory (MBI) is the most widely used burnout measure. One major limitation of the instrument is that it is copyrighted and expensive to purchase the instrument especially for research studies with large samples size. The various variations include the Maslach Burnout Inventory-Human Services Survey MBI-HSS), the Maslach Burnout Inventory-Student Survey (MBI-SS) and the Maslach Burnout Inventory-General Survey (MBI-GS). The Maslach Burnout Inventory-General Survey (MBI-GS) (Schaufeli et al., 1996) was initially developed for English speaking populations (Demerouti et al., 2003). According to the developers, the MBI-GS can be used in any occupational context and includes three subscales: Exhaustion, Cynicism and Professional Efficacy (Schaufeli & Enzman, 1998). These three components are similar to those included in the original MBI but consist of items that are not contextualised in human services work. "The emotional exhaustion subscale measures primarily depletion of physical energy and fatigue but does not refer to people as the source of these feelings. The cynicism subscale, which replaced the MBI depersonalisation subscale, reflects indifference or a distant attitude toward one's work in general. Reduced personal efficacy or ineffectiveness, which is similar to the MBI's personal accomplishment subscale, refers to a decline in one's feelings of competence and successful achievement in one's work" (Shirom & Melamed, 2006, p. 178).

One limitation of the MBI-GS is that it does not measure all the dimensions of burnout. The MBI-GS focuses only on the emotional component of exhaustion (Hasbesleben & Demerouti, 2005). Several researchers (Pines, Aronson, & Kafry 1981; Shinn, 1982) have suggested that the exhaustion component should be expanded to include other aspects of exhaustion,

including cognitive and physical exhaustion. Including these aspects would better capture the nature of exhaustion experienced as a result of chronic work stress. The scale also fails to measure cognitive impairment and distress syndrome. The MBI-GS therefore measures a narrow conceptualisation of the burnout construct, as does the MBI (Schaufeli, 2003). In addition, some researchers have suggested that professional efficacy should be regarded as a personality change and not a part of the burnout construct (Cordes & Dougherty, 1993; Schaufeli, 2003).

In addition, as pointed out by Shirom and Melamed (2006), the three dimensions of the MBI (in all its versions) resulted from the labelling of exploratory factor-analysed items originally collected to show the range of experiences related with the burnout phenomenon rather than being theoretically deduced (Maslach, 1998; Schaufeli & Enzmann, 1998). Furthermore, the third dimension of the MBI-GS, (reduced efficacy), includes the concepts of incompetence, low self-efficacy, lack of productivity, and lack of accomplishment (Leiter & Maslach, 2001). According to Shirom and Melamed (2006) these concepts are all distinct concepts within the behavioural sciences research field and should not be grouped together. Also, the MBI-GS simply relabelled the MBI scale of depersonalisation as cynicism while still implying the same types of symptoms; this represents a theoretical overlap with already defined measures of cynicism (Shirom & Melamed, 2006).

Demerouti, Mostert and Bakker (2010) highlighted a further critical psychometric limitation of the MBI-GS which is the fact that all items in each subscale are phrased in the same direction. The professional efficacy scale is worded positively while the exhaustion and cynicism scales are all worded negatively (Demerouti et al., 2010). This could result in response biases and might have caused an artificial clustering of factors due to the positively and negatively worded scales (Bouman, te Brake, & Hoogstraten, 2002).

Also according to Shirom and Melamed (2006), the third dimension of the Maslach Burnout Inventory-General Survey (MBI-GS) (reduced efficacy), incompetence, low self-efficacy, lack of productivity, and lack of accomplishment are all different in the behavioural sciences research field and should therefore not be grouped together (Shirom & Melamed, 2006).

While recognising the role of interpersonal variables in the conceptualisation of the burnout construct, Maslach (1993) proposed that a multidimensional approach to burnout should be

adopted and recommended that future studies focus on the influence of individual factors. Research has found that when individuals report cases of experienced burnout (of themselves or others) they often indicate the experience of exhaustion. Exhaustion is therefore the most commonly reported symptom of burnout and has also been extensively researched (Maslach et al., 2001).

The Burnout Measure: Researchers such as Pines, Aronson, and Kafry (1981), assume that burnout is a one-dimensional construct exclusively reflecting exhaustion. Pines and her colleagues applied the term burnout to employment relationships (Pines et al., 1981) and organisational careers (Pines & Aronson, 1988) as well as to marital relationships (Pines, 1988, 1996) and the aftermath of political conflicts (Pines, 1993).

Pines and Aronson (1988) developed an instrument for the measurement of burnout that they named the Burnout Measure. A recent short version (BMS; Maslach-Pines, 2005) has been introduced. This instrument defines burnout as "a state of physical, emotional and mental exhaustion caused by long term involvement in emotionally demanding situations" (Pines & Aronson, 1988, p. 9). Although the BM does distinguish between mental, emotional, and physical exhaustion an overall sum-score is used to assess burnout as this single score is easy to interpret (Pines, 1993). Studies on the factorial validity of the BM failed to distinguish more than one burnout (exhaustion) dimension in the BM (Corcoran, 1986; Schaufeli & Van Dierendonck, 1993). Also, studies have found that the physical and emotional aspects of exhaustion theorised by Pines et al. (1981) appear to collapse into one factor that reflects fatigue (Enzmann, Schaufeli, Janssen, & Rozeman, 1998). This is similar in terms of item content to the exhaustion subscale of the MBI. The results of the factor analysis of the current short version have shown inconsistent results in factor analysis across countries (see Malach-Pines, 2005).

The conceptualisation and measurement of burnout as exemplified by the BM (Burnout Measure) became well established as a result of case studies and clinical experience (Shirom & Melamed, 2005). In the course of developing the BM measure, Pines and her colleagues digressed from the initial way burnout was conceptualised towards an empirical description that views burnout" as a syndrome of co-occurring symptoms including helplessness, hopelessness, entrapment, decreased enthusiasm, irritability, and a sense of lowered self-

esteem" (Shirom & Melamed, 2005, p. 603). Shirom and Melamed (2005) noted that none of these symptoms is based in the work or job environment relationships.

The BM assesses burnout as a one-dimensional measure resulting in a single composite burnout score. However, the overlap between the conceptual definition and the operational definition of burnout within the BM is minimal (Schaufeli & Enzmann, 1998). In addition, the discriminant validity of the BM, relative to depression, anxiety, and self-esteem has been questioned (Shirom & Ezrachi, 2003). Previous researchers such as Schaufeli and van Dierendonck (1993) and Shirom and Ezrachi (2003) have described the BM as a general index of psychological distress that encompasses physical fatigue, emotional exhaustion, depression, anxiety, and reduced self-esteem. The items of the Burnout Measure are written in a general manner so that they can be used to assess any occupation. Although Enzmann et al. (1998) suggested that the measure should be seen as a useful diagnostic tool, other researchers have highlighted a number of problems with its factor structure and theoretical underpinnings (Enzmann et al., 1998; Schaufeli & van Dierendonck, 1993). Consequently, Shirom and Melamed (2006) recommended that the Burnout Measure should not be used as a distinctive measure of burnout without significant modification and research attention.

The Shirom-Melamed Burnout Measure: The conservation of resources (COR) theory of Hobfoll and Freedy (1993) offers yet another conceptual approach to the burnout construct. According to Hobfoll and Freedy (1993) stress occurs when work or other situations threaten an individual's ability to obtain or maintain resources. This approach therefore views burnout as relating principally to the physical, emotional and cognitive exhaustion experienced by an individual. The emphasis within the conceptual framework is an unremitting depletion of the individual's energetic coping resources resulting from their chronic exposure to occupational stress" (Shirom, 1989, 2003). According to COR theory an individual has a basic motivation to obtain, retain and protect the resources that he or she values. Although these resources may include material, social and energetic resources, the Shirom-Melamed Burnout Measure's (SMBM) concept of burnout relates only to energetic resources (Hobfoll & Shirom, 1993, 2000; Shirom and Melamed, 2005).

Shirom and his colleagues put forward three arguments for focusing solely on energetic resources in the construction of the SMBM. Firstly, these forms of energy are individually possessed and theoretically likely to be interrelated (Hobfoll & Freedy, 1993). Furthermore,

the COR proposes that personal resources not only influence each other but also exist as a resource pool, such that a lack in one resource is often linked to a lack in another resource (Hobfoll & Shirom, 2000). Secondly, these individually possessed forms of energy do not overlap with any other known behavioural science concept, such as cynicism and detachment or facets of the self-concept such as self-esteem and self-efficacy. Thirdly, the burnout concept as measured by the SMBM clearly differentiates burnout from its antecedents, from coping behaviours and from likely consequences (Shirom & Melamed, 2005).

The conceptualisation of burnout measured by the SMBM therefore consists of a combination of physical fatigue, emotional exhaustion and cognitive weariness (Shirom, 2003). In this context, physical fatigue refers to feelings of tiredness and low levels of energy in carrying out daily tasks at work, like getting up in the morning to go to work (Shirom & Melamed, 2005). Emotional exhaustion refers to feeling too weak to display empathy to clients or co-workers and lacking the energy needed to invest in relationships with other people at work. Finally, cognitive weariness refers to feelings of slow thinking and reduced mental agility (Shirom & Melamed, 2005).

Therefore, by SMBM's conceptualisation, burnout relates principally to energetic resources (Hobfoll & Shirom, 1993, 2000) and excludes other resources (such as social resources) which could come into play in work settings. Although the conservation of resources theory is considered an individualistic approach, Hobfoll and Freedy (1993) stated categorically that the system within which the individual functions should not be overlooked. In fact Qiao and Schaufeli (2011) pointed out that by labelling the Emotional Exhaustion subscale of the SMBM as Emotional/Interpersonal Exhaustion, Armon, Shirom, Shapira and Melamed (2008) tacitly acknowledge the fact that burnout does not result solely from an individual's energetic resource loss but also from conditions such as interpersonal relationships at work. This interpersonal dimension of burnout has been referred to by Schaufeli, (2003) as mental distance which is involves an individual's detached or insensitive attitude to his work, co-workers, patients or clients.

The Oldenburg Burnout Inventory: The Oldenburg Burnout Inventory (OLBI) (Demerouti et al., 2003) is based on a similar model to the MBI and was developed in Germany. This scale was specifically designed to solve the problem of wording bias that could result from the use of the MBI (Demerouti et al., 2003). The OLBI includes two scales (exhaustion and

disengagement) that can be used to measure burnout in occupations both within and outside the human service professions (Demerouti, Bakker, Nachreiner, & Ebbinghaus, 2002). One of the criticisms of the OLBI is that it uses both positively and negatively phrased items to measure exhaustion and disengagement. This could result in problems of interpretation due to the fact that positive and negative affective states have been shown to have different antecedents (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), may be examined independently (Davis, Zautra, & Smith, 2004), and are represented differently in people's behaviours (Gendolla, 2000) and physiological systems (Davidson, 2000; Wager, Phan, Liberzon, & Taylor, 2003).

The OLBI (in contrast to the MBI, which focuses only on affective components of emotional exhaustion) has items formulated to assess cognitive and physical components of exhaustion. This is in keeping with Shinn's (1982) previous suggestions in the burnout literature. Previous researchers (Demerouti et al. 2001) have confirmed the two-factor structure of the OLBI. However, in a study by Pretorius (2007) the OLBI presented with item loadings that did not correspond with the originally intended factor structure reported by Demerouti et al. (2003). According to Pretorius (2007), the OLBI does not deliver consistent results in terms of construct validity in the South African context. Brand (2006) also reported difficulties with the statistical analysis of the OLBI on a sample of 240 South African insurance employees. According to Brand (2006) there is serious question as to whether the items of the OLBI are properly phrased for use in South Africa. These problems from previous research studies could be due to the fact that the OLBI is a four point scale which creates problem of reliability. Foxcroft and Roodt (2011) stated that measures with higher point scales are more reliable. Pretorius (2007) recommended that further research should be conducted on the appropriateness of the OLBI within the South African context. This research should focus either on developing an alternative measuring instrument or on adapting the current version.

The Copenhagen Burnout Inventory: Kristensen et al. (2005) developed the Copenhagen Burnout Inventory (CBI) in Denmark. The theoretical bases for the CBI are exhaustion and fatigue (Kristensen et al., 2005). A key feature of the CBI is that it differentiates between various domains of burnout (Kristensen et al., 2005). The instrument includes three subscales designed to measure three forms of burnout, which are defined in accordance with the life domain in which they arise. These three subscales are labelled as follows: (1) personal or

generic burnout, measuring the degree of physical and psychological exhaustion experienced by the person, regardless of occupational status; (2) work-related burnout, measuring the degree of physical and psychological exhaustion which is perceived by the person as related to work; and (3) client-related burnout, measuring the degree of physical and psychological exhaustion which is perceived by the person as related to work with clients (Kristensen et al., 2005). The instrument's developers suggest that a researcher should determine which scale to use based on the respondents to be assessed. This instrument is relatively new and therefore not many validation studies have been conducted.

The major limitation of the seven item work-related burnout subscale of this instrument is that although the factor structure of the CBI items suggested that there were different dimensions in work related burnout, these are not specified (Yeh, Cheng, Cheng, Hu, & Kristensen (2007). However, according to Yeh et al. (2007) factor analysis of the CBI suggested that experiences of frustration at work or consequential aversion toward work might be a distinguishable form of work related burnout. The instrument's developers have yet to provide further psychometric support (for instance by using confirmatory factor analyses to test this assumption) for their claim that the three burnout scales are not totally dependent on each other.

In addition, a careful examination of the instrument by the current researcher prior to the start of this research project suggested that the seven-item questionnaire would not be adequate for the purposes of this research. This study was designed to assess the physical, affective and cognitive components of burnout, and the seven CBI items measure were considered not adequate to measure all three conceptualised dimensions, most especially, the cognitive dimension of burnout.

The current study: Based on the review of the abovementioned literature, this study aimed to develop a comprehensive scale to measure burnout. The decision to develop a new instrument rather than adapting an existing one was firstly based on the fact that various limitations existed in each of the previously discussed instruments. Secondly, the information gathered from available literature suggested that burnout should be conceptualised as a multi-dimensional construct that consists of physical, emotional and cognitive components (Kahn, 1990; Schaufeli & Greenglass, 2001; Pines & Aronson, 1988; Shirom, 1989, 2003). Lastly, the developers of the instruments discussed above (MBI-GS,

BM, OLBI, CBI and SMBM) all agree that exhaustion is part of the burnout experience. However, they differ in relation to the dimension of exhaustion that is measured. This study also aimed at exploring whether the burnout construct was basically related to fatigue/exhaustion or whether it includes other dimensions, such as aversion to work. Yeh et al. (2007) have proposed that other dimensions such as aversion to work could be embedded in the factor structure of the CBI, and which is closely related to what has been labelled mental distance or withdrawal (Schaufeli, 2003). This is also necessary considering the fact that the dimensions of burnout experienced by workers would likely differ from one occupational group to another and between socio-economic groups (Yeh et al., 2007). Taking all these factors into account, developing a new, comprehensive instrument seemed to be an appropriate option.

Therefore, for the purposes of the current research project, burnout was viewed as a three-dimensional construct consisting of fatigue (physical component), cognitive weariness (cognitive component) and emotional exhaustion/withdrawal (emotional component). This is in keeping with definitions contained in the literature (e.g. Aronson et al., Shirom, 1989; Shirom & Melamed, 2005). Additionally, because the employees in organisations generally work in teams, emotional exhaustion includes measuring the effect of interpersonal relationships considering the fact that Shirom and his colleagues (see Armon et al., 2008) have recently labelled emotional exhaustion as emotional/interpersonal exhaustion.

Construct equivalence

In developing a new instrument the researchers were cognisant of the fact that this instrument should be suitable for usage on a diverse range of individuals as represented within the South African population. In this regard Rothmann (2003) noted that it is important to use a reliable and valid instrument to measure burnout, regardless of whether the assessment is being done for research purposes or for individual assessment). This is especially true in the multicultural South African context, where most organisations employ individuals with diverse cultural backgrounds. The Employment Equity Act, no. 55 of 1998, Section 8, stipulates that "Psychological testing and other similar assessments are prohibited unless the test or assessment being used (1) has been scientifically shown to be valid and reliable, (2) can be applied fairly to all employees, and (3) is not biased against any employee or group" (Government Gazette, 1998). South African researchers are therefore obligated to

investigate, validate and standardise assessment tools that so that they can be used within the multicultural South African context.

Test users and developers cannot merely assume that scores obtained in one culture within the South African setting can be compared across cultural groups. Before any comparisons are made between scores across cultural groups, equivalence and bias should be established (Van de Vijver & Leung, 1997). This is necessary in order to ascertain the degree to which scores or constructs underlying an assessment tool can be compared across cultures. Bias denotes disparities in a measurement tool that does not have the same meaning within and across cultural groups (Poortinga, 1989). Bias is not intrinsic to a psychological measure but instead results from the use of such a measure in two or more cultures (Van de Vijver & Leung, 2011). In contrast, equivalence refers to the level of comparability of test scores and looks at whether or not scores obtained in different cultures can be meaningfully compared (Poortinga, 1989; Van de Vijver & Leung, 1997). Bias and equivalence are interconnected; the presence of biased items in a measurement is usually a form of inequivalence.

Given that an individual's affiliation in terms of language and cultural groupings can impact the way that individual perceives the environment around him or her, Van de Vijver and Leung (1997) recommended assessing the construct equivalence and bias of instruments in multicultural research settings in order to account for these individual differences. Construct equivalence refers to the extent to which the same construct is measured across the cultural groups under study. Item bias concerns aspects of measurement validity in intercultural group comparisons (Van de Vijver & Leung, 1997). It is therefore important to determine whether the newly developed burnout scale displays appropriate construct equivalence.

In the light of the above, the following hypotheses were set for this study:

Hypothesis 1: Burnout, as measured by the Burnout Scale, is a three-dimensional construct (consisting of fatigue, emotional exhaustion/withdrawal and cognitive weariness)

Hypothesis 2: The Burnout Scale shows high internal consistency.

Hypothesis 3a: Burnout is an equivalent construct for white and black employees.

Hypothesis 3b: Burnout is an equivalent construct for African and Afrikaans language groups.

Hypothesis 4: The Burnout Scale is unbiased for the Afrikaans, Sepedi and Sesotho language groups.

Burnout in different demographic groups

While the focus of the study was validating a Burnout Scale on a sample of South African employees, the influence of demographic variables on burnout within the present sample could not be ignored. An emerging trend over the past decade has been the rapid growth in literature examining the interaction of key individual and environmental factors in developing burnout (Rothmann & Barkhuizen, 2008) such as age, gender, race and employee rank.

According to Maslach et al., (2001), the demographic variable of age is consistently related to burnout probably due to the relationship between age and work experience, thereby indicating that burnout seems to be more of a threat early in an individual's career. Other researchers (Kilfedder, Power, & Wells, 2001; Rothmann & Barkhuizen, 2008; Jackson & Rothmann, 2005a) have found higher levels of burnout among younger employees when compared to their older colleagues.

Some researchers have hypothesised that females tend to experience more burnout compared to males (Maslach et al., 2001). Research findings have however been inconsistent with some researchers reporting higher levels of burnout for women, while others report high levels of burnout for men and others report no gender differences (Maslach et al., 2001). There is a consistent finding that men score higher on cynicism, while their female counterparts score slightly higher on exhaustion; although this could easily be attributed to sex job stereotyping (Maslach et al., 2001). While Rothmann & Barkhuizen (2008) found no significant differences between the burnout levels of gender groups, the follow-up ANOVA analysis showed that the levels of exhaustion, mental distance, and professional efficacy did not differ between the gender groups.

With regards to employee rank, Rothmann and Barkhuizen (2008) and Jackson and Rothmann (2005a) found no significant difference in levels of burnout based on rank. Finally, Coetzee and Rothmann (2004) found that white employees (in comparison to black employees) showed higher levels of exhaustion.

Despite all the studies done in other occupations, showing that demographic variables could affect the burnout level of employees, there is no available literature on the effect of demographic variables on the experienced burnout of employees in agricultural research organisations in South Africa.

In light of the above findings, the following additional hypothesis was set:

Hypothesis 5: There is a significant difference in the burnout levels of participants based on different demographic variables.

RESEARCH DESIGN

The research consisted of an empirical study in the form of quantitative research, the methodology of the study follows.

Research approach

An exploratory research design approach was used to achieve the objectives of this research study as it is the ideal approach to use to examine the reliability, validity, construct equivalence and item bias of a newly developed burnout scale as well as to explore differences in the burnout levels of various demographic groups of employees in an agricultural research organisation. The exploratory design approach is used since the objectives of this research has not yet been investigated in previous research studies (Berg, 2009).

For the purposes of the development of the Burnout Scale, a quantitative research methodology was employed. "In quantitative research, inquiries are usually done by using objective and mechanical measures (for example, psychometric tests, experiments and other scales of measurement) providing numerical data which can be manipulated statistically, and mostly also interpreted according to statistical indices" (Berg, 2009, p. 440). This approach was deemed appropriate for the purposes of the research as it allowed for the development of the Burnout Scale as well as for data gathering. Lastly, a cross-sectional field survey was used to gather the information required to achieve the research objectives. In cross-sectional surveys several groups of participants are examined at one point in time (Salkind, 2009).

Research method

Research participants

The data was collected by means of convenience sampling. The research participants consisted of employees of a South African agricultural research institution. The core mandate of the organisation is to act as the principal agricultural research institution in South Africa so as to conduct research, drive research and development, drive technology development and the transfer (dissemination) of information in order to (1) promote agriculture and related industries; (2) contribute to a better quality of life; (3) facilitate/ensure natural resource conservation; and (4) alleviate poverty ("What we do", 2014). Although participation was voluntary, it was noted that employees from many of the job groups and educational levels in the organisation volunteered to partake in the study. However, the researcher took care to ensure that the participants with the lowest level of education had a literacy level sufficient enough for them to adequately complete the questionnaire. The biographical information for the study's participants is presented in table 1.

Table 1

Biographical information of study participants (N = 443)

Item	Category	Frequency	Percentage
Gender	Male	221	49.9
	Female	217	49.0
	Missing values	*5*	*1.1*
Race	African	247	55.8
	Coloured	19	4.3
	Indian	3	7.0
	White	170	38.4
	Missing values	*4*	*0.9*
Marital status	Single	124	28.0
	Engaged	18	4.1
	Married	232	52.4
	Living together	16	3.6
	Separated/Divorced	24	5.4
	Widow/Widower	16	3.6
	Other	5	1.1
	Missing values	*8*	*1.8*
Language	Afrikaans	165	37.2
	English	21	4.7
	IsiNdebele	5	1.1
	IsiXhosa	6	1.4
	IsiZulu	26	5.9
	Sepedi	64	14.4
	Sesotho	59	13.3
	Setswana	38	8.6
	SiSwati	14	3.2
	Tshivenda	18	4.1
	Xitsonga	8	1.8
	Other	14	3.2
	Missing values	*5*	*1.1*
Age	20-25	28	6.3
	26-30	53	12.0
	31-35	73	16.5
	36-40	60	13.5
	41-45	72	16.3

	46-50	71	16.0
	51-55	37	8.4
	+55	44	9.9
	Missing values	*5*	*1.1*
Education	Grade 9 -11	59	13.3
	Grade 12	60	13.5
	Certificate/Diploma	70	15.8
	Bachelor's degree	44	9.9
	Honours degree	42	9.5
	Master's degree	86	19.4
	PhD	51	11.5
	Other	24	5.4
	Missing values	*7*	*1.6*
Position	Research assistant	124	28.0
	Research technician	122	27.5
	Researcher	110	24.8
	Programme manager/Specialist scientist	17	3.8
	Support staff	62	14.0
	Missing values	*8*	*1.8*

Table 1 illustrates that 49.9% of the participants were males. Over half (55.8%) of the participants belonged to the African racial group. Married individuals comprised 52.4% of the sample. Furthermore, 37.2% of the participants belonged to the Afrikaans speaking group, and 16.5% of the participants were between 31-35 years of age. Approximately one fifth (19.4%) of the participants had Master's Degrees. Research assistants had the highest percentage (28.0%) representation; 44.0% of the participants had been in their positions for between 1 and 5 years while 34.3% of the participants had been employed in the organisation for between 1 and 5 years.

Measuring instruments

A biographic questionnaire was developed to gather information about the demographic characteristics of the participants. These included the participants' gender, race, marital status, home language, age, education, unit, position, number of years in the present position and number of years in the organisation.

A self-developed Burnout Scale (with items specially formulated for the purpose of this research) was used to measure the burnout of employees within the agricultural sector. The initial scale consisted of 20 items specially designed to measure the Fatigue (6 items, e.g. I feel weak while at work), Emotional Exhaustion/withdrawal (7 items, e.g. I am not affected by how other people at work feel) and cognitive weariness (7 items, e.g. I can't think clearly while at work) of burnout. The items were scored on a seven point frequency scale ranging from 1 (never) to 7 (always). Likert scales are best utilised when responses are expressed as a numerical value (Dyer, 2006). An odd number of divisions (7 point) were used instead of an even number to avoid respondents making a forced choice (Dyer, 2006). Furthermore, as

pointed out by Foxcroft and Roodt (2011), having as many as 7 point response groups will not only increase the array of score but also the reliability coefficient. This choice is also in line with Foddy (1994) (as cited by Pearce, 2011) who recommends that a minimum of seven categories is required to ensure scale validity and reliability.

The development of the burnout scale

A thorough study of the available literature on burnout was conducted in order to develop a scale to measure burnout amongst employees in the agricultural sector. The information gathered from available literature suggested that burnout should be conceptualised as consisting of physical, emotional and cognitive components. Based on the literature items were formulated to assess each of these components. For example, the item "I feel weak while at work" was developed for the physical component. Once the items were developed they were sent to three Industrial Psychology experts, (who have worked extensively on the burnout construct) for review. The reviewers checked for the following: (1) face validity to ensure that all the items measure the burnout construct; (2) ambiguity of words used to construct the items in order to ensure better understanding of the items; (3) double barrelled questions to ensure that there was only one indicator in each item; (4) use of contractions such as don't instead of do not; and (5) use of frequency indicators (e.g. sometimes) already included in the Likert scale.

A pilot survey was conducted with employees from the same organisation where the survey was to be conducted. These employees were from the same job groups and educational level as those employees to be included in the final survey. The purpose of the pilot survey was to evaluate the item content to determine which items the respondents found difficult to understand and to determine whether the instructions were clearly understood by the respondents. The respondents reported no difficulties understanding the content of the items and instructions.

Research procedure

A South African agricultural research organisation was approached to be part of the study and permission was requested to conduct the current study. The research process commenced upon receipt of written permission from the director of human resources of the organisation to conduct the research. A letter requesting participation in the survey was then emailed to employees within the organisation. The letter explained the objective of the survey, which

was to investigate in the agricultural research sector. Specifically, the study aimed to investigate the levels of wellness and how employees personally evaluate different aspects of their work and work environment.

Questionnaires were personally distributed by the researcher to 511 participants who indicated their willingness to participate in this study. The questionnaires were collected by the researcher following a six week period. This gave respondents ample time to complete the questionnaire. However, because of the respondents' very busy schedules, some of the employees were unable to find time to complete the questionnaire. A total of 472 questionnaires were returned, representing 92% response rate. However, 29 of the 472 questionnaires collected were improperly completed and were therefore unusable for data analysis.

Statistical analysis

The statistical analysis was carried out with SPSS program (IBM SPSS statistics, version 21). In the first step, means, standard deviations, skewness and kurtosis were determined to describe the data. A cut-off point of >2.00 was set for skewness and >4.00 for kurtosis to ensure that the data was normally distributed. The reliability and validity of the Burnout Scale were also determined through means of Cronbach alpha coefficients, as well as exploratory factor analysis. Exploratory factor analysis approach was used in this research instead of confirmatory factor analysis (CFA) approach because it is the logical method to use in "the development of a new assessment measure" (Byrne, 2005, p.17), especially in the instance where the developer will have constructed items designed to measure particular constructs underlying this instrument, but he or she has no knowledge of the extent to which such scale items in fact meet this expectation (Byrne, 2005, p.17), while CFA is best used when the instrument has undergone considerable investigation of its psychometric properties over time (Byrne, 2010). Nunnally and Bernstein (1994) recommended a guideline of .70 as an acceptable guideline for determining the internal consistency of an instrument. It is important for a measuring instrument to have an acceptable alpha coefficient as this is crucial for making decisions as to whether the items measure a similar construct.

A simple principal components analysis was first conducted on the items of the Burnout Scale for the total sample. The eigenvalues, scree plot and parallel analysis were studied to

determine the number of factors. Subsequently, a direct Oblimin rotation was used to determine the solution for the total sample. Factors were retained based on the following criteria: (1) the item loadings were above .32; (2) the items loaded on only one factor indicating that there is no overlap of factors or components; (3) each factor had at least three substantive item loadings; and (4) the retained factor was theoretically meaningful. (Tabacknick & Fidell, 2001). The reliability for the total sample was determined by Cronbach alpha coefficients.

Construct equivalence was examined for language and racial groups. A simple principal component analysis with a direct Oblimin rotation was then computed for each language and racial group. The same criteria used to retain factors for the total sample were applied for the racial and language groups. Based on the composition of the sample it was decided to conduct the analysis for construct equivalence on race groups and on the Afrikaans and African languages rather than on all the different language groups in the sample. Although the best approach would have been to compare the African languages separately the sample sizes of the language groups were not sufficiently large to satisfy the assumptions of the statistical techniques that were employed. However, evaluating the construct equivalence of both racial and linguistic groups and item bias for Afrikaans, Sepedi and Sesotho language groups offered some level of cultural comparison in relation to both racial and linguistic groupings. Construct equivalence can be investigated with several techniques, such as factor analysis, cluster analysis, and multidimensional scaling or other dimensionality-reducing techniques (Van de Vijver & Leung, 1997). However factor analysis is the most frequently employed technique for studying construct equivalence; this study therefore made use of exploratory factor analysis to examine construct equivalence. A principal component analysis with a direct Oblimin rotation was used to determine the solution for each cultural (linguistic and racial) group. Factors obtained (after factor analysis) in each racial and linguistic group were compared (after target rotation).

According to Van de Vijver and Leung (1997) the comparison between the similarities of the factor structure of two cultural groups could be underestimated as a result of the arbitrary spatial distribution of factors through factor analysis. It is therefore suggested that target rotation be conducted prior to comparing the factor solutions of cultural groups by rotating the factor loading matrices with regard to each other in order to significantly improve the agreement between the factors. While carrying out this procedure, one group is arbitrarily

assigned to be the target group, and the factor loadings of the other group are rotated towards the target group to form a common factor matrix. Within this study the agreement was evaluated through the use of a factor congruence coefficient, Tucker's phi (Van de Vijver & Leung 1997). According to this statistic values above .90 are taken to point to essential agreement between cultural groups, while values above .95 point to very good agreement.

The items were tested for differential item functioning (item bias) using conditional analysis of variance, which is an application of Cleary and Hilton's (1968) ANOVA (Van de Vijver & Leung, 1997, 2011). Although different statistical methods are available for analysing item bias, ANOVA was used in this study because of its inherent advantages. These advantages include computational ease, robustness and the possibility of studying both uniform and non-uniform bias (Mellenbergh, 1982). The comparison was made between the three language groups that had the highest number of participants (i.e. Afrikaans, Sepedi and Sesotho). Each item was examined for bias separately. The language groups (three levels) and score levels were the independent variables while the score for the item was the dependent variable.

Score levels were calculated using the total score on the Burnout Scale. According to Van de Vijver and Leung (1997) when determining score groups, minimum and maximum score groups should not be considered because the responses of all the respondents would essentially be alike throughout the groups thereby, making it 'impossible' to study bias. Score levels were calculated using the total score on the Burnout Scale while excluding all minimum and maximum obtainable scores. A total of four levels were attained by making use of percentiles identified through SPSS. Using this method made it possible to use score groups with at least 50 persons in each group (Van de Vijver & Leung, 1997). Two effects were tested: (1) the main effect of language; and (2) the interaction of score level and language. When the main effect of language was significant the item was taken to have uniform bias. When the interaction of score level and culture was significant, the item was taken to have non-uniform bias. Pallant (2010) recommended that when the assumption of equality of error variances is violated in ANOVA univariate analysis (with two independent variables) the significance level should be set to .01. When any item is statistically significant for uniform or non-uniform bias, the effect size is examined to determine whether or not the obtained results are of practical importance. A cut off point of .50 (medium effect) was set for practical significance in this research (Cohen, 1988).

Multivariate analysis of variance (MANOVA) was used to determine the significance of differences between the burnout of demographic groups. MANOVA tests whether mean differences among groups on a combination of dependent variables are likely to have occurred by chance (Tabachnick & Fidell, 2001). In MANOVA a new dependent variable that maximizes group differences is created from the set of dependent variables. Wilks's Lambda is used to test the "likelihood of the data under the assumption of equal population mean vectors for all groups against the likelihood under the assumption that the population mean vectors are identical to those of the sample mean vectors for the different groups" (Tabachnick & Fidell, 2001, p. 348). When an effect is significant in MANOVA one-way analysis of variance (ANOVA) is used to discover which dependent variables have been influenced (Pallant, 2010). Because multiple ANOVAs were used a Bonferoni-type adjustment was used to control for inflated Type I error (Field, 2009). Games-Howell tests were also conducted to indicate which group differed significantly when ANOVAs were conducted (field, 2009). According to Cohen (1988) when determining practical significance, .10 – .50 indicates a small effect; .50 – .80 indicates a medium effect and above .80 indicates a large effect. In terms of the current research, a cut-off point of .50 (medium effect) was set for the practical significance of the differences between group means.

Ethical considerations

The ethical aspects of this research relate to obtaining written permission from the director of human resources of the organisation and seeking permission from the management of the institute and receiving consent from the participants in the study. Further ethical considerations that were appropriate for this study included voluntary participation, informed consent, and confidentiality. Voluntary participation means that no participant was coerced into completing the questionnaire; while the prospective research participants were also fully informed about the procedures and risks involved in research and gave their consent to participate (cf. Trochim & Donnelly, 2008). Lastly, the participants were assured that identifying information will not be made available to anyone who is not directly involved in the study (cf. Trochim & Donnelly, 2008).

RESULTS

The first step in the data analysis involved examining the descriptive statistics of the initial 20 items which is reported in Table 2 below.

Table 2

Descriptive Statistics of the Initial 20 Burnout Scale Items (N =443)

Item	Mean	Std. Deviation	Skewness	Kurtosis
BS_1	3.03	1.31	0.05	-0.50
BS_2	2.55	1.37	0.67	-0.08
BS_3	2.30	1.31	0.91	0.35
BS_4	3.38	1.25	-0.30	-0.52
BS_5	2.29	1.18	0.65	-0.08
BS_6	2.28	1.34	1.04	0.82
BS_7	2.20	1.32	1.20	1.35
BS_8	2.08	1.28	1.55	2.70
BS_9	2.52	1.17	0.64	0.21
BS_10	2.97	1.66	0.47	-0.60
BS_11	2.36	1.46	1.08	0.80
BS_12	2.71	1.44	0.66	0.03
BS_13	2.27	1.29	0.98	0.71
BS_14	2.03	1.19	1.21	1.32
BS_15	2.13	1.27	1.15	1.17
BS_16	2.27	1.22	0.87	0.54
BS_17	2.23	1.33	1.09	0.97
BS_18	2.01	1.27	1.55	2.41
BS_19	2.14	1.25	1.14	1.16
BS_20	2.02	1.16	1.38	2.36

Table 2 displays the descriptive statistics for the initial 20 items of the Burnout Scale. The results indicated that none of the items had kurtosis which exceeded 4.00 or skewness which exceeded 2.00. This implies that none of the items deviated from the normal distribution, which would have indicated the presence of clustering of scores.

All 20 items of the Burnout Scale were therefore used as input for principal component analysis to determine the number of components that could be extracted. The results are presented next in Table 3 and the scree plot follows in Figure 1.

Table 3

Eigenvalues of the 20-item Burnout Scale (N = 443)

	Total Variance explained					
Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.70	43.52	43.52	8.70	43.52	43.52
2	1.71	8.53	52.05	1.71	8.53	52.05
3	1.30	6.50	58.55	1.30	6.50	58.55
4	0.88	4.38	62.94			
5	0.77	3.85	66.79			
6	0.73	3.66	70.45			
7	0.65	3.26	73.71			
8	0.62	3.10	76.80			
9	0.59	2.93	79.74			
10	0.56	2.82	82.55			
11	0.52	2.61	85.16			
12	0.45	2.27	87.43			
13	0.41	2.05	89.48			
14	0.40	2.02	91.50			
15	0.36	1.78	93.28			
16	0.33	1.65	94.93			
17	0.30	1.52	96.45			
18	0.28	1.39	97.84			
19	0.25	1.25	99.09			
20	0.18	0.92	100.00			

According to Table 3, the Eigenvalues indicated that three factors that explained 58.55% of the variance could be extracted from the Burnout Scale. The scree plot (Figure 1) was then inspected and are indicated as follows:

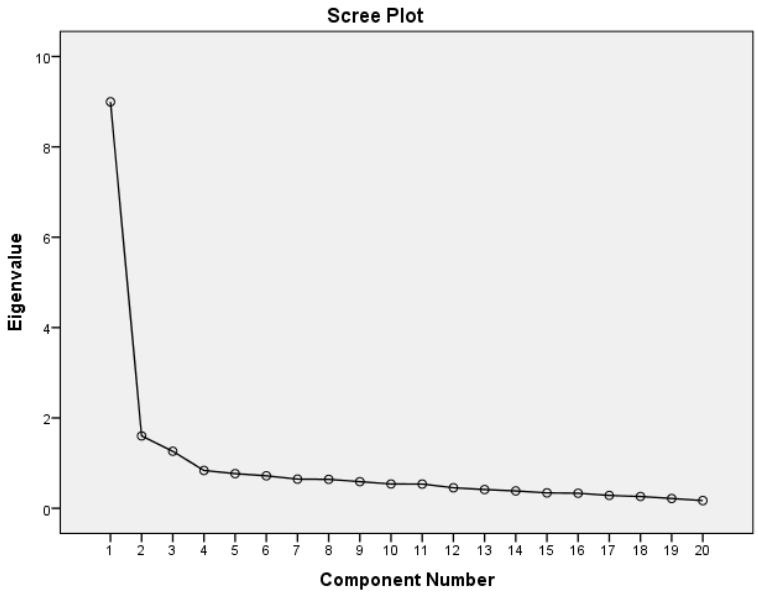


Figure 1: Scree plot of the Burnout Scale items

Figure 1 shows a break between the third and fourth component, indicating that three factors could be extracted.

Parallel analysis was also conducted to compare the eigenvalues obtained from the principal component analysis with those of a randomly generated data set of the same kind. The results of this analysis are presented in Table 4.

Table 4

Parallel Analysis of the 20-item Burnout Scale (N = 443)

Eigen value	Random Eigen value	Standard Deviation
1	1.40	0.04
2	1.33	0.03
3	1.27	0.03
4	1.22	0.02
5	1.18	0.02
6	1.14	0.02
7	1,11	0.02
8	1.07	0.02
9	1.04	0.02
10	1.00	0.02
11	0.97	0.02
12	0.94	0.02
13	0.91	0.02
14	0.88	0.02
15	0.84	0.02

16	0.81	0.02
17	0.78	0.02
18	0.75	0.02
19	0.71	0.02
20	0.66	0.02

The results for the parallel analysis presented in Table 4 indicate that three factors could be extracted when the initial Eigenvalue from the SPSS analysis (1.30) was compared to the random Eigenvalue from the parallel analysis (1.27). Taking all three indicators into account, three factors were therefore extracted from the data.

A principal component analysis with a direct Oblimin rotation was then conducted on the total sample and are presented next in Table 5.

Table 5

Factor Loadings of the Initial 20-item Burnout Scale Items (N = 443)

Item		**F1**	**F2**	**F3**
BS_1	I feel weak while at work.	-.02	.75	.05
BS_2	I do not have enough energy to carry out my daily tasks.	.11	.71	.08
BS_3	I do not have the energy to go to work in the morning.	.08	.73	.04
BS_4	I feel exhausted at the end of a working day.	.04	.72	-.04
BS_5	I feel emotionally exhausted at work.	.10	.76	-.03
BS_6	My work makes me feel weary.	.13	**.43**	**.35**
BS_7	I do not feel like building relationships with my co-workers.	.00	-.04	.84
BS_8	I lack the energy to build relationships with people at work.	.07	.05	.73
BS_9	I feel I am less connected to my work.	-.03	.13	.69
BS_10	I feel frustrated at work.	-.13	**.37**	**.56**
BS_11	I am unable to imagine the feelings of my co-workers.	.16	.08	.54
BS_12	I am not emotionally affected by how other people at work feel.	-.03	-.02	.66
BS_13	I am not excited about my job.	.23	-.23	.62
BS_14	I do not think clearly while at work.	.65	.22	.08
BS_15	I cannot concentrate while at work.	.70	.19	.06
BS_16	I struggle to process problems quickly.	.67	.07	.07
BS_17	The thought of the work I have to do makes me tired.	**.50**	**.34**	.12
BS_18	I find it difficult to learn new things on my job.	.81	-.13	.07
BS_19	I find it difficult to think about complex things while at work.	.89	-.08	-.05
BS_20	I am not focused while working.	.65	.20	-.02

* Items in bold indicate items that loaded on more than one factor.

Table 5 shows that three items (items BS_6, BS_10, and BS_17) proved problematic as they cross loaded on two factors. These items were subsequently excluded from further analyses.

The factor loadings following the deletion of the three cross loaded items are shown in Table 6.

Table 6

Pattern Matrix of the 17-Item Burnout Scale for the Total Sample

Factor	**Item nr**	**Item**	F	h^2
F1	BS_14	I do not think clearly while at work.	.66	.69
	BS_15	I cannot concentrate while at work.	.72	.71
	BS_16	I struggle to process problems quickly.	.69	.57
	BS_18	I find it difficult to learn new things on my job.	.78	.63
	BS_19	I find it difficult to think about complex things while at work.	.89	.70
	BS_20	I am not focused while working.	.67	.57
F2	BS_1	I feel weak while at work.	.77	.61
	BS_2	I do not have enough energy to carry out my daily tasks.	.71	.65
	BS_3	I do not have the energy to go to work in the morning.	.75	.64
	BS_4	I feel exhausted at the end of a working day.	.72	.52
	BS_5	I feel emotionally exhausted at work.	.77	.65
F3	BS_7	I do not feel like building relationships with my co-workers.	.79	.65
	BS_8	I lack the energy to build relationships with people at work.	.75	.65
	BS_9	I feel I am less connected to my work.	.66	.53
	BS_11	I am unable to imagine the feelings of my co-workers.	.52	.46
	BS_12	I am not emotionally affected by how other people at work feel.	.72	.46
	BS_13	I am not excited about my job.	.66	.50

Table 6 shows that three factors, labelled cognitive weariness (F1), fatigue (F2) and emotional exhaustion/withdrawal (F3), could be extracted. This supports hypothesis 1 and suggests that burnout consists of three factors. The communalities of the obtained three factors ranged between .46 and .71.

Next, in Table 7, descriptive statistics, reliability and Pearson correlation of the factors are presented.

Table 7

Descriptive Statistics, Rreliability and Pearson Correlation of the Factors

Factor	**Mean**	**SD**	**Skewness**	**Kurtosis**	**1**	**2**	
Cognitive Weariness	12.40	5.56	0.79	-0.03	(.88)		
Fatigue	13.54	5.04	0.27	-0.35	.559**	(.85)	
Emotional Exhaustion/ Withdrawal	14.02	5.54	0.57	-0.35	.632**	.491**	(.82)

** Correlation is significant at the .01 level (2-tailed).

++ Correlation is practically significant r> .50 (medium effect)

(Take note: Alpha coefficients indicated on the diagonal)

Table 7 shows that the three Burnout Scale factors are normally distributed. It also indicates that all three of the obtained factors from the Burnout Scale are reliable using the guideline of $\alpha > .70$, as suggested by Nunnally and Bernstein (1994). The Cronbach alpha results for the three factors were .82, .85 and .88. The results further provide support for hypothesis 1, indicating that the measuring instrument shows high internal consistency. The results also show that fatigue correlated practically and significantly with cognitive weariness (r = .56, large effect) and emotional exhaustion/withdrawal (r = .49, large effect); while emotional exhaustion/withdrawal was significantly and practically related to cognitive weariness (r = .63, large effect).

Following the deletion of the three cross-loaded items, a principal component analysis with a direct Oblimin rotation was again conducted on the different racial and language groups. Thereafter, the obtained pattern matrices were used as input for target rotation. Three factors, labelled cognitive weariness, fatigue and emotional exhaustion/withdrawal, with acceptable Tucker's phi coefficients (> .90), could be obtained from white and black employees, as well as from the African and Afrikaans language groups. The Tucker's phi value for cognitive weariness was .94 in both instances; which suggests essential agreement between the respective racial groups on the one hand and the two language groups on the other (cf. Van de Vijver & Leung, 1997). Fatigue and emotional exhaustion/withdrawal had Tucker's phi values of >.95, indicating again very good agreement firstly between the respective racial groups, as well as very good agreement between the language groups (cf. Van de Vijver & Leung, 1997). These results indicate that the same construct of burnout was measured in the two racial groups (confirming Hypothesis 3a) and the two language groups (confirming Hypothesis 3b).

The differential item functioning statistic (DIF) was computed for Afrikaans, Sepedi and Sesotho participants where none of the items for cognitive weariness, fatigue and emotional exhaustion/withdrawal tested significant for both uniform and non-uniform bias. This lends support to Hypothesis 4, which suggests that the Burnout Scale is not biased against any of the Afrikaans, Sepedi and Sesotho language groups.

Preliminary assumption checking was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity. As no serious violations were noted with regard to these criteria, MANOVA was then used to determine differences between demographic groups with regard to job demands and resources. The demographic groups included were gender, race, marital status, age, education, years in research institution and years in position. An analysis of Wilks' Lambda values suggested the existence of statistically significant differences for age category *(F* = 2.50, *p* = .000), education *(F* =2.03, *p* =.005) and years in position (*F* = 1.82, *p* = .023). However, when the results for the dependent variables were examined separately using a Bonferroni adjusted level of .017, only one dependent variable for age (fatigue; F2) recorded a significance value less than the cut-off *(F* = 2.65, *p* = .014). This shows that there was a statistically significant difference in burnout in relation to the age of the employees, but no statistically significant differences in relation to marital status, education and years in position. Hypothesis 5 was therefore partially accepted.

An ANOVA was then performed to further investigate the relationship between the dependent variable (fatigue) and the age of the employees as measured by the Burnout Scale. Participants were divided into eight groups according to their age (20-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55 and +55). There was a statistically significant difference at the $p < .05$ level in fatigue scores for the groups based on age: *F* (2.478) = 4.4, *p* = .019. However, despite the fact that it was statistically significant, the actual difference in mean scores between the groups was relatively small. The effect size calculated using Eta squared was .03. Post-hoc comparisons using Games-Howell indicated that the mean score for employees within the 20-25 group (*M* = 11.32, *SD* = 3.32) was significantly lower than that for the 31-35 *(M* = 13.81, *SD* = 4.11), 36-40 (M = 14.32, SD = 5.32) and 46-50 (*M* = 14.66, *SD* = 5.41) age groups.

DISCUSSION

The main objectives of this research study were to (1) give an overview of the current burnout measures being used in literature, (2) identify potential gaps within these measures, (3) address these gaps through the development of the Burnout Scale, (4) investigate the psychometric properties of the Burnout Scale on a South African sample of employees, (5) examine the construct equivalence of the newly developed measure for usage on a diverse range of employees within South Africa, and (6) explore whether demographic variables influenced the degree of burnout within South African employees.

The findings of the study confirmed the three-factor model of burnout, with the three factors labelled cognitive weariness, fatigue and emotional exhaustion/withdrawal. The findings are similar to some existing burnout measures. With regard to the first factor labelled fatigue, Enzmann et al. (1998) obtained a similar factor from the Burnout Measure, which they also labelled fatigue. This factor obtained by Enzmann et al. also comprised physical and emotional aspects of burnout as found in this study. Furthermore, fatigue is closely related to the exhaustion subscale of the MBI-GS (Schaufeli et al., 2001) and the OLBI (Demerouti et al., 2003). The exhaustion subscale of the MBI-GS consists of items that primarily relate to the affective component of exhaustion, while that of the Burnout Scale includes physical tiredness. On the other hand, the OLBI exhaustion subscale measures physical, emotional and cognitive exhaustion.

The second factor, labelled emotional exhaustion/withdrawal, found in the current study, included items that combine not only the emotional exhaustion component as proposed in SMBM, but also measure interpersonal aspects of exhaustion, whereas the SMBM items assess only the depletion of the individual's affective energetic reaction to chronic work stress (Qiao & Schaufeli, 2011). Furthermore, the emotional exhaustion/withdrawal dimension includes the employees' detached attitude to work, while the MBI-GS cynicism scale measures only the employees' detached attitude to work.

The cognitive weariness subscale measures a state of slow thinking and reduced mental agility as conceptualised by the SMBM (Shirom & Melamed, 2005). Although Pines and her colleagues, and Shirom and Melamed (2005) theorised this in the BM and SMBM

respectively, they did not obtain a separate factor measuring cognitive weariness. All three these subscales in this research study proved to be highly reliable.

The current study's finding regarding the construct equivalence of burnout (as measured by the Burnout Scale) for racial groups is in keeping with the findings reported by Storm and Rothmann (2003), who found construct equivalence for the MBI-GS for white and black employees. It can be deduced that the same construct of burnout can be measured in the two groups (Van de Vijver & Leung, 1997). Construct equivalence was also found for the three dimensions of the Burnout Scale (cognitive weariness, fatigue and emotional exhaustion/withdrawal) for the Afrikaans and African language groups. Jackson and Rothman (2005a) also found equivalence in the burnout construct during their study of the adaptation of MBI-GS for Afrikaans and African language-speaking educators. However, Jackson and Rothmann's (2005a) assessment of burnout was based on an adapted model of the MBI-GS that consisted of exhaustion, cynicism/depersonalisation (which merged into mental distancing) and professional efficacy.

Differential item functioning (item bias) was investigated for the Afrikaans, Sepedi and Sesotho groups and the results indicated that no items had uniform or non-uniform bias. The Burnout Scale therefore meets the stipulation that any instrument that is to be used in a multicultural setting with diverse linguistic and racial groups should not contain items that are biased against cultural groups (Van de Vijver & Rothmann, 2004; Van de Vijver & Leung, 1997).

Differences in the fatigue levels of employees from different age groups were found where employees who were between the ages of 20 and 25 scored significantly lower than those who were aged between 31 and 35, 36 and 40, and 46 and 50. This finding is in contrast with findings in previous studies. Jackson and Rothmann (2005a) found that employees between 45 and 50 years of age experienced lower scores than younger employees (aged below 27 years of age). In this study, it was hypothesised that the lower fatigue levels of employees aged between 20 and 25 years of age could be accounted for by the fact that workers tend to take on greater family responsibilities and work overload as they age (Osipow, Doty, & Spokane, 1985). This finding is also supported by the finding of Ekstedt *et al.* (2006), who found that fatigue in occupational burnout may be attributed to variables external to the work environment such as disturbed sleep.

The findings of this study provide information regarding the burnout levels of employees in an agricultural research institution (based on different demographics). These findings could serve as a reference for both practitioners and researchers to plan interventions. The evidence provided in this research with regard to the validity and reliability of the Burnout Scale suggests that the Burnout Scale could be used to reliably assess burnout within the agricultural research sector. Likewise, the Burnout Scale could be used to measure the level of burnout of other knowledge workers, specialists and/or workers working within similar research institutions where the general aim is also to conduct research, drive research and development, drive technology development and transfer (disseminate) information. Especially since the items in the Burnout Scale are not sector specific and therefore should have more generalisability to other organisations.

The development of this instrument therefore opens up a range of possibilities concerning burnout research in South Africa and beyond as it provides researchers with an instrument that could be used to measure the relationship between the three subcomponents of burnout (cognitive weariness, fatigue and emotional exhaustion/withdrawal) and other psychological variables.

Limitations

A limitation of this study is the composition of the sample in terms of cultural groups, which made it not possible to examine construct equivalence for coloured and Indian employees as well. In addition, the language grouping could also have been used to test for construct equivalence had the sample been large enough to justify the statistical method used. Another limitation is the use of self-report measures. The use of self-report measures is known to result in common method variance problems, although researchers are yet to agree fully on whether or not this poses problems for research (Spector, 2006; Tremblay & Messervey, 2011).

Recommendations

Based on the findings of this study, it is recommended that the Burnout Scale be used to assess the burnout levels of employees in agricultural research institutions in South Africa. Although evidence was found for the validity and reliability of the Burnout Scale in this study, it is also recommended that further research be undertaken to assess the validity and reliability of the Burnout Scale in other sectors and research institutions in South Africa.

Additionally, Confirmatory Factor Analysis using Structural Equation Modelling can be used to investigate the factor structure of the Burnout Scale. Further studies should also test the construct equivalence of the instrument for the various cultural groups. It is also recommended that longitudinal research studies that allow inferences regarding cause and effect with regard to the burnout construct be carried out in future research. Future studies could also be done using a stratified random-sample design where the researcher would pre-organise the sampling frame into various groups according to levels of the variables that could be important to the research. Using this sampling method would ensure maximising the probability that all cultural groups are adequately represented in the research sample. Lastly, it is also recommended to investigate the differences between groups in the experience of burnout using the Burnout Scale.

CHAPTER 4: ARTICLE 3

A model of well-being of employees in a South African agricultural research organisation

ABSTRACT

Orientation: Research to obtain insight into the well-being of employees in a South African agricultural research organisation is necessary.

Research purpose: The objectives of this study were to assess the relationship between job demands, job resources, psychological conditions, burnout, and work engagement among employees in a South African agricultural research organisation.

Motivation of the study: Little is known about the relationship between psychological conditions and well-being constructs. Research is needed on the indirect effects of job demands and job resources on well-being via psychological conditions.

Research design, approach and method: A cross-sectional study was conducted among 443 employees in an agricultural organisation. The measuring instruments included an adapted Job Demands Resources Scale, the Psychological Conditions Scale, the Burnout Scale and the Work Engagement Scale.

Main findings: The results confirmed a model in which (1) job demands (overload) and a lack of resources contributed to burnout, and (2) job resources contributed to work engagement. Psychological availability and meaningfulness mediated the relationship between job demands and burnout. The relationship between job resources and work engagement was mediated by psychological meaningfulness, safety and availability. Furthermore, the relationship between job resources and burnout was mediated by all three psychological conditions.

Practical/managerial implications: The psychological conditions of meaningfulness, safety and availability provides framework to understand the levels of burnout and engagement of employees and should therefore be considered when interventions to promote well-being are planned.

Contribution/value-add: This study contributes to available literature by providing information on the relationship between job characteristics (Job demand and resources), psychological conditions and well-being constructs among employees in a South African agricultural research organisation.

Keywords: work engagement, burnout, psychological conditions, job demands, job resources

INTRODUCTION

Employees generally engage in job activities that are meaningful to them as individuals and also to accomplish different physical and psychosocial obligations (Bergh, 2006). Employees' psychological connection with their work has recently been given much attention in different sectors of the economy (Bakker, Albrecht, & Leiter, 2011). It is imperative that organisations not only employ high achievers, but also inspire and empower employees to attain their potential, in order to compete favourably (Bakker et al., 2011). This is important, because organisations are constantly faced with a number of new challenges (such as internationalisation and global competition, technological advances, and changing workforces (Dewey & Cooper, 2012).

Agricultural research organisations in South Africa often experience problems in recruiting employees who are adequately qualified (Agricultural Research Council, 2008). On the other hand, employees in agricultural research organisations often experience unanticipated crisis situations (usually in the form of the control of weeds, pests and diseases) while carrying out their research activities on plants and animals (Saayman-du Toit, 2002). This could ultimately put undue pressure on available employees with regard to their workload.Overload is a common stressor in most organisations (Boyd et al., 2011; De Beer, Rothmann & Pienaar, 2012). The negative consequence of excessive workloads on the well-being of employees has been well publicised in burnout literature, mainly stating that overload (having too much work to do within the time available) may result in burnout that may consequently result in ill health (Schaufeli & Bakker, 2004). Therefore, investigating the effects of overload on the well-being of agricultural employees is of paramount importance.

With regard to resources, South African agricultural research organisations face challenges of modernising laboratories and equipment for effective research on new crops, animals and new techniques (ARC, 2005). These challenges are further compounded by the fact that employees are expected to compete globally and to keep abreast with changes in technology (ARC, 2009). When organisational challenges are not properly handled, these could result in dire repercussions on the well-being of the individual and the organisation (Schaufeli & Bakker, 2004). Organisations (such as the agricultural organisations) are therefore faced with the challenge of addressing these characteristics of the work environment that may potentially

be inimical to the well-being of individuals as well as the organisations (Le Fevre, Kolt, & Matheny, 2006).

In order to effectively address these challenges, it is imperative that the different stakeholders are aware of the variables that might come into play with regard to the well-being of employees. Two concepts, i.e. burnout and work engagement, are well-being-related concepts that have been extensively researched in literature (Bakker et al., 2011; Schaufeli, Leiter & Maslach, 2009).

Research on burnout and engagement has mostly been done from two perspectives, namely by studying the work activities as referenced through the Job Demands Resources model (JD-R); (Bakker & Demerouti, 2007; 2008; Schaufeli & Bakker, 2004) and by incorporating psychological conditions into the JD-R model. Studies in the latter category have mostly used the Self Determination Theory (SDT) (Deci & Ryan, 2000) to investigate the role of the satisfaction of basic needs in the relationship between job demands, job resources and well-being constructs (burnout and work engagement). However, the model of Kahn (1990) conceptualised engagement or disengagement as an extension of the self, through the psychological conditions of meaningfulness, safety and availability.

According to the work activities reference model, job demands and resources could affect the level of well-being of employees. The Demand Induced Strain Compensation (DISC) expands on the JD-R model. The model proposes that the interactional effect of demands and resources should be noted when there is a match between the type of demands, resources and outcomes (De Jonge & Dormann, 2003). In other words, if there are high emotional demands, there should be sufficient emotional resources; inversely, if there are high emotional demands, but low emotional resources, poor well-being will result. Applying this to the present study, when employees are faced with job demand in the form of overload they would require appropriate resources to cope with the demand to avoid negative outcomes.

Previous researchers (e.g. Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Maslach, Schaufeli, & Leiter, 2001; Schaufeli & Bakker, 2004) observed that burnout is specifically related to job demands, whilst engagement is specifically related to job resources. Empirical evidence from most South African studies (e.g. Buys & Rothmann, 2010; Rothmann & Jorgensen, 2007, Visser & Rothmann, 2008) showed that job demands such as overload

(which results from experienced workload and time pressure) contribute to burnout. Previous studies indicate that different job resources, most commonly learning/growth opportunities (Bakker & Bal, 2010; Bakker, van Emmerik, & Euwema, 2006; Buys & Rothmann, 2010; Coetzer & Rothmann, 2007), organisational support (Coetzer & Rothmann, 2007; Rothmann & Joubert, 2007) and autonomy/job control (Albrecht, 2010; Bakker & Demerouti, 2008; Schaufeli & Salanova, 2007; Koyuncu, Burke, & Fiksenbaum, 2006), are positively related to work engagement, indicating that employees who have adequate resource have higher engagement levels. Learning/growth opportunities refer to planned efforts aimed at facilitating employee acquisition of knowledge, skills and abilities that enhance the employee's ability to meet job requirements (Noe, Hollenbeck, Gerhart & Wright, 2010). Organisational Support refers to the relationship with the supervisor, ambiguities regarding work, information, communication, participation and contact possibilities (Jackson & Rothmann, 2005b). Perceived organisational support creates the feeling in employees that the "organisation values their contribution and cares about their well-being" (Eisenberger, Huntington, Hutchison & Sowa, 1986, p. 501). Control refers to how much employees can influence their own work situation, e.g. the methods they apply and the order in which tasks are handled. (Taris, Stoffelsen, Bakker, Schaufeli, & van Dierendonck, 2005). Studies also indicate that a lack of resources, such as a lack of career or growth opportunities on the job (Rothmann & Jorgensen, 2007; Visser & Rothmann, 2008), organisational support (Rothmann & Jorgensen, 2007) and control (Jackson & Rothmann, 2005b) contribute strongly to burnout.

Job demands and resources present a situational context to explain the effect of psychological conditions on well-being as they are associated with individual psychological processes (i.e. the motivational relationship between job resources and employees' work engagement, as well as the energetic associations between job demands, job resources and burnout (Schaufeli & Bakker, 2004). Researchers (e.g. Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008), who studied the effect of psychological conditions on well-being within the JD-R framework, used the SDT approach, and found that job demands and resources indirectly affect employee engagement via satisfaction (or dissatisfaction) of the psychological needs of competence, autonomy and relatedness.

However, the role of psychological conditions in the JD-R model as conceptualised by Kahn (1990) has not been fully studied. Attempts have been made by previous researchers (e.g.

Oliver & Rothmann, 2007; Rothmann & Buys, 2011; Rothmann & Welsh, 2013) to incorporate psychological conditions as conceptualised by Kahn (1990) into the JD-R model. One major limitation of these studies, however, is that the burnout (disengagement) construct and *psychological safety* have been excluded. Psychological safety, meaningfulness and availability are constructs which are embedded in the context of relationships at work (Kahn & Heaphy, 2014). Relationships influence the manner in which work is performed as well as how individual employees and work teams interact to get work done (Bechky, 2006) and ultimately the level of engagement of employees (Kahn & Heaphy, 2014). Despite the importance of the context of relationships at work towards increasing employee engagement, current research studies are yet to fully investigate the relational contexts and their association with engagement (Kahn & Heaphy, 2014). A previous study by Schneider, Macey, Barbera, & Young, (2010) which presented the most research focus on the association between trust and engagement failed to vividly establish the nature of that relationship (Kahn & Heaphy, 2014).

Three psychological conditions (i.e. psychological meaningfulness, availability and safety) contribute to employee engagement and disengagement at work (Kahn, 1990). These psychological conditions could also mediate between their antecedents and outcomes (May et al., 2004; Olivier, & Rothmann, 2007; Rothmann, & Buys, 2011). However, there is currently no literature available on a model that has explored the relationship between all the above-mentioned well-being constructs in one single study. The present study fills that gap in literature by assessing the relationship between job demands, job resources, burnout, work engagement and psychological conditions, and testing a structural model of their relationships in a group of employees in a South African agricultural research organisation.

Job demands and job resources

Employees' working conditions contain their own stress-related factors. These factors can be grouped into two broad elements, namely job demands and job resources (Bakker & Demerouti, 2007; Demerouti & Bakker, 2011). Schaufeli and Enzmann (1998), on the other hand, categorise organisational stressors as job demands and lack of job resources. The argument regarding the relationship between psychological conditions and work engagement is better understood within the context of job demands and job resources. Job demands refer "to those physical, psychological, social, or organisational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) effort or skills and are

therefore associated with certain physiological and/or psychological costs" (Demerouti & Bakker, 2011, p. 2).

These can vary from changes in the job content (from too little work to too much work), many deadlines and increased/decreased work pace. *Quantitative job demands* refer to the amount of work to be done and the available timeframe (work overload), while *qualitative workload* involves employees' affective responses to their jobs (Schaufeli, & Bakker, 2004). Job demands do not always have resultant negative effects (such as stress), except when meeting those demands necessitates high effort from which the employee does not fully recover.

Job resources are "those physical, psychological, social or organisational aspects of the job that may be functional in achieving work goals, reducing job demands and the associated physiological and psychological costs, and stimulating personal growth and development" (Demerouti et al., 2001, p. 501). Resources are therefore not only necessary to deal with job demands, but are also important in their own right. Job resources may be located at the macro-organisational level (e.g. career opportunities), the interpersonal level (e.g. supervisor and co-worker support, team climate), the specific job position (e.g. participation in decision-making), or at task level (e.g. autonomy) (Demerouti et al., 2001).

Burnout

Burnout refers to the "exhaustion of employees and their capacity to maintain an intense involvement that has a meaningful impact at work" (Schaufeli, Leiter, & Maslach, 2009), with implications for well-being (Kilfedder, Power, & Wells, 2001). The burnout phenomenon can be experienced by any employee (Maslach et al., 2001) and refers to a crisis in an employee's interaction with work in general and not necessarily the employee's relationship with *people* at work (Maslach et al., 2001).

Pines (1993) and Malach-Pines (2005) proposed an existential perspective on burnout. According to her, the core reason for burnout lies in a person's need to believe that his/her life is meaningful, that the things he/she does have meaning, and, consequently, in his/her perception of being useful and important. Therefore, burnout results when an individual tries to find meaning in life through work, and fails. Work carries a great deal of significance, having replaced religion as

an avenue of finding a meaningful existence. Individuals fail to find meaning where work fails to meet the expectations they imposed on it, which ultimately results in burnout. Therefore, individuals who perceive their work environment as unsupportive will be more prone to developing burnout (Pines, 1993; Malach-Pines, 2005). On the other hand, individuals who find their work meaningful will be better engaged in their work (Kahn, 1990).

Kahn (1990) described the burnout (disengagement) phenomenon as the uncoupling of the self from work roles (p. 694); the withdrawal of personal, internal energies from physical, cognitive, and emotional labours (Kahn, 1990). Disengagement is associated with lack of commitment and motivation of workers (Aktouf, 1992).

Work engagement

Work engagement is considered an independent, distinct concept that is related negatively to burnout (Bakker, Schaufeli, Leiter, & Taris, 2008). Kahn (1990) defined the engagement concept as "the harnessing of organisation members selves to their work roles (by which they) employ and express themselves physically, cognitively and emotionally during role performances" (Kahn, 1990, p.694). Therefore, engaged employees are physically involved in their tasks, cognitively alert, and emotionally connected to others when performing their jobs. Relationships at work are an important criterion to foster engagement or disengagement (Kahn & Heaphy, 2014). It contributes to peoples "experience of the purposes of their work, and heighten their sense of belonging" (p. 83), defines the context in which individuals are able to feel safe or unsafe to express themselves and sustain or weaken limitations essential to sustain availability at work (Kahn & Heaphy, 2014).

The *work engagement* construct is closely associated with similar constructs such as job involvement and flow (May, Gilson, & Harter, 2004). Csikszentmihalyi (1990) defined 'flow' as a psychological phenomenon experienced by individuals who not only feel they can control what they are doing, but who also feel efficacious in their capacity to accomplish their tasks. On the other hand, job involvement is a cognitive state that refers to the centrality of a job to the employee and work engagement is an antecedent to job involvement (May et al., 2004). Engaged employees display tenacity and focused energy, which manifest in personal initiative, flexibility, determination and diligence towards an organisation's goals (Macey, Schneider, Barbera, & Young, 2009). Engagement is an important state for individuals to

foster given that disengagement, or alienation, is fundamental to the problem of workers' lack of commitment and motivation (Aktouf, 1992).

Psychological conditions

Three psychological conditions, namely meaningfulness, safety and availability, affect personal engagement or disengagement at work (Kahn, 1990; Kahn & Heaphy, 2014). *Meaningfulness* can be defined as the value of a work goal or purpose, judged in relation to an individual's own ideals or standards (Hackman, & Oldham, 1980). Meaningfulness refers to the level of importance something holds for an individual (Pratt, & Ashforth, 2003). It refers to "a feeling that one is receiving a return on investment of one's self in a currency of physical, cognitive, or emotional energy" (Kahn, 1990, pp. 703-704). Meaningfulness relates to a person's personal appraisal of events in his/her life, and the importance ascribed to these events in comparison with his/her personal goals, values, beliefs and identity (Matuska, & Christiansen, 2008).

Psychological meaningfulness often results from situations where people have feelings of self-worth and importance (Rothmann & Jordaan, 2006). Work is an area where one seeks meaningfulness, as a substantial amount of one's life is spent at work (Holbeche, & Springett, 2004). Meaningful work could have a significant impact on employee outcomes (Fairlie, 2011) and is vital for resilience in stressful work environments (Matuska, & Christiansen, 2008). Meaningless work often results in a lack of interest and indifference to one's work (Thomas, & Velthouse, 1990). On the other hand, the provision of work that is experienced as meaningful by employees should facilitate both their personal growth and their work motivation (Spreitzer, Kizilos, & Nason, 1997). Individuals who believe that a given work role activity is personally meaningful are likely to be motivated to invest themselves more fully in it (May et al., 2004). In fact, theorists and researchers have often proposed that experiencing meaning in one's life is a key determinant of psychological well-being (Frankl, 1997; Steger, Kashdan, Sullivan, & Lorentz, 2008).

Psychological safety is defined as "feeling able to show and employ one's self without fear of negative consequences to self-image, status, or career" (Kahn, 1990, p. 708). Psychological safety ensues when the employee perceives the interpersonal relationships as characterised by mutual support, openness, trust, genuineness and flexibility (De Clercq, & Ruis 2007) and

when a work supervisor is supportive, uncontrolling and concerned about his/her employees' needs and feelings, provides positive feedback to them, helps develop new skills and encourages employees to voice their opinions (Edmondson, 1999). Therefore, when the relationship between supervisor and co-workers is characterised by support, trust and flexibility in behavioural norms, this may lead to feelings of safety (De Bruin, & Taylor, 2005; May et al., 2004). Feelings of safety result in employees taking more risks that express their true selves and make them more likely to invest in their employment relationship.

Psychological availability refers to "the sense of having the physical, emotional or psychological resources to engage at a particular moment" (Kahn, 1990, p. 714). It assesses one's readiness or confidence to engage in a work role, given that individuals are also engaged in many other social activities. Generally, four types of interferences influence psychological availability: depletion of physical energy, depletion of emotional energy, individual insecurity, and outside lives (Kahn, 1990). Therefore, individual employees who have excessive workloads may be depleted of physical energy, especially if they lack the individual resources (such as available time) to engage in it. This will, in turn, affect their level of psychological availability. The end result of excessive workload and lacking the resources to deal with it is *burnout* (Maslach et al., 2001). Many workplace models have proposed that individual antecedent variables, such as self-efficacy (Macey & Schneider, 2008; Wollard & Shuck, 2011), are at the core of employee psychological availability.

Bandura (1997) defined self-efficacy as the "beliefs in one's capability to organise and execute the course of action required to produce given attainments and it refers to an individual's belief in his or her capability to achieve a favourable result in any given situation". Breso´, Schaufeli, and Salanova (2011) suggested that burnout results from successive self-efficacy crises. Leiter (1992) went further by referring to burnout as an "efficacy crisis". On the other hand, high levels of self-efficacy mark an increase in motivation that will result in employee engagement (Breso´ et al., 2011). In the personal engagement model of Kahn (1990), self-efficacy refers to psychological availability to engage.

Job demands, job resources, burnout, engagement and psychological conditions

Organisations and individuals experience various demands and resources (Rothmann, 2005) that could, in turn, affect the well-being of employees (Schaufeli & Bakker, 2004). Job

demands and job resources present a situational dimension to the argument of relationships between psychological conditions, burnout, and work engagement. Proponents of the JD-R model (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004) emphasise a well-established link between heavy work demand in the form of work overload and lack of resources in the development of burnout (Maslach et al., 2001), and also between job resources and engagement (Schaufeli & Bakker, 2002). Job demands lead to burnout through an energetic mechanism, while job resources lead to engagement through a motivational mechanism by (1) reducing the health-impairing effect of job demands, (2) being functional in achieving work goals, and (3) stimulating personal growth, development, and learning (Schaufeli & Bakker, 2004). Job resources, such as job demands, are linked to several job characteristics, such as supervisor support and career opportunities (de Lange et al., 2008). On the basis of the above-mentioned JD-R frameworks, it has been suggested that job resources lead directly to engagement (Conservation of Resources Theory; Hobfoll, 2002), or indirectly to engagement through other avenues such as psychological condition (Kahn, 1990) and enhancing employees' self-efficacy (Bandura, 1977).

Although the JD-R model has been supported by considerable empirical evidence within other contexts, to date it has not been used to indirectly examine the psychological mechanisms underlying the relationships within the JD-R model. The psychological conditions of meaningfulness, availability and safety could be used to explain the relationships between burnout and engagement and their antecedents within the JD-R framework. According to Saks (2006), engagement involves being "psychologically present when occupying and performing an organisational role" (p. 601). Therefore, three psychological conditions, namely psychological meaningfulness, psychological safety and psychological availability, contribute to employee engagement (Kahn, 1990). Generally, individual antecedents to employee engagement include: the individual's availability to engage, feelings of choice and control, involvement in meaningful work, willingness to direct personal energies, as well as perceived organisational support (Wollard & Schuck, 2010).

A study by Kahn (1990) indicated that individuals personally engage in situations characterised by more psychological meaningfulness. Recent studies (May et al., 2004; Olivier & Rothmann, 2007; Rich, Lepine, & Crawford, 2010; Rothmann, & Buys, 2011; Rothmann, & Rothmann, 2010) have also supported the role of a meaningful work setting and an employee's involvement in contextually meaningful work as catalysts in employee

engagement. Maslach and Leiter (1997, p. 23) referred to burnout as "an erosion of engagement with the job", when work that started out as important, meaningful and challenging becomes unpleasant, unfulfilling and meaningless. Therefore, a lack of meaningfulness in a job leads to burnout (Leiter, 1992). Employees who experience less meaningful work may also experience higher levels of exhaustion, and would likely report more cynical views (i.e. disengagement) of their jobs (Fairlie, 2011).

Different job characteristics affect the significance of a job to an employee (Kahn, 1990). Some of these factors include: (1) Autonomy/control/freedom (Hackman & Oldham, 1980; May et al., 2004; Rothmann & Buys, 2011; Saks, 2006). The need for autonomy is a fundamental concept for employee well-being (Deci & Ryan, 2000, 2008). The need for autonomy is defined as people's desire to experience ownership of their behaviour, and to act with a sense of volition (Deci & Ryan, 2000). Autonomy/control in a task relates to the degree of freedom with which employees can choose what and how to complete their tasks; (2) Supportive/good relationships with colleagues and supervisors (May et al., 2004; Pratt & Ashforth, 2003; Steger & Dik, 2010). Satisfying relations with co-workers that create a feeling of belonging may lead to psychological meaningfulness (Olivier & Rothmann, 2007); and (3) Growth/development/participation opportunities (May et al., 2004; Rothmann & Buys, 2011; Saks, 2006).

A supporting and trusting relationship between employees and their supervisors could have a great effect on psychological safety (May et al., 2004). Staff members will feel safe in their jobs and be more likely to engage when a supervisory relationship is trusting, supportive and non-controlling (Olivier & Rothmann, 2007). On the other hand, employees will likely become stressed if they perceive their workplace as psychologically unsafe (Edmondson, 2004).

Building on earlier works, Dollard and Bakker (2010) constructed a model of a workplace psychosocial safety climate to expound the background understanding of job demands and resources, worker psychological health, and employee engagement. Psychosocial safety climate refers to practices, procedures and policies put in place to safeguard worker psychological health and safety (Dollard, 2007). While using the job demands-resources framework, Dollard and Bakker (2010) hypothesised that Psychosocial Safety Climate (PSC) (an organisational resource) is greatly affected by senior management, and also precedes the

work situation (i.e. work demands and resources) and would, in turn, predict work engagement and psychological health through mediation and moderation pathways.

Masterson, Lewis, Goldman, and Taylor (2000) stated that employees may be exposed to two separate work-related social exchange relationships: firstly, with the direct supervisor and, secondly, with the organisation. Most often, the employee views the direct supervisor as a representative of the organisation. Therefore, the employee will perceive organisational support and engage in his/her role when the relationship with the direct supervisor is non-controlling and positive. In their empirical studies, May et al. (2004) found that psychological safety showed a significant positive relationship with engagement.

The positive role of psychological availability, which has been labelled *self-efficacy* (Bandura, 1997), has been well explained in the relationship between job resources and engagement (Llorens, Salanova, Schaufeli, & Bakker, 2007). Employees will be most likely to engage in their roles when they have the resources (physical, emotional and cognitive) to complete a task (Olivier & Rothmann, 2007). Therefore, employees may disengage from their roles when they do not possess the right amount of resources to accomplish such roles (Olivier & Rothmann, 2007).

Rothmann and Rothmann (2010) found that psychological availability was a significant predictor of engagement. Some of the factors that may affect psychological availability include: (1) The availability of cognitive, emotional and physical resources (May et al., 2004; Rothmann, & Welsh, 2013); (2) Perceived organisational support (Rothmann & Buys, 2011; Rothmann & Welsh, 2013); (3) Co-worker support and supervisor support (Rothmann & Welch, 2013). Vinarski-Peretz and Carmeli (2011) stated that employees will display higher psychological availability if they are sure that their co-workers care about them, and if their work environment is supportive. Organisational support includes, among other things, providing employees with information to enable them plan their activities, giving consideration to the employees' opinions and showing willingness to help the employees when they encounter problematic situations (Rothmann & Welsh, 2013); and (4) Autonomy (Rothmann, & Buys, 2011). Rothmann and Buys (2011) specifically found a moderate association between a lack of psychological availability and pace and amount of work on the one hand, and a lack of psychological availability and lack of social and organisational

support on the other hand. They found psychological availability to be a significant predictor of employee engagement.

May et al. (2004) provided some empirical evidence that the psychological conditions of meaningfulness, safety and availability could mediate between engagement and its antecedents. Although studies conducted in some African countries, such as South Africa (Olivier & Rothmann, 2007; Van Zyl, Deacon, & Rothmann, 2010) and Namibia (Rothmann & Welsh, 2013), could not support the finding of May et al. (2004) on psychological safety, they provided support that the psychological conditions of meaningfulness and availability could mediate the effect of the antecedents on work engagement.

In their study on organisations in Namibia, Rothmann and Welsh (2013) specifically found that work-role fit, job enrichment and the availability of resources indirectly impacted on employee engagement via experiences of psychological meaningfulness, while employee engagement was indirectly affected via psychological availability by the availability of resources and co-worker relations. These results provide evidence of the important role of psychological meaningfulness and psychological availability as mediators between antecedents and outcomes of well-being variables.

In the light of the above discussion, the present study explores the research questions of whether the three psychological conditions actually explain the effects of their determinants on burnout or engagement of workers in an agricultural organisation. The following research hypotheses were formulated regarding the relationships between the antecedent conditions, psychological conditions, and burnout and work engagement.

Hypotheses

Based on the review of the literature, it is argued that job demands (overload) and lack of resources contribute to burnout, while job resources contribute to work engagement of employees in a South African agricultural organisation. Organisational psychological research has shown that it is of paramount importance for organisations to provide employees with resources in order to ensure the positive well-being (work engagement) of their employees. Furthermore, organisations have to create a work setting where the psychological conditions of meaningfulness, safety and availability are considered important antecedents to well-being. Psychological meaningfulness, safety and availability contribute to the work

engagement of employees, while the lack thereof contributes to burnout (Kahn, 1990). These psychological conditions could also mediate between their antecedents and outcomes (Buys, 2008; May et al., 2004; Olivier, & Rothmann, 2007).

The following hypotheses were set for this study based on the literature review:

H_1: Job resources (control, growth opportunities and organisational support) relate positively to work engagement.

H_2: A lack of job resources relates positively to burnout.

H_3: Job demands (overload) relates positively to burnout.

H_4: Psychological meaningfulness relates negatively to burnout.

H_5: Psychological meaningfulness relates positively to work engagement.

H_6: Psychological availability relates negatively to burnout.

H_7: Psychological availability relates positively to work engagement.

H_8: Psychological safety relates negatively to burnout.

H_9: Psychological safety relates positively to work engagement.

H_{10}: Job demands (overload) indirectly affects burnout through psychological conditions.

H_{11}: A lack of job resources indirectly affects burnout through psychological conditions.

H_{12}: Job resources indirectly affect engagement through psychological conditions.

RESEARCH DESIGN

The methodology of the study is presented next:

Research approach

A cross-sectional survey design was used to reach the objectives of this research. Cross-sectional designs involve the gathering of data at the same point in time from a single sample comprising different subgroups that have had different experiences over time (Dyer, 2006). This approach is not only better suited to studying relationships between variables in a population, but is also ideal for correlational studies with descriptive and predictive functions (Shaughnessy, Zechmeister, & Zechmeister, 2006). This makes it most suited to examine the relationships between psychological conditions, job demands and resources, burnout, and work engagement of workers in a South African agricultural organisation.

Research method

Research participants

The data were collected by means of convenience sampling. In convenience sampling, participants are selected based on their readiness and accessibility to complete the survey (Fink, 2009). The research participants were made up of employees from all employment groups and educational levels within a South African agricultural organisation. The participants with the lowest educational level had an adequate literacy level to complete the questionnaire. The demographic composition of the participants is provided in Table 1 below.

Table 1

Biographical Information of Participants (N = 443)

Item	Category	Frequency	Percentage
Gender	Male	221	49.9
	Female	217	49.0
	Missing cases	*5*	*1.1*
Race	African	247	55.8
	Coloured	19	4.3
	Indian	3	7.0
	White	170	38.4
	Missing cases	*4*	*0.9*
Language	Afrikaans	165	37.2
	English	21	4.7
	isiNdebele	5	1.1
	isiXhosa	6	1.4
	isiZulu	26	5.9
	Sepedi	64	14.4
	Sesotho	59	13.3
	Setswana	38	8.6
	SiSwati	14	3.2
	Tshivenda	18	4.1
	Xitsonga	8	1.8
	Other	14	3.2
	Missing cases	*5*	*1.1*
Age	20-25	28	6.3
	26-30	53	12.0
	31-35	73	16.5
	36-40	60	13.5
	41-45	72	16.3
	46-50	71	16.0
	51-55	37	8.4
	+55	44	9.9
	Missing cases	*5*	*1.1*
Education	Grade 9-11	59	13.3
	Grade 12	60	13.5
	Certificate/Diploma	70	15.8
	Bachelor's degree	44	9.9
	Honours degree	42	9.5
	Master's degree	86	19.4
	PhD	51	11.5
	Other	24	5.4
	Missing cases	*7*	*1.6*
Position	Research assistant	124	28.0
	Research technician	122	27.5
	Researcher	110	24.8
	Programme manager/Specialist scientist	17	3.8
	Support staff	62	14.0
	Missing cases	*8*	*1.8*

Table 1, above, shows that about half of the participants, numbering 221 (49.9%), were males, while a total of 247 (55.8%) were Africans. A total of 37.2% were Afrikaans speaking, 16.5% were between 31-35 years of age, and 19.4% had a master's degree. Research assistants, as well as participants with a master's degree, were more in number with regard to position and education.

Measuring instruments

A questionnaire was developed to gather information about demographic characteristics of the participants.

The *Burnout Scale (BS),* which was developed by the researcher (refer to Chapter 3), was used to measure burnout of employees within the agricultural sector. The scale measured three dimensions of burnout, namely Fatigue (5 items, ρ = .87), e.g. "I feel weak while at work," Emotional exhaustion/withdrawal (6 items, ρ = .87), e.g. "I am not emotionally affected by how other people at work feel," and Cognitive weariness (6 items, ρ = .91), e.g. "I cannot concentrate while at work."

Job demands and job resources were measured by items taken from an Adapted Job Demands Resources Scale. Quantitative job demands (overload) were measured by a seven-item scale on workload (ρ = .76), e.g. "Do you have too much work to do?" Job resources were measured by three factors, namely Organisational support (measured by nine items, ρ = .92), e.g. "Is it clear whom you should address within the organisation/institute for specific problems?", Control (measured by five items, ρ = .86), e.g. "Do you have freedom in carrying out your work activities?", and Growth opportunities (measured by three items,ρ = .75), e.g. "Does your job offer you opportunities for personal growth and development?"

An adapted version of the Psychological Conditions Questionnaire (PCQ) of May et al. (2004) was used to measure the psychological conditions of meaningfulness, safety and availability. Psychological meaningfulness was measured by four items (ρ = .92), e.g. "The work I do on this job is meaningful to me." Psychological safety was measured by the Psychological safety subscale, which was adapted for the purpose of this study. It consists of seven items (ρ = .86), e.g. "There is a threatening environment at my work place." The scale was adapted to have a more valid instrument that could be used to measure psychological

safety, as previous South African researchers (Such as Buys, 2008; Olivier and Rothmann, 2007, Phale, 2008) have found low Cronbach alphas for the psychological safety scale and could subsequently not include psychological safety in their study. Psychological availability was measured by five items ($\rho = .91$), e.g. "I am confident in my ability to handle competing demands at work."

Work engagement was measured by a 13-item Work Engagement Scale ($\rho = .91$), which was specifically developed for this research. The questionnaire was developed after a careful study of literature and consisted of items measuring physical, emotional and cognitive components of engagement based on Kahn's engagement and the extension of the theory by May et al. (2004). Example items are: the physical component ("I am full of energy while working"), emotional component ("I am enthusiastic about my job") and cognitive component ("I am not distracted while doing my job"). All the items used in this study were scored on a seven-point Likert Scale ranging from 1 (*Never*) to 7 (*Always*).

Research procedure

The research procedure started after the researcher had obtained written permission to conduct the research from the director of human resources of the organisation. Subsequently, a letter that explained the aim of the study was emailed to employees within the organisation, requesting their participation in the survey, and emphasising the confidentiality of the research study.

The researcher personally provided the participants who indicated their readiness to take part in the study with a consent form and paper-and-pencil questionnaires. The researcher collected the questionnaires from the participants who had duly completed the form, after a six-week period. A total of 472 questionnaires (indicating a 92% response rate) were returned after the expiration of the six-week period given to the respondents to complete the questionnaire. A total of 29 of the 472 questionnaires returned were found to not have been properly completed, and could therefore not be included in the data analysis, leaving a total of 443 questionnaires that were subsequently used for the statistical analysis.

Statistical analysis

The analysis of the data was carried out by means of Mplus version 7.11 (Muthen & Muthen, 1998-2013). Items of the questionnaires were defined as categorical and the weighted least

squares with corrections to means and variances (WLSMV) were used as estimator. Latent variable modelling with a categorical estimator (rather than maximum likelihood estimation which is vulnerable to multivariate skewness and kurtosis) was used (Wang & Wang, 2012). A categorical estimator is applicable when Likert scales are used (Newsom, 2012) and is appropriate as it is less sensitive to multivariate skewness and kurtosis (Geiser, 2013; Newsom, 2012). There is growing agreement among researchers that categorical variables ought to be analysed with the WLSMV approach, i.e. categorical estimators especially for Likert scales. The maximum likelihood (ML) estimator (which is often used in SEM) analysis assumes that observed variables are measured on a continuous scale. However, in the behavioural sciences, response variables are often non-continuous and psychological constructs are frequently measured on Likert scales.

Standardised path coefficient sizes and their significance were considered to investigate the theoretical paths in the model. The model indirect function of Mplus was used with the bootstrapping re-sampling option enabled and set to 5 000 samples. As a rule of thumb, this value is set to at least 1 000 (Hayes, 2009) to evaluate the indirect effects; bias-corrected 95% confidence intervals (Shrout, & Bolger, 2002) were also used in this regard. Earlier studies that investigated the mediating effects of well-being constructs implemented the traditional methods of Baron and Kenny (1986), which usually resulted in evidence of partial or full mediation and the Sobel test. According to Rucker, Preacher, Tormala, and Petty (2011, p. 359), attention in mediation analyses "should be shifted towards the magnitude and significance of indirect effects." Therefore, bootstrapping has recently been considered a more statistically valid option (Williams, & MacKinnon, 2008; MacKinnon, Lockwood, & Williams, 2004). In addition, in line with suggestions by Preacher and Kelley (2011), Kappa squared values (k^2) were calculated to assist in applying values as a basis to communicate the degree of the mediating effect sizes, using the guidelines of Cohen (1988, pp. 79-81), where the values .01, .09 and .25 indicate small, medium and large effect sizes, respectively.

The χ^2 statistic is usually examined to test for overall model fit (Hooper, Coughlan, & Mullen, 2008). However, it is necessary to consider other fit indices in addition to the χ^2 because of some limitations in its use. These include sensitivity to sample size (the statistic most often rejects a model when a large sample is used) and to multivariate normality (Hooper, et al., 2008). Therefore the following fit indexes, produced by Mplus, were used in

this study: the Root-Means-Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Tucker-Lewis index (TLI). For the CFI and TLI, a value of .90 and above indicates an acceptable fit (Bentler, 1992; Schumacker, & Lomax, 1996). According to Cudeck and Browne (1993), there is a good model fit if the RMSEA value is less than or equal to .05. Values up to .08 indicate reasonable fit (Cudeck, & Browne, 1993), while values above .10 indicate a poor fit (MacCallum, Browne, & Sugawara, 1996).

The calculation of latent variable scores violates the assumption of tau equivalence (required for alpha coefficients). Therefore reliabilities (ρ) of scales were computed by means of a formula based on the sum of squares of standardised loadings and the sum of standardised variance of error terms (Wang & Wang, 2012).

RESULTS

In the next section, the results are reported. First, the results of the test of the measurement model are reported, followed by the results of the tests of the alternative structural models.

Testing the measurement model

First, confirmatory factor analysis (CFA) was used to test a hypothesised four-factor measurement model, so as to investigate whether individual measurement items loaded significantly onto the scales with which they were associated. The measurement model consisted of four latent variables, namely 1) Job demands, made up of one latent variable, and Overload (measured by seven observed variables); 2) Burnout, which consisted of Fatigue (measured by five observed variables), Emotional exhaustion/withdrawal (measured by six observed variables), and Cognitive weariness (measured by six observed variables); 3) Work engagement (measured by 13 observed variables); and 4) Psychological conditions, which consisted of Psychological meaningfulness (measured by four observed variables), Psychological safety (measured by seven observed variables), and Psychological availability (measured by five observed variables).

Table 2

Fit Statistics of the Measurement Model

Variable	χ^2	*df*	TLI	CFI	RMSEA	WRMR	*p*
Model	4265.73*	2319	.93	.93	.04	1.51	.000

χ^2 = chi square statistics *df* = degrees of freedom; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation.

In Table 2 above, a χ^2 value of 4265.73 (*df* = 2319) was obtained for the hypothesised measurement model. Acceptable fit statistics were found for the three fit indices: TLI = .93, CFI = .93, and RMSEA = .04 (90% CI = .04 - .05, probability RMSEA = < .05), WRMR = 1.51 and *p* = .00.

Testing the structural model

Table 3 below shows the descriptive statistics, reliabilities and correlations of the latent variables. The reliabilities (ρ) of the scales ranged from .76 to .92, which indicated acceptable internal consistency (Nunnally, & Bernstein, 1994).

Table 3

Reliability (ρ) and Estimated Correlation Matrix of the Latent Variables (N = 443)

Variable	ρ	1	2	3	4	5	6
1. Burnout	.85	-					
2. Work engagement	.91	-.62*	-				
3. Meaningfulness	.92	-.31*	.59*	-			
4. Safety	.86	.37*	-.17*	-.18*	-		
5. Availability	.91	-.34*	.52*	.62*	-.27*	-	
6. Job resources	.84	-.39*	.62*	.62*	-.49*	.63*	-
7. Job demand (Overload)	.76	.06	.34*	.41*	.19*	.38*	.21*

* = p < .001

Table 3 shows a negative correlation between burnout and job resources, as well as psychological meaningfulness and availability, and a (reversed) positive correlation with psychological safety, because the items on the psychological safety were reverse items (negatively phrased). Furthermore, work engagement correlated negatively with burnout and positively with job resources, as well as psychological meaningfulness, and availability; and reversed negative correlation with safety, because the safety items were reversed items (negatively phrased). Burnout and work engagement were negatively correlated.

The structural model was tested based on the measurement model. The hypothesised relationships were tested using latent variable modelling as implemented by Mplus version 7.11 (Muthen & Muthen, 2013). Paths were included from (1) Job demands (overload) to Psychological availability, Safety and Meaningfulness to Burnout, (2) Job resources (Organisational support, Control and Growth opportunities) to Psychological safety, Availability and Meaningfulness to Work engagement and (3) from Job resources (Organisational support, Control and Growth opportunities) to Psychological safety, Availability and Meaningfulness to Burnout. Results indicated a good fit of the hypothesised model to the data χ^2 value of 4157.001 (*df* = 2318), TLI = .93, CFI = .93, RMSEA = .04 (90% CI = .04 - .04, Probability RMSEA = < = .05, 1.000) and WRMR = 1.47.

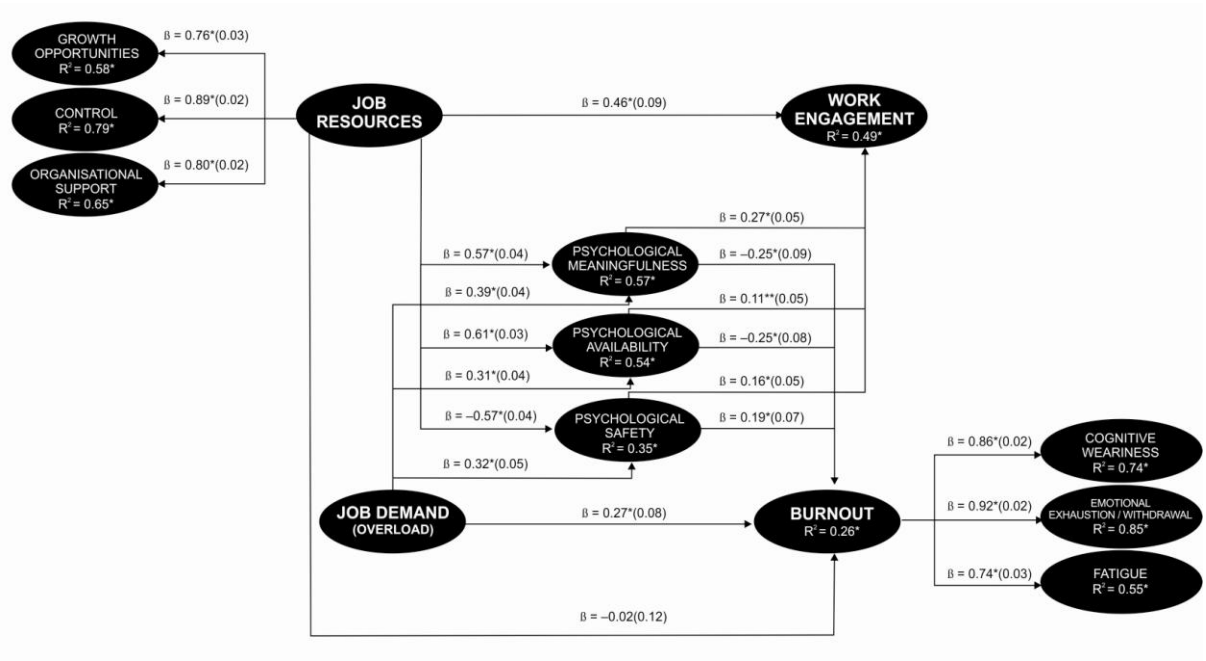
Given the cross-sectional nature of the data, two other competing structural models were tested in order to determine the absolute indirect effect of the three psychological conditions. This was done by placing restrictions on the paths specified in Model 1. In Model 2, the relationship between Meaning, Burnout, and Engagement was constrained to zero. In Model 3, the relationship between Safety, Burnout, and Engagement was restricted to zero. With Model 4, the zero constraint was placed on the relationship between Availability, Burnout, and Engagement.

The results indicated the following changes in chi-square ($\Delta\chi^2$): Models 1 and 2 ($\Delta\chi^2$ = 23.499, $\Delta d\,f$ = 2, p < .001), Models 1 and 3 ($\Delta\chi^2$ = 18.538, Δdf = 2, p < .001), and Models 1 and 4 ($\Delta\chi^2$ = 12.011, Δdf = 2, p < .001) indicating that model 1 was the best model. Table 4 shows the standardised path coefficients estimated by Mplus for the hypothesised model.

Table 4

Standardised Regression Coefficients of the Variables

Variable	Estimate	SE	Est/SE	*p*
Burnout				
Job resources	-.02	.12	-.17	.869
Job demands (Overload)	.27	.08	3.52	.000*
Psychological meaningfulness	-.25	.09	-2.84	.005*
Psychological safety	.19	.07	2.74	.006*
Psychological availability	-.25	.08	-3.15	.002*
Work engagement				
Job resources	.46	.09	5.35	.000*
Psychological meaningfulness	.27	.05	5.29	.000*
Psychological safety	.16	.05	3.27	.001*
Psychological availability	.11	.05	2.11	.035*
Psychological meaningfulness				
Job resources	.57	.04	15.96	.000*
Job demand (Overload)	.39	.04	9.19	.000*
Psychological safety				
Job resources	-.57	.04	-15.02	.000*
Job demand (Overload)	.32	.05	6.64	.000*
Psychological availability				
Job resources	.61	.03	18.36	.000*
Job demands (Overload)	.31	.04	7.68	.000*



*p < .001; ** p < .05

Figure 1. The structural model

Next, the obtained relationships of the hypothesised structural model are discussed with reference to the hypotheses of this study.

Hypothesis 1

With regard to the part of the model predicting work engagement, Table 4 shows that the path coefficient of Job resources (β = .46, p < .001) was statistically significant, and had the expected positive sign. Job resources (Control, Growth opportunities, and Organisational support) had a positive relation with Work engagement. Large proportions of the variance in Work engagement (R^2 = .49) were accounted for. Hypothesis 1 (that job resources, control, growth opportunities, and organisational support relate positively to work engagement) is therefore accepted.

Hypothesis 2

With regard to the part of the model predicting burnout, the path coefficient from Job resources to Burnout was statistically significant (β = -.02, p <.05). A large proportion of the variance in Burnout was accounted for (R^2 = .26). Hypothesis 2 (that a lack of job resources relates positively to burnout) is accepted.

Hypothesis 3

With regard to the part of the model predicting burnout, the path coefficient of Overload was statistically significant (β = .27, < .001). A large proportion of the variance in Burnout was accounted for (R^2 = .26). Hypothesis 3 (that job demands/overload relates positively to burnout) is therefore accepted.

Hypothesis 4

With regard to the part of the model predicting burnout, Table 4 shows that the path coefficient of Psychological meaningfulness (β = -.25, p < .001) was statistically significant and had the expected sign. Psychological meaningfulness had a negative relation with burnout and accounted for a large proportion of the variance in work engagement (R^2 = .49). Hypothesis 4 (that psychological meaningfulness relates negatively to burnout) is therefore accepted.

Hypothesis 5

For the part of the model predicting work engagement, the path coefficient of Psychological meaningfulness (β = .27, p < .001) was statistically significant and had the expected sign. Psychological meaningfulness had a positive relation with Work engagement. The WLSMV-estimated equation accounted for a large proportion of the variance in Work engagement (R^2 = .49). Hypothesis 5 (psychological meaningfulness relates positively to work engagement) is accepted.

Hypothesis 6

With regard to the part of the model predicting burnout, Table 4 shows that the path coefficient of Psychological availability (β = -.25, p < .001) was statistically significant and had the expected sign. Psychological availability showed a negative relation with Burnout. The WLSMV-estimated equation accounted for a large proportion of the variance in burnout (R^2 = .26). Hypothesis 6 (psychological availability relates negatively to burnout) is accepted.

Hypothesis *7*

For the part of the model predicting work engagement, the path coefficient of Psychological availability (β = .11, p < .05) was statistically significant and had the expected sign. Psychological availability had a positive relation with Work engagement. The WLSMV-estimated equation accounted for a large proportion of the variance in Work engagement (R^2 = .49). Hypothesis 7 (psychological availability relates positively to work engagement) is accepted.

Hypothesis 8

With regard to the part of the model predicting burnout, the path coefficient of Psychological safety (β = .19 p < .01) was statistically significant. The WLSMV-estimated equation accounted for a large proportion of the variance in Burnout (R^2 = .26). Hypothesis 8 (psychological safety relates negatively to burnout) is accepted.

Hypothesis 9

With regard to the part of the model predicting work engagement, the path coefficient of Psychological safety (β = .16, p < .01) was statistically significant and had the expected sign. Psychological safety had a positive relation with Work engagement. The WLSMV-estimated

equation accounted for a large proportion of the variance in Work engagement (R^2 = .49). Hypothesis 9 (psychological safety relates positively to work engagement) is accepted.

The procedure explained by Hayes (2009) was used to determine whether (1) the relationship between job demand (overload) and burnout was affected by psychological conditions of availability, meaningfulness and safety, and (2) whether the relationships between job resources and work engagement were indirectly affected by psychological meaningfulness, safety and availability. Bootstrapping was used to construct two-sided bias-corrected 95% confidence intervals (CIs) in order to assess indirect effects. The lower and upper CIs are reported (see Tables 5-7).

Table 5

Indirect Effects of Job Demands (Overload) on Burnout

Variable	Estimate	SE	*p*	95% BC CI
Overload: Availability	-.11	.05	.022***	[-.20, -.02]
Overload: Meaning	-.12	.05	.021***	[-.23, -.02]
Overload: Safety	.00	.00	.000*	[.00, .00]
Sum of indirect effects	-.23	.08	.005**	[-.40, -.07]

*$p < .001$; **$p \leq .01$; ***$p < .05$

Table 6

Indirect Effects of Job Resources on Burnout

Variable	Estimate	SE	*p*	95% BC CI
Job resources: Availability	-.17	.07	.008**	[-.30, -.04]
Job resources : Meaning	-.16	.07	.015***	[-.29, -.03]
Job resources: Safety	-.11	.03	.001*	[-.17, -.04]
Sum of indirect effects	-.44	.12	.000*	[-.67, -.20]

*$p \leq .001$; **$p \leq .01$; ***$p < .05$

Table 7

Indirect Effects of Job Resources on Work Engagement

Variable	Estimate	SE	*p*	95% BC CI
Job resources: Meaning	.18	.04	.000*	[.11, .26]
Job resources: Availability	.09	.04	.032***	[.01, .18]
Job resources: Safety	-.06	.02	.013***	[-.10, -.01]
Sum of indirect effects	.22	.05	.000*	[.12, .32]

*$p < .001$; **$p \leq .01$; ***$p < .05$

Hypothesis 10

Regarding the indirect effects of job demands on burnout, the 95% CIs of psychological conditions of Availability, Meaningfulness, and Safety did not include zero. However, examination of the specific effect of Psychological safety showed that it had no effect. Therefore, Hypothesis 10 is partially accepted. Job demands had indirect effects on Burnout through Psychological availability (-.11, p < .05; 95% *CI* = -.20, -.02) and Meaningfulness (-.12, *p* < .05; 95% *CI* = -.23, -.02), but not through Safety (.00, *p* < .001; 95% *CI* = .00, .00). The κ^2 value for the mediating effect of Psychological meaningfulness and Availability between Job demands (overload) and Burnout was calculated to be κ^2 = .11 and .10, respectively. Both mediators had medium effects.

Hypothesis 11

Regarding the indirect effects of job resources on burnout, the 95% CIs of psychological conditions did not include zero. Therefore, Job resources had indirect effects on Burnout through Psychological availability, Meaningfulness and Safety. Hypothesis 11 is accepted regarding the indirect effects of job resources on burnout through psychological availability (Estimate = -.17, *p* < .01; 95% *C*I = -.30, -.04), meaningfulness (Estimate = -.16, *p* < .05; 95% CI = -.29, -.03), and safety (Estimate = -.11, *p* <0.01; 95% CI = -.17, -.04), and through all three psychological conditions (Estimate = -.44, *p* < .001; 95% CI = -.67, -.20). The obtained κ^2 values for the mediating effects were: Psychological meaningfulness (κ^2 = .14, medium effect), Safety (κ^2 = .11, medium effect), and Availability (κ^2 = .14, medium effect).

Hypothesis 12

Regarding the indirect effects of job resources on work engagement, the 95% CIs of Psychological meaningfulness, Safety, and Availability did not include zero. Therefore, Job resources had indirect effects on Work engagement through Psychological meaningfulness (.32, *p* < .001; 95% CI = .11, 0.26), Availability (.09, *p* < .05; 95% CI = .01, .18) and Safety (-.06, *p* < .05; 95% CI = -.10, -.01). Hypothesis 12 is accepted regarding the indirect effects of job resources on work engagement (through psychological meaningfulness, safety, and availability). The κ^2 value for the mediating effect of Meaningfulness between Job resources and Work engagement was calculated to be κ^2 = .18 (a medium effect). With regard to the mediating effect of Safety, a κ^2 value of .7 (small effect) was obtained, whereas a κ^2 value of .09 (medium effect) was obtained for Psychological availability.

DISCUSSION

The aims of this study were to investigate the relationships between job demands, job resources, burnout, work engagement and psychological conditions, and to test a structural model of their relationships. Results showed that job demands have direct effects on burnout, while job resources are not a significant predictor of burnout. On the other hand, job resources have a direct effect on work engagement. With regard to the relationship between psychological conditions, burnout and work engagement, results showed that all three psychological conditions contribute to the well-being (i.e. burnout and work engagement) of the employees. The relationship between job resources and work engagement is mediated by all three psychological conditions. Furthermore, the relationship between job resources and burnout is mediated by all three psychological conditions. However, although the sum of indirect effects indicated that the three psychological conditions mediate the relationship between job demands and burnout, psychological safety seems to have no specific effect. The reason for this could be because Job demands in terms of overload result in burnout when the employee lacks the resources to cope in terms of availability (self-efficacy) and when the job activities are not meaningful and not necessarily when the employee does not feel safe.

The results confirm that job resources (job control, growth opportunities and organisational support) are a significant predictor of work engagement, which is in accordance with previous research findings (Bakker, & Demerouti, 2008; Barkhuizen, & Rothmann, 2006). Employees who have the necessary resources are engaged in their jobs. In fact, Saks (2006) argued that employees show appreciation when they receive resources from their organisation by becoming more deeply involved in their role performances. Therefore, when employees are given opportunities for independence in their jobs, receive support, and have opportunities for development, they will show higher levels of engagement (Xanthopoulou et al., 2009).

Furthermore, job demands (overload) predicted burnout, while job resources did not contribute significantly to burnout. Previous research findings have supported this relationship (Bakker et al., 2004; Buys & Rothmann, 2010; Rothmann & Jorgensen, 2007,

Visser & Rothmann, 2008). Burnout usually results when the employees are overburdened, especially when they lack the resources to buffer the effects of the overload.

A strong relationship was found between psychological meaningfulness, on the one hand, and burnout, as well as work engagement, on the other hand. Psychological meaningfulness showed a negative relationship with burnout, and a positive relationship with work engagement. This finding has been supported in recent studies (May et al., 2004; Olivier & Rothmann, 2007; Rothmann & Rothmann, 2010), which also found that psychological meaningfulness showed a strong positive relation with work engagement. On the other hand, lack of meaning in one's work leads to disengagement from work (Aktouf, 1992). Therefore, meaningfulness would enhance work engagement (Rothmann & Rothmann, 2010), while meaninglessness would exacerbate burnout (Leiter, 1992). An individual achieves meaning in life when his or her life is experienced as purposeful, significant and understandable (Steger, 2009). This sense of purpose provides individuals with goals that guide action and promote positive well-being (Baumeister & Vohs, 2002).

Psychological availability was found to significantly affect both burnout and work engagement. Psychological availability was negatively associated with burnout, and positively with work engagement. When an individual is depleted of resources (physical, emotional and cognitive), it results in disengagement by the individual from his/her work role. On the other hand, the presence of these resources would result in higher availability and, consequently, higher work engagement (May et al., 2004). Rothmann and Jordaan (2006) also found that, when individuals experience less job demands and more job resources, it leads to psychological availability. The positive link between job demands and burnout, as well as between job resources and work engagement, has been well established in literature (Demerouti & Bakker, 2007; Schaufeli & Bakker, 2004). This further explains the negative relationship between psychological availability and burnout, as well as the positive relationship between psychological availability and work engagement, both of which were found in the present study.

An individual's perceptions of self-efficacy serve as a behavioural predictor (Bandura, 1986), which will, in turn, determine the individual's behaviour, including in stressful situations. It regulates performance through cognitive, emotional, motivational and choice processes (Bandura, 1997). At a cognitive level, people with high perceived self-efficacy show greater

resilience in managing environmental challenges (Carr, 2011). In terms of motivation, people with strong self-efficacy beliefs tend to set challenging goals for themselves and see obstacles as something that can be overcome. On an emotional level, efficacy beliefs allow people to interpret potentially threatening demands as manageable challenges by reducing worrying and negative thinking about potential threats. Furthermore, self-efficacy regulates emotional states by enabling people to solicit social support to act as a buffer against stress (Carr, 2011).

The results further indicated that burnout and work engagement are directly affected by psychological safety. Psychological safety is positively related to both burnout and work engagement. Moreover, psychological safety strengthens the well-being (burnout and work engagement) of employees. This result is not far from the findings of Dollard and Bakker (2010) who used the psychosocial safety climate to elucidate the relationship between job demands and resources, psychological health of workers, as well as engagement of employees. Dollard and Bakker (2010) showed that changes in psychological health problems (such as emotional exhaustion and psychological distress) of an individual are predicted by the psychological safety climate through its association with individual job demands (e.g. work load and emotional demands). Dollard and Bakker (2010) also found that the psychological safety climate predicted change in employee engagement through its association with skill preference. Therefore, psychological safety is a key predictor of well-being (burnout and work engagement).

In addition, the results show that job demands indirectly affect burnout of employees via psychological conditions. Therefore, psychological conditions play an important role in mediating the relationship between burnout and its antecedent (overload). However, a specific indirect effect of job demands on burnout via psychological safety was not supported in this study. When employees experience high levels of job stress, it negatively impacts their meaningfulness, and results in disengagement (George, Louw, & Badenhorst, 2008; Schulze, & Steyn, 2007). This is also consistent with Matuska and Christiansen's (2008) assertion that psychological meaningfulness is most important for resilience under stressful conditions.

The results of this study showed an indirect effect of lack of job resources on burnout by all three psychological conditions. When employees lack resources, it will result in lower

psychological meaningfulness, availability and safety, which will, in turn, result in burnout. Furthermore, job resources equally affect work engagement indirectly via psychological conditions. May et al. (2004) found that the psychological conditions of meaningfulness, safety and availability mediated between work engagement and its antecedents. Therefore, all three psychological conditions are crucial in understanding the relationship between work engagement and its antecedents (job control, organisational support and growth opportunities).

The above results are consistent with the findings of May et al. (2004) that the three psychological conditions influence the degree of engagement in one's work function, and Kahn's report that disengagement could result when an individual finds the work meaningless. When employees see work as meaningful to them, they will be better engaged in it, or they will disengage if they perceive it as meaningless. Employees who are more engaged in meaningful work are more intrinsically motivated than employees with a low level of meaningfulness (Treadgold, 1999). Psychological safety also leads to engagement at work, because it affirms one's belief that one can voice one's opinion without any adverse consequences. Disengagement results when one's work setting is uncertain or hostile (Kahn, 1990). With regard to availability, employees are more likely to be willing to be engaged in their jobs if they have the physical, emotional and cognitive resources necessary to do so (May et al., 2004). It therefore follows that they will most likely experience burnout if they lack these resources.

Managerial implications and recommendations

The results of the current cross-sectional study suggest that job demands and job resources could play dissimilar roles with regard to their impact on the burnout and engagement of employees in agricultural research organisations. For the management of the organisations, this would imply that reducing the demands and increasing the resources of employees are likely to produce different effects. Reducing job demands would decrease levels of burnout, while increasing job resources would not only directly increase the level of engagement of agricultural employees, but could also directly safeguard them from burnout. Furthermore, the relationships between job demands and burnout and job resources and work engagement would be affected indirectly via the psychological conditions of meaningfulness, availability and safety of employees in agricultural research organisations. Therefore, from a managerial perspective, investing in human resource management policies aimed at ensuring availability

of job resources is highly recommended for agricultural research organisations as this could ensure greater productivity from the employees. It is also recommended that the organisation provides a work environment that would enhance meaningfulness, safety and availability of employees to improve their level of engagement at work as these factors might transfer the effects of job demands and resources to burnout and engagement

Suggestions for future research

Future studies should apply this model in other employment sectors. Future research may also investigate the antecedents of psychological conditions in the agricultural sector using a longitudinal design. This could provide more insight into the effects of job demands and job resources on the psychological condition, burnout and work engagement of employees at work, and also shed more light on other variables that mediate the relationship between job demands/job resources and psychological states at work.

Limitations of the study

The major limitation of this study is the use of a cross-sectional survey design as a data collection method. Therefore, causality of relationships could not be proven as the findings of the study were based on correlational data. Another limitation could be in the use of a non-probability voluntary sampling method. This could result in limitations in terms of generalising the sample to the total sample. However, this limitation could have been significantly addressed by the fact that data were taken from across different institutes within the organisation throughout the country.

Conclusion

The results of this study confirm the importance and usefulness of the job demands and resources models/theories as well as the Psychological Conditions at work theory in understanding the association between well-being constructs. More specifically, job demands (overload) contribute to burnout via the psychological conditions of meaningfulness and availability, while job resources contribute to work engagement via all three psychological conditions.

CHAPTER 5

CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS

In this chapter, conclusions are drawn regarding the specific objectives of this study. The limitations of the research are discussed, followed by recommendations for the organisation and suggestions for future research.

5.1. CONCLUSIONS

The general objective of this research is to investigate the well-being of employees in a South African agricultural research organisation. More specifically, to investigate the main job demands and resources of employees in an agricultural research organisation, the burnout of employees in an agricultural organisation, and to examine the relationship between job demands, job resources, burnout, work engagement and the psychological conditions of employees in an agricultural research organisation. A further aim was to test a structural model of their relationships in a group of employees in a South African agricultural research organisation. Conclusions are based on the results of the three research articles.

Next, the conclusions of the empirical studies are presented.

Article 1 of this study focused on the job demands and resources of employees in a South African agricultural research organisation. The first objective of this article was to investigate the validity and reliability of a scale that has been adapted to measure job demands and resources of employees in a South African agricultural research organisation; secondly, to determine the specific job demands and resources of this group of employees and, lastly, to determine the differences in the perceived job demands and resources of employees that may exist based demographic variables. The following nine themes relating to specific job demands and resources experienced by employees in an agricultural research institution were identified: Task-related demands, Client-related demands, Support, Employees' being a part of the planning and decision-making process, Learning/growth opportunities, Security, Communication, Significance of work, and Equipment. The results were used to adapt the JDRS, and showed that the factor analysis resulted in eight valid factors with acceptable alpha coefficients.

The identified job demands and resources included: organisational support, insecurity, rewards, overload, growth opportunities, control, relationships with colleagues, and physical resources. These are discussed next:

Organisational support refers to the agricultural research institution's employees' relationship with their supervisor, receiving information on their work, participating in decisions about the nature of their work, and feeling that they are effectively communicated with about things within the organisation. Insecurity denotes the employee's uncertainty about his/her future in the organisation in terms of retaining his/her job and current job status. *Reward* refers to whether the employee in an agricultural organisation can adequately live on his/her salary, whether he/she thinks he/she is paid enough for the tasks performed, and whether the job offers him/her opportunities to progress financially. Overload includes physical, mental and emotional demands, time pressure, pace, and amount of work experienced by the employees in an agricultural research organisation. *Growth opportunities* refer to the employees having access to opportunities for personal growth and development, as well as learning on the job. *Control* means the employees in an agricultural research organisation have the opportunity to think and act independently, to take part in planning their work activities, have the freedom with regard to how and when to carry out their work, and make a significant contribution to the organisation. The employee's relationship with his/her colleagues basically refers to the availability of his/her colleagues to help when requested by the employee, having contact possibilities with colleagues, whether the employee believes he/she can count on the colleague, and whether he/she gets on well with his/her colleagues. *Physical resources* refer to the employees in an agricultural organisation having adequate and good working equipment to accomplish their tasks.

Second-order factor analysis was done to ascertain which of the identified work factors could be classified into job demands and job resources, and showed that the job demands often experienced by employees in an agricultural research organisation consist of overload and insecurity. In addition, the employees experience job resources, which consist of organisational support, control, growth opportunities, rewards and physical resources. This finding confirms the basic proposition of the JD-R model that every job may have its own unique risk factors, classified into the categories of job demands and job resources (Bakker & Demerouti, 2007; Demerouti & Bakker, 2011).

However, Relationships with colleagues loaded onto both job demands and job resources. This could be because the employee in an agricultural research organisation experiences his/her relationship with his/her colleagues as a job resource that could be useful in achieving his/her work goals, especially within a team climate such as is found in the agricultural research sector (Demerouti et al., 2001; Schaufeli, & Bakker, 2004). However, relationships with colleagues can also be an interpersonal stressor (Basson & van der Merwe, 1994) that could place much demand on the employee in agricultural research organisation. This result therefore indicates the need to rephrase the items of the subscale measuring the employee's relationship with his/her colleagues to better reflect the individual employee's experience as either a demand or a resource.

The investigation to determine whether there were differences in the experienced job demands and resources of employees in an agricultural organisation based on demographic variables showed that research technicians perceive that they have inadequate physical resources (equipment) compared to research assistants and support staff. This could be because the equipment (e.g. computers, printers, and fax machines) needed by the support staff to accomplish their tasks was often supplied by the organisation. On the other hand, research assistants only perform jobs for which they do not need sophisticated equipment, while the technicians do the planting, harvesting, and laboratory functions that require modern-day (state-of-the-art) equipment, which may not always be available or in good working condition.

The second article of this research related to the investigation of the psychometric properties of a new scale to measure burnout. The unique contribution of this study relates to the second objective of this research, which was to provide an overview of current burnout measures being used in the literature. From the literature, research gaps were identified and used to develop a new Burnout Scale for use with employees within a South African agricultural organisation. The research then intended to examine the construct validity, reliability, construct equivalence and item bias of the newly-developed Burnout Scale. The research also investigated whether any differences in burnout existed in relation to the employees' demographic variables.

The Burnout Scale was developed to assess the burnout of employees in an agricultural research organisation, based on the theoretical conceptualisation of the *burnout* construct as

consisting of physical, emotional and cognitive components (see Pines & Aronson, 1981; Schaufeli & Greenglass, 2001; Shirom & Melamed, 2005) and also to address gaps of aspects of burnout not currently measured by available instruments.

These gaps included non-inclusion of cognitive weariness and the interpersonal aspects of burnout, which were lost with the introduction of the MBI-GS. Literature on burnout indicates that it represents an experience of insufficient energetic resources (of energy and motivation) (Bakker & Demerouti, 2007; Hobfoll, 2002), but all the aspects of exhaustion, i.e. physical, emotional and cognitive, are not effectively covered by the available instruments. Furthermore, burnout has been described as a psychological syndrome involving chronic emotional and interpersonal stressors that individuals experience at work and their subsequent responses to their tasks, organisations, co-workers, clients, and themselves (Maslach & Leiter, 2008); however, the interpersonal nature of burnout was lost with the introduction of the MBI-GS (Borgogni, Consiglio, Alessandri, & Schaufeli, 2012).

Previous research studies have shown that cognitive weariness (Marais, 2006) and interpersonal aspects of burnout (Rothmann & Barkhuizen, 2008; Jackson & Rothmann, 2006) are important dimensions of burnout. Exploratory factor analysis of the BS with target rotations resulted in a reliable three-factor model of burnout for employees in an agricultural research organisation. The results show that burnout of employees in an agricultural research organisation consists of (1) fatigue, which manifests in the employees feeling weak and exhausted and lacking the energy required to carry out their daily activities at work, such as getting up in the morning to go to work; (2) emotional exhaustion/withdrawal, which manifests in the employees feeling too weak to display empathy at work, lacking the energy to invest in relationships with colleagues at work and showing less excitement and connection to the job; and (3) cognitive weariness, which is illustrated in the employees' feelings of slow thinking and reduced mental alertness.

Furthermore, the results indicate that black and white members of the agricultural research organisation, as well as the Afrikaans and African-speaking employees, perceive the *burnout* construct the same way as the three burnout dimensions, which indicated equivalence for these linguistic and cultural groups within the agricultural research sector. Therefore, the mean scores of these groups of employees could be compared in other analyses. Investigations into differential item functioning (item bias) showed no item bias for the

Afrikaans, Sepedi, and Sesotho groups, thereby making the Burnout Scale largely appropriate for use within an agricultural research organisation in a multicultural setting with diverse linguistic and racial groups, such as South Africa (Van der Vijver & Rothmann, 2004; Van der Vijver & Leung, 1997, 2011).

Finally, the results also show that the burnout (fatigue) levels of employees in an agricultural organisation differ when taking their age into account. Employees who are between the ages of 20 and 25 reported lower fatigue than those aged 31 to 35, 36 to 40, and 46 to 50. Younger employees feel less tired at work, have enough energy to carry out their daily activities at work, and feel agile enough to get up in the morning to go to work. These findings do not support those of previous studies (Jackson & Rothmann, 2005a), which found that employees between 45 and 50 years of age experienced lower exhaustion levels than younger employees did (younger than 27 years). The findings in the present study could be explained by the fact that older employees have more family responsibilities and work overload as they age (Osipow, Doty, & Spokane, 1985). The result of the present study is supported by the finding of Ekstedt et al. (2006; 2012), who found that fatigue in occupational burnout may be due to variables outside of the work setting, such as disturbed sleep. Researchers such as Geurts and Demerouti, (2003) have shown the negative effect of Work Home Interference on employees. Specifically, Allen, Herst, Bruck, and Sutton (2000) found that stress-related outcomes were especially related to work-home interference. The result of this finding could therefore help the organisation in planning intervention programmes for employees who fall within certain age groups.

The third article of this thesis involved a model of well-being of employees in a South African agricultural research organisation. This study included investigating the relationship between job demands, job resources, psychological conditions, burnout and engagement and to test a structural model of their relationships in a group of employees in a South African agricultural research organisation.

A fit was found for a model in which (1) job demands (overload) and a lack of resources contributed to burnout and (2) job resources (organisational support, control, and growth opportunities) contributed to work engagement fitted the data. Psychological availability and meaningfulness mediated the relationship between job demands and burnout. The

relationship between job resources and engagement was mediated by psychological meaningfulness, safety, and availability. Furthermore, the relationship between job resources and burnout was mediated by all three psychological conditions.

Results showed that perceived job demands have direct effects on the burnout of employees in an agricultural research organisation, implying that the greater the load experienced by an employee, the higher the risk of the employee experiencing burnout, especially when they have no control over when and how to do their work, when they lack organisational support, and when they have no opportunities to grow and develop in their jobs. This finding confirmed the results of previous researchers (Buys & Rothmann, 2010; Maslach et al., 2001; Rothmann & Jorgensen, 2007), who found that burnout is a direct response to overload. On the other hand, job resources had a direct effect on work engagement; employees in an agricultural research organisation will experience higher levels of engagement when they have control over their work, when they have the support of the organisation, and if they have opportunities to grow in their organisation. This finding is in line with previous research findings (see Bakker & Demerouti, 2008; Barkhuizen & Rothmann, 2006; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009).

Further findings indicate a strong association between psychological meaningfulness, on one hand, and burnout, as well as work engagement of employees in an agricultural research organisation, on the other hand. Psychological meaningfulness is a state that results when an individual feels that he/she is receiving a return on investment of him-/herself via a currency of physical, cognitive, or emotional energy (Kahn, 1990). Therefore, employees in agricultural research organisations experience meaningfulness when they feel useful, valuable, not taken for granted, and feel that they make a difference in their organisation. Furthermore, people who experience meaningfulness not only feel able to give to others and to the work itself in the performance of their roles, they are also able to receive (Kahn, 1990). In the current study, psychological meaningfulness was negatively related to burnout and positively related to the engagement of employees in an agricultural research organisation. Therefore, employees in an agricultural research organisation become more motivated to engage in their work when they find meaning and purpose in it, and when they feel that they are receiving corresponding physical, cognitive, and emotional resources for their contributions to the organisation. However, they experience burnout when they find no meaning in their work activities. One way that agricultural research organisations could

foster the psychological meaningfulness of employees is through job design that would adequately ensure appropriate fit between employees and the roles they occupy. Findings support previous studies, such as those of May, Gilson, and Harter (2004), Olivier and Rothmann (2007), and Rothmann and Rothmann (2010), who also found that psychological meaningfulness showed strong positive correlation with work engagement, and lack of meaning in one's work could lead to disengagement from work (Kahn, 1990). Therefore, the employees in an agricultural research organisation need to experience meaningfulness in their work, not only to enhance work engagement, but also to prevent the likelihood of burnout.

Psychological availability was found to significantly affect both burnout and engagement of employees in an agricultural research organisation. Psychological availability refers to one's belief of being equipped with the physical, emotional, or psychological resources to personally engage in work at a particular point in time (Kahn, 1990). It assesses how prepared people are to engage in their work, considering the distractions they experience as members of communal structures (Kahn, 1990). It further refers to self-efficacy, "which is the belief in one's capability to organise and execute the course of action required to produce given attainments, and also refers to an individual's belief in his or her capability to achieve a favourable result in any given situation" (Bandura, 1997, p. 477). Individuals engage in tasks for which they are more psychologically available, and disengage from tasks for which they are less available (Kahn, 1990). Psychological availability was found to be negatively associated with burnout, and positively associated with the work engagement of employees in an agricultural research organisation. When the employees are depleted of resources (physical, emotional, and cognitive), they feel they cannot achieve results, and subsequently become disengaged from such tasks. On the other hand, when the employees in an agricultural research organisation have these resources, they feel that they are able to achieve desired results, and they are more psychologically available, and, consequently, engaged in their work (May et al., 2004). This supports previous findings establishing a positive association between availability and work engagement (Rothmann & Rothmann, 2010; Breso´, Schaufeli, & Salanova, 2011), and a negative association between availability and burnout (Breso´ et al., 2011; Leiter, 1992), especially the finding related to a lack of self-confidence being a critical factor in the development of burnout (Salanova, Peiro, & Schaufeli, 2002).

Burnout and work engagement levels of employees in an agricultural research organisation are directly affected by psychological safety. Psychological safety is defined as "feeling able to show and employ one's self without fear of negative consequences to self-image, status, or career" (Kahn, 1990, p. 708). Psychological safety was found to be a strong predictor of burnout and work engagement of employees in an agricultural research organisation. Psychological safety strengthens well-being (burnout and work engagement) of the employees and addresses how employees perceive their safety at work affects their engagement (and, by extension, disengagement), especially through its association with skill preference (Dollard, & Bakker, 2010). The extent to which the employees in an agricultural research organisation feel they can safely express their opinions without negative repercussions affects whether they can take work-related risks. Psychological safety is therefore a key construct in the well-being of employees in an agricultural research organisation. It is therefore vital that agricultural research organisations provide employees with an environment that is supportive to enhance their feelings of psychological safety.

With regard to the mediating effect of psychological conditions, results from the present study show that job demands indirectly affect the burnout of employees via psychological conditions of availability and meaningfulness of employees in an agricultural research organisation. Therefore, these psychological conditions play important roles in mediating the relationship between burnout and its antecedent (overload). When employees experience high levels of job stress, it negatively impacts their meaningfulness, and results in disengagement (George, Louw, & Badenhorst, 2008; Schulze & Steyn, 2007). However, this effect can be buffered by coping mechanisms of the employees (Rothmann & Buys, 2011). This is also consistent with Matuska and Christiansen's (2008) assertion that psychological meaningfulness is most important for resilience under stressful conditions. Furthermore, the effect of job demands on burnout is mediated by the psychological condition of availability. The effect of job demands on employees is significantly reduced, not only by availability of job resources, which motivates the employee (Schaufeli, & Bakker, 2004), but also by self-efficacy of the employees, which allows individuals to make themselves psychologically available and be fully immersed in their work (Phale, 2008). Therefore, psychological availability and meaningfulness can be considered pathways through which job demands (overload) impact on the burnout of employees in an agricultural research organisation.

Furthermore, this study showed that a lack of job resources indirectly affects the burnout of employees in an agricultural research organisation via all three psychological conditions. The meaning that employees in an agricultural organisation derive from their jobs will be affected when they lack control over their jobs, have no opportunities to grow in their jobs, and do not receive the support of the organisation. This state would equally affect the confidence in their ability to perform the task (psychological availability), and lower their feelings of psychological safety, which will ultimately affect their burnout levels. However, when the employees in an agricultural research organisation have job resources, their engagement levels will increase. A study by May et al. (2004) showed that the relationship between work engagement and its antecedent variables was mediated by the psychological conditions of meaningfulness, safety, and availability. All three psychological conditions are therefore vital in understanding the relationship between work engagement and its antecedents (job control, organisational support, and growth opportunities).

Kahn (1990) reported that an individual will become disengaged if he finds the work meaningless. When employees see work as meaningful, they will be better engaged in it, but will disengage if they perceive it as meaningless. Employees are more intrinsically motivated when they are engaged in meaningful work (Treadgold, 1999). Furthermore, employees are better engaged in their work when they feel psychologically safe because they are assured that they can voice their opinions without any negative consequences. On the other hand, employees become disengaged from their work when they perceive their work setting as unsafe or hostile (Kahn, 1990). Employees are also more likely to be engaged in their jobs if they have the physical, emotional, and cognitive resources necessary to do so (May et al., 2004). Lacking these resources will most likely result in burnout. Therefore, the psychological conditions of meaningfulness, safety, and availability could be considered pathways to understanding the effect of job resources on engagement, and lack of resources on burnout of employees in an agricultural research organisation.

5.1.1 Summary of the contributions of the research study

The specific contributions of each study as indicated in the research articles include:

Research article 1: The research study provides information on the job demands and resources experienced by employees in an agricultural research organisation. Prior to this research study, there was no empirical information (both locally and abroad) on the specific

job demands and resources experienced by employees in an agricultural research organisation. Therefore, this study fills the gap in literature. The findings of this research study with regard to the differences in experienced job demands and resources could be used as the basis of planning intervention programmes either by practitioners or researchers (see Hakannen & Roodt, 2010). Through the research study, a valid and reliable tool is made available for investigating job demands and resources in an agricultural organisation.

Research article 2: This research study fills the gap in literature by providing a valid and reliable instrument that could be used to measure all the dimensions of burnout as conceptualised in literature and which will be readily available to researchers. It not only measures burnout as an exhaustion of physical, emotional and cognitive resources (as conceptualised by the Shirom Melamed Burnout Measure (SMBM)), but also includes items that measure cognitive weariness. Schaufeli (2003) has proposed that this is an important dimension of the burnout construct. Furthermore, the newly-developed burnout scale includes items to measure interpersonal aspects of burnout that had been lost with the introduction of the MBI-GS (Borgogni, Consiglio, Alessandri, &. Schaufeli, 2012) and which had been identified as an important dimension of burnout (Armon, Shirom, Shapira & Melamed, 2008; Borgogni et al., 2012). This aspect is equally missing in other available instruments for measuring burnout (i.e. the Burnout Measure, the Copenhagen Burnout Inventory, the Oldenburg Burnout Inventory and the SMBM). This instrument will be readily available to the general public and could be the basis for further research studies. The findings with regard to differences in burnout of employees could be used as basis for intervention by the organisation.

Research article 3: This study contributes to knowledge about the mediating effect of the psychological conditions of meaningfulness, safety and availability on well-being (burnout and engagement) utilising the JD-R framework. The role of these psychological conditions with regard to engagement (or disengagement) has not fully been established (Kahn & Heaphy, 2014). Most importantly, there is hardly any literature available both locally and abroad where the relationship between burnout, work engagement and psychological conditions (as mediating variables) has been investigated in a model within the JD-R framework. Most South African studies have investigated the relationship between

availability and engagement or meaningfulness and engagement neglecting the role of psychological safety as a mediator between work engagement and its antecedent. Information on the relationship between burnout and its antecedents via the psychological conditions is equally non-existent. The model presented in this research study could form a basis for future research studies either through validating the model in other sample of employees or as a basis for extending the JD-R model. This could be done by extending the model to include outcome variables. Furthermore, the information provided will be a useful resource for the management of agricultural research organisations and other human resource practitioners.

Furthermore, the methodology utilised in the study (i.e. the use of categorical estimator in mediation studies and calculating effect sizes by means of kappa squared) is still relatively new. Most studies have utilised the maximum likelihood method (ML). This study is the first both locally and abroad to utilise the categorical estimator in testing for mediation of psychological conditions (of meaningfulness, safety and availability) within the JD-R framework. Furthermore, previous studies investigating the mediation of burnout and work engagement within the JD-R framework (with the exception of a few studies such as De Beer, Rothmann and Pienaar, 2012) have mostly utilised the classic methods of Baron and Kenny (1986), and the Sobel test. These mediation tests result in claims of partial or full mediation. Bootstrapping (which is used in this study) is considered a more statistically valid and powerful option (Williams & MacKinnon, 2008; Hayes, 2009). Rucker, Preacher, Tormala, and Petty (2011) proposed that interest in mediation analysis should shift to the magnitude and significance of indirect effects; rather than total effects. This is due principally to the fact that an overemphasis on total effects before or after controlling for a mediator could lead to misleading and even false conclusions. This study also utilised the new method of calculating kappa-squared values to interpret mediation effect sizes. As suggested by Preacher and Kelley (2011), using the methods spelt out above offers a valid report on the mediating effects of psychological conditions in the relationship between job resources (control, growth opportunities and organisational support) and work engagement as well as between job demand (overload) and burnout.

5.2 LIMITATIONS OF THIS RESEARCH

The first limitation of this study was the use of a cross-sectional survey design to collect data. The major shortcoming of this type of design is that it does not permit the researcher to assess how variables manifest over time, in spite of the use of statistically advanced techniques, such as structural equation modelling methods. Because the findings of the present study were based on correlational data, no causal connections could be drawn with regard to relationships between the constructs used in the study. The relationships between constructs could only be analysed, described, and interpreted, not established. Therefore, the identification of relationships in the present study only serves to establish certain patterns consistent with previous theoretical research regarding the sequential relationships of the different variables studied. In order to deal with the limitation of the use of a cross-sectional design, a prospective longitudinal research design (in which data are collected at different points in time, Spector (2012) is needed to further validate the hypothesised causal relationships in the present study. Longitudinal studies could not be used in this present study considering the high turnover of employees in the organisation. The researcher could therefore not be assured of the availability of the employees if a longitudinal research design was utilised.

The second limitation of the present research study is that the results were obtained through self-report measures. As pointed out by Schaufeli, Enzmann, and Girault (1993), this could lead to what is generally known as 'method variance'. This implies that at least part of the shared variances between variables may be attributed to method variance. Method variance refers to using the same method of data collection, and when the correlations between two variables are artificially inflated due to shared biases (Spector, 2006). Common method variance can arise as a result of different factors, such as item ambiguity, item grouping, social desirability and measurement context effects (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). A proposed solution is observer ratings, but these observers cannot be freed from their own biases and stereotypes. Moreover, the common method bias effect has been indicated as minor in magnitude (Meade, Watson, & Kroustalis, 2007). Several researchers have argued that this phenomenon is not a major threat if (as in the current study) interactions were found between the variables (Dollard, & Winefield, 1998; Wall, Jackson, Mullarkey, & Parker, 1996). In fact, common method variance is considered a myth and it has been suggested that the terminology should be abandoned altogether (Spector, 2006).

An extension to the limitation of the use of self-reports is that the method does not allow the use of other, additional data-gathering methods to gather information on well-being constructs (i.e. burnout and work engagement). Researchers (see Dolan, 1995; Viljoen, 2006) have proposed integrating multivariate approaches in data-gathering methods (e.g. by including variables inherent to the job, the environment, and the individual in the study of constructs such as burnout and engagement).

A third limitation could be the use of a non-probability purposive voluntary sampling method. This method of sampling might impose limitations with regard to generalising the sample to the total population. However, the present researchers believe that the fact that data were taken from across different institutes of the organisation throughout the country may have greatly addressed this limitation.

The fourth limitation lies in the sample, in terms of the distribution of linguistic groups. No distinction could be made between different linguistic groups, because of the small or non-existent representation of some groups. The sample consisted mainly of Afrikaans-speaking employees, while the English-speaking and some African language groups were not adequately represented, which made it impossible to have a separate analysis for each language with regard to the statistical analyses on item bias for the BS.

5.3. RECOMMENDATIONS

5.3.1. Recommendations for the organisation

The findings of this research study suggest that interventions should be aimed at the reduction of job demands, together with an increase in job resources of agricultural research organisations. Employees in agricultural research organisations have substantial work burdens. Indeed, they often experience stressful situations (ARC, 2005), but if they also receive support from the organisation, and have control over when and how their work is done, they will be psychologically available within their various roles. The employees feel they have physical, emotional, or psychological resources when they receive more support from the organisation, and when they experience less pace and amount of work. Management should endeavour to decrease the workload of the employees, which can be expected to cause a decrease in burnout of employees, which consists of fatigue, emotional exhaustion/withdrawal, and cognitive weariness. Planned interventions aimed at increasing

job resources (such as control, growth opportunities, and organisational support) will lead to increased work engagement. Therefore, from a managerial perspective, investing in human resource management policies aimed at ensuring the availability of job resources is highly recommended for agricultural research organisations. Merely expecting employees to function with a high workload is essential to achieve organisational goals, and by not providing them with the necessary resources could negatively affect the employees by reducing their productivity and resulting in exhaustion and negative work attitudes. This would ultimately impact on the effectiveness of the organisation, as employees' well-being is essential for organisational success.

Specific areas of intervention should include improvement in supervisory relationships in the organisation and job design. Job design is of great practical significance to companies (Tims & Bakker, 2010). The process of job design would involve the agricultural research organisation creating jobs and then recruiting individuals with adequate knowledge, skills, and abilities for these jobs. Strümpfer (2006) recommends that by appropriately designing jobs, they could increase the well-being and thriving (i.e. when employees personally overcome challenges at work, and grow from them) of employees (inclusive of those in an agricultural research organisation). Researchers of job design have specifically established that enrichment of jobs in the five core job dimensions of the Job Characteristics Model (Hackman, & Oldham, 1980) can significantly affect the meaningfulness experienced by employees (see May et al., 2004).

Closely related to the job design concept is job redesign. In order to assist the employees to better handle their jobs, the organisation under study should consider job redesign. Job redesign is usually seen as a process in which the supervisor decides to change an aspect of the job, tasks, or roles of the individual (Tims & Bakker, 2010). Job redesign is a new and alternative perspective on job design at individual level. During the job redesign process, the organisation first employs the employees, who subsequently start to change the job to better fit their capabilities and preferences (Berg, Dutton, & Wrzesniewski, 2008). This way, individual employees are seen as also being accountable for the outcomes of their work (Tims & Bakker, 2010). This could further motivate the employees into enhancing their performance.

Another way for management to improve the work motivation and other positive work outcomes of the employees in an agricultural research organisation is through job crafting (Tims & Bakker, 2010). According to Wrzesniewski and Dutton (2001), job crafting is defined as "changing the boundaries and conditions of job tasks and job relationships and of the meaning of the job" (p. 179). Changing task boundaries would involve the employees changing how they conceptualise and carry out their work. Changing relationship boundaries would involve changing how frequently and with whom they interact at work. Changing meaning would involve the manner in which employees in an agricultural organisation "cognitively ascribe meaning and significance to their work" (Tims & Bakker, 2010, p. 3). Job-crafting behaviours could result in several positive outcomes for the employees in the organisation under study. These desirable outcomes would include thriving, resilience, and work engagement (Berg et al., 2008), and may be used by employees as a temporary solution during demanding periods (Tims & Bakker, 2010).

Secondary interventions can be implemented to prevent the employees who are already showing signs of burnout from becoming ill, and to increase their engagement. A good starting point would be providing adequate physical resources to the employees (i.e. research assistants who have reported inadequacies in available physical resources). Providing the needed resources will not only reduce the strain of accomplishing their tasks, but could also substantially improve their level of engagement.

Another area of intervention could be to build a conducive work environment. This will include that the organisation provides employees with the necessary support and growth opportunities, where employees could trust their supervisors, and the supervisors, in turn, allow their subordinates control over their work.

In conclusion, it is recommended that the organisation provides the employees with a working environment that fosters psychological meaningfulness, safety, and availability to improve their well-being.

5.3.2 Recommendations for future research

Certain recommendations are made in order to overcome limitations in future research studies.

In order to deal with the limitation of the use of a cross-sectional design, longitudinal and quasi-experimental research designs are needed to further validate the hypothesised causal relationships in the present study. These studies are necessary to explore the effects of specifically designed interventions, focusing on, at individual or organisational level, improving perceived psychological conditions, reducing burnout, and improving engagement levels of employees.

It is recommended that the AJDRS be used to measure the job demands and job resources of employees in the agricultural research sector in South Africa. However, it is suggested that items on relationship with colleagues be revisited and clearly defined, and that the variables be included in future studies examining its relationship with *well-being* variables. It is further recommended that future research studies examine the construct equivalence of the AJDRS, as this could not be investigated in the present study, because of the limitations in terms of the demographic make-up of the participants.

Although the Burnout Scale was originally developed in South Africa, it is recommended that future studies establish the construct equivalence in samples from other sectors within and outside of South Africa. Furthermore, more balanced cultural samples could be used to test the construct equivalence of the instrument for other cultural groups not included in this study.

It is also recommended that future researchers build on the framework of the well-being model presented in this research study by investigating the mediating effect of psychological conditions between burnout and ill-health, and engagement and organisational commitment and other variables of research interest.

Further investigations should also be carried out on the mediating effects of psychological conditions on work engagement and burnout within other work contexts. Furthermore, within the JD-R framework, the indirect effect of work engagement on organisational commitment and of burnout on ill-health via psychological conditions should be further explored. Schaufeli and Bakker (2004) found that ill-health and organisational commitment were consequences of burnout and engagement. Phale (2008) found a direct association between psychological availability and physical and psychological ill-health, as well as a direct inverse association between psychological meaningfulness and psychological ill-

health; psychological meaningfulness strongly predicted normative commitment. It is equally necessary to use longitudinal research studies to investigate the effects of psychological conditions in different work settings, and also as part of the interventions designed specifically for dealing with psychological availability.

The model of well-being proposed in this study could be tested in and extended to other occupational sectors. Future research may also examine the antecedents of psychological conditions at work, using a longitudinal design. This could present further information on the effects of job demands and job resources on psychological conditions, burnout, and work engagement of employees, and could also offer greater insight into other factors that could mediate the relationship between job demands/job resources and psychological states at work.

Future research should also include a diary study of the job demands and resources of employees within a South African agricultural research organisation, so as to establish how the experiences of job demands and resources of the workers vary over days. Future studies should also investigate the immediate and long-term effects of specific job demands and resources on the health and well-being of employees within the agricultural research sector. Stone and Shiffman (1994) recommended the use of the ecological momentary assessment (EMA) method to test how employees experience job demands and job resources on a momentary basis within their natural environment, which would provide complementary information to that obtainable from the cross-sectional research design utilised in the present study. Utilising the EMA (which can be classified as diary study) would be appropriate to study the employees' job demands, job resources, burnout, and engagement on more than one occasion and make it feasible to obtain inter-individual and/or intra-individual results (Collins, 2006). This would be particularly of much importance since studies have shown that the variables under study can vary (see Bakker, 2009; Sonnenteng, 2003).

Finally, future researchers should also focus on the study of appropriate interventions and their effect, using appropriate research designs such as probability sampling methods. In line with the suggestion by Vandenberg and Self (1993), it is also recommended that intervention mapping be used in the planning, application, and research of the impact of interventions and the combination of different types of change with regard to the effectiveness of intervention methods.

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Appendix A: Questionnaire for survey

BIOGRAPHICAL DATA

Please indicate what is applicable to you

Gender:	Male	①
	Female	②

Marital Status:	Single	①
	Engaged	②
	Married	③
	Living together	④
	Separated/Divorced	⑤
	Widow/Widower	⑥
	Other	⑦

Race:	African	①
	Coloured	②
	Indian	③
	White	④

Home Language:	Afrikaans	①	Sesotho	⑦
	English	②	Setswana	⑧
	IsiNdebele	③	SiSwati	⑨
	IsiXhosa	④	Tshivenda	⑩
	IsiZulu	⑤	Xitsonga	(11)
	Sepedi	⑥	Other	(12)

Age:	20-25	①
	26-30	②
	31-35	③
	36-40	④
	41-45	⑤
	46-50	⑥
	51-55	⑦
	+55	⑧

Education:	Grade 9 - 10	①
	Grade 12	②
	Certificate/Diploma	③
	Bachelors degree	④
	Honours	⑤
	Masters	⑥
	PhD	⑦
	Other	⑧

Position:	Research Assistant	①
	Research Technician	②
	Researcher	③
	Programme Manager/Specialist Scientist	④
	Support Staff	⑤

Number of years in present position	1-5	①
	6-10	②
	11-15	③
	16-20	④
	21-25	⑤
	26-30	⑥
	30+	⑦

Number of years in organisation	1-5	①
	6-10	②
	11-15	③
	16-20	④
	21-25	⑤
	26-30	⑥
	30+	⑦

WORK-RELATED WELL-BEING SURVEY

Below are a number of statements that describe different ways you may feel about your work and work environment. Please read each statement carefully and indicate how often you have had each of the following feelings.

Please do not skip any questions.

Scale:

1 = Never	2 = Almost Never	3 = Rarely	4 = Sometimes	5 = Often	6 = Very often	7 = Always

1.	I feel weak while at work.	①	②	③	④	⑤	⑥	⑦
2.	I do not have enough energy to carry out my daily tasks.	①	②	③	④	⑤	⑥	⑦
3.	I do not have the energy to go to work in the morning.	①	②	③	④	⑤	⑥	⑦
4.	I feel exhausted at the end of a working day.	①	②	③	④	⑤	⑥	⑦
5.	I feel emotionally exhausted at work.	①	②	③	④	⑤	⑥	⑦
6.	My work makes me feel weary.	①	②	③	④	⑤	⑥	⑦
7.	I do not feel like building relationships with my co-workers.	①	②	③	④	⑤	⑥	⑦
8.	I lack the energy to build relationships with people at work.	①	②	③	④	⑤	⑥	⑦
9.	I feel I am less connected to my work.	①	②	③	④	⑤	⑥	⑦
10.	I feel frustrated at work.	①	②	③	④	⑤	⑥	⑦
11.	I am unable to imagine the feelings of my co-workers.	①	②	③	④	⑤	⑥	⑦
12	I am not emotionally affected by how other people at work feel.	①	②	③	④	⑤	⑥	⑦
13.	I am not excited about my job.	①	②	③	④	⑤	⑥	⑦
14.	I do not think clearly while at work.	①	②	③	④	⑤	⑥	⑦
15.	I cannot concentrate while at work.	①	②	③	④	⑤	⑥	⑦
16.	I struggle to process problems quickly.	①	②	③	④	⑤	⑥	⑦
17.	The thought of the work I have to do makes me tired.	①	②	③	④	⑤	⑥	⑦
18.	I find it difficult to learn new things on my job.	①	②	③	④	⑤	⑥	⑦
19.	I find it difficult to think about complex things while at work.	①	②	③	④	⑤	⑥	⑦
20.	I am not focused while working.	①	②	③	④	⑤	⑥	⑦

WORK ENGAGEMENT SCALE

The following statements are about how you may feel at work. Please read each statement carefully and circle the number that best describes how frequently you feel this way.

Please do not skip any questions.

Scale:

1 = Never	2 = Almost Never	3 = Rarely	4 = Sometimes	5 = Often	6 = Very often	7 = Always

1.	I put a lot of effort into my job.	①	②	③	④	⑤	⑥	⑦
2.	I feel *vigorous throughout a work day.	①	②	③	④	⑤	⑥	⑦
3.	I persevere to make sure everything goes well in my job.	①	②	③	④	⑤	⑥	⑦
4.	I expend a lot of energy performing my job.	①	②	③	④	⑤	⑥	⑦
5.	I am full of energy while working.	①	②	③	④	⑤	⑥	⑦
6.	I have the energy to work for long periods of time.	①	②	③	④	⑤	⑥	⑦
7.	I do not feel like taking a break while working.	①	②	③	④	⑤	⑥	⑦
8.	I am enthusiastic about my job.	①	②	③	④	⑤	⑥	⑦
9.	I feel happy while I am doing my job.	①	②	③	④	⑤	⑥	⑦
10.	It makes me happy when I do my job well.	①	②	③	④	⑤	⑥	⑦
11.	I am emotionally connected to my job.	①	②	③	④	⑤	⑥	⑦
12	I identify with my job.	①	②	③	④	⑤	⑥	⑦
13.	I look forward to going to work in the morning.	①	②	③	④	⑤	⑥	⑦
14.	I am not aware of other things that go on around me while doing my work.	①	②	③	④	⑤	⑥	⑦
15.	My attention is completely focused on my job.	①	②	③	④	⑤	⑥	⑦
16.	I am not distracted while doing my work.	①	②	③	④	⑤	⑥	⑦
17.	I am focused in my thinking.	①	②	③	④	⑤	⑥	⑦
18.	I am deeply involved in my job.	①	②	③	④	⑤	⑥	⑦
19	I do not think of other things while doing my job.	①	②	③	④	⑤	⑥	⑦
20.	I loose track of time while working.	①	②	③	④	⑤	⑥	⑦

*** Vigorous: Very active, determined or full of energy.**

ADAPTED JOB DEMANDS-RESOURCES SCALE

The purpose of this questionnaire is to obtain an accurate picture of how you personally evaluate specific aspects of your work and work environment.

Please read each statement carefully and decide if you feel this way.

Please do not skip any questions.

Scale:

1 = Never	2 = Almost Never	3 = Rarely	4 = Sometimes	5 = Often	6 = Very often	7 = Always

1.	Do you have too much work to do?	①	②	③	④	⑤	⑥	⑦
2.	Do you work under time pressure?	①	②	③	④	⑤	⑥	⑦
3.	Do you have enough time to complete your work?	①	②	③	④	⑤	⑥	⑦
4.	Do you complete your work within the prescribed time?	①	②	③	④	⑤	⑥	⑦
5.	Do you have to put in extra hours beyond your working time?	①	②	③	④	⑤	⑥	⑦
6.	Do you find that you do not have enough work?	①	②	③	④	⑤	⑥	⑦
7.	Do you have to be attentive to many things at the same time?	①	②	③	④	⑤	⑥	⑦
8.	Do you have to give continuous attention to your work?	①	②	③	④	⑤	⑥	⑦
9.	Do you have to remember many things in your work?	①	②	③	④	⑤	⑥	⑦
10.	Are you confronted in your work with many things that affect you personally?	①	②	③	④	⑤	⑥	⑦
11.	Do you have contact with difficult clients in your work?	①	②	③	④	⑤	⑥	⑦
12	Does your work put you in emotionally upsetting situations?	①	②	③	④	⑤	⑥	⑦
13.	Do you have to repeatedly do the same things in your work?	①	②	③	④	⑤	⑥	⑦
14.	Does your work put much demand on you physically?	①	②	③	④	⑤	⑥	⑦
15.	Does your work put much demand on you mentally?	①	②	③	④	⑤	⑥	⑦
16.	Does your work require you to be very accurate?	①	②	③	④	⑤	⑥	⑦
17.	Do you have enough variety in your work?	①	②	③	④	⑤	⑥	⑦
18.	Does your work offer you opportunities for personal growth and development?	①	②	③	④	⑤	⑥	⑦
19.	Does your work contribute significantly to the growth of your institute/organisation?	①	②	③	④	⑤	⑥	⑦
20.	Do you think you are doing an important work people can benefit from?	①	②	③	④	⑤	⑥	⑦
21.	Does your job offer you the opportunities for independent thought and action?	①	②	③	④	⑤	⑥	⑦
22.	Do you have freedom in carrying out your work activities?	①	②	③	④	⑤	⑥	⑦
23.	Do you take part in the planning of your work activities?	①	②	③	④	⑤	⑥	⑦
24.	Can you participate in decisions about when a piece of work must be completed?	①	②	③	④	⑤	⑥	⑦

1 = Never	2 = Almost Never	3 = Rarely	4 = Sometimes	5 = Often	6 = Very often	7 = Always

25.	Can you count on your colleagues when you come across difficulties in your work?	①	②	③	④	⑤	⑥	⑦
26.	Can you ask your colleagues for help if necessary?	①	②	③	④	⑤	⑥	⑦
27.	Do you get on well with your colleagues?	①	②	③	④	⑤	⑥	⑦
28.	Can you count on your supervisor when you come across difficulties in your work?	①	②	③	④	⑤	⑥	⑦
29.	Do you get on well with your supervisor?	①	②	③	④	⑤	⑥	⑦
30.	Do you feel appreciated by your supervisor?	①	②	③	④	⑤	⑥	⑦
31.	Do you know exactly what is expected of you in your work?	①	②	③	④	⑤	⑥	⑦
32.	Do you know exactly for what you are responsible and what not?	①	②	③	④	⑤	⑥	⑦
33.	Do you know exactly what your direct supervisor thinks of your performance?	①	②	③	④	⑤	⑥	⑦
34.	Do you receive sufficient information on the purpose of your work?	①	②	③	④	⑤	⑥	⑦
35.	Do you receive sufficient information on the results of your work?	①	②	③	④	⑤	⑥	⑦
36.	Does your direct supervisor inform you on how well you are doing your work?	①	②	③	④	⑤	⑥	⑦
37.	Are you kept adequately up to date about important issues in your organisation/institute/division?	①	②	③	④	⑤	⑥	⑦
38.	Is the organisation's/institute's decision making process clear to you?	①	②	③	④	⑤	⑥	⑦
39.	Is it clear whom you should address within the organisation/institute for specific problems?	①	②	③	④	⑤	⑥	⑦
40.	Can you discuss work problems with your direct supervisor?	①	②	③	④	⑤	⑥	⑦
41.	Can you participate in decisions about the nature of your work?	①	②	③	④	⑤	⑥	⑦
42.	Do you have direct influence on your institute's/organisation's decisions?	①	②	③	④	⑤	⑥	⑦
43.	Do you have contact with colleagues as part of your work?	①	②	③	④	⑤	⑥	⑦
44.	Do you talk with your colleagues regarding work related matters?	①	②	③	④	⑤	⑥	⑦
45.	Can you have a chart with colleagues during working hours?	①	②	③	④	⑤	⑥	⑦
46.	Do you have enough contact with colleagues during working hours?	①	②	③	④	⑤	⑥	⑦
47.	Do you need to be more secure that you will still be working in one year?	①	②	③	④	⑤	⑥	⑦
48.	Do you need to be more secure that you will keep your current job next year?	①	②	③	④	⑤	⑥	⑦
49.	Do you need to be more secure that you will keep the same function level next year?	①	②	③	④	⑤	⑥	⑦
50.	Do you need to be more secure you will be working on a funded project after the current one ends?	①	②	③	④	⑤	⑥	⑦
51.	Do you think your organisation pays good salaries?	①	②	③	④	⑤	⑥	⑦
52.	Can you live comfortably on your pay?	①	②	③	④	⑤	⑥	⑦
53.	Do you think that you are paid enough for the work that you do?	①	②	③	④	⑤	⑥	⑦
54.	Does your job offer you the possibility to progress financially?	①	②	③	④	⑤	⑥	⑦

1 = Never	2 = Almost Never	3 = Rarely	4 = Sometimes	5 = Often	6 = Very often	7 = Always

55.	Does your organisation/institute give you opportunities to follow training courses/workshops/conferences?	①	②	③	④	⑤	⑥	⑦
56.	Does your work offer you opportunities to learn on the job?	①	②	③	④	⑤	⑥	⑦
57.	Does your job give you the opportunity to be promoted?	①	②	③	④	⑤	⑥	⑦
58.	Do you have all the equipment/implements you need to accomplish your work?	①	②	③	④	⑤	⑥	⑦
59.	Is/Are the equipment/implements you use in your work in good working condition?	①	②	③	④	⑤	⑥	⑦
60.	Do you have modern day equipment/implements to do your work?	①	②	③	④	⑤	⑥	⑦

PSYCHOLOGICAL CONDITIONS SCALE

The purpose of this questionnaire is to obtain an accurate picture of how you personally perceive your work and work environment.

Please read each statement carefully and choose an answer that best describes your feelings.

Please do not skip any questions.

Scale:

1 = Strongly Disagree	2 = Disagree	3 = Slightly Disagree	4 = Neither agree nor disagree	5 = Slightly Agree	6 = Agree	7 = Strongly Agree

1.	The work I do on this job is very important to me**.**	①	②	③	④	⑤	⑥	⑦
2.	My job activities are personally meaningful to me.	①	②	③	④	⑤	⑥	⑦
3.	The work I do on this job is worthwhile.	①	②	③	④	⑤	⑥	⑦
4.	My job activities are significant to me.	①	②	③	④	⑤	⑥	⑦
5.	The work I do on this job is meaningful to me.	①	②	③	④	⑤	⑥	⑦
6.	I feel that the work I do on my job is valuable.	①	②	③	④	⑤	⑥	⑦
7.	I am afraid when I do not behave the way my organisation expects me to.	①	②	③	④	⑤	⑥	⑦
8.	I feel my job will be on the line if I express myself at work.	①	②	③	④	⑤	⑥	⑦
9.	Mistakes I make at work are held against me.	①	②	③	④	⑤	⑥	⑦
10.	I feel safe to take work-related risks in my institute/organisation.	①	②	③	④	⑤	⑥	⑦
11.	I feel that people at my work place may undermine my work.	①	②	③	④	⑤	⑥	⑦
12	I feel safe to discuss any mistakes I make with my supervisor.	①	②	③	④	⑤	⑥	⑦
13.	I do not know what to expect from my institute/organisation.	①	②	③	④	⑤	⑥	⑦
14.	I am not sure what is expected of me at my work place.	①	②	③	④	⑤	⑥	⑦
15.	There is a threatening environment at my work place.	①	②	③	④	⑤	⑥	⑦
16.	I do not feel safe to express my opinions at work.	①	②	③	④	⑤	⑥	⑦
17.	I am afraid to be myself at work	①	②	③	④	⑤	⑥	⑦
18.	I am confident of my ability to handle competing demands at work.	①	②	③	④	⑤	⑥	⑦
19.	I am confident of my ability to deal with problems that come up at work	①	②	③	④	⑤	⑥	⑦
20.	I am confident in my ability to think clearly at work.	①	②	③	④	⑤	⑥	⑦
21.	I am confident in my ability to display the appropriate emotions at work.	①	②	③	④	⑤	⑥	⑦
22.	I am confident that I can handle the physical demands at work.	①	②	③	④	⑤	⑥	⑦

Appendix B: Consent form

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOMKAMPUS

Tel +27 18 299 4309
Fax +27 18 299 1393
E-Mail Lene.Jorgensen@nwu.ac.za

11 March 2010

Dear participant,

Your participation is required in a PhD research study on work related well-being. The objective of the research is to investigate work related well-being in the agricultural sector. By participating in this research you will in no small measure be contributing to available research data on work wellness. Your consent will be highly appreciated

I.....give consent to be interviewed by the researcher, Mrs D.N. Asiwe, concerning my job. I understand that participation in the study is voluntary and that whatever information I give will be treated with utmost confidentiality. I also have the assurance of the researcher that anonymity will be ensured.

Signature..... Date.....

For any further enquiries, this office can be contacted.

Yours sincerely

Dr. Lené Jorgensen
School for Human Resource Sciences

North-West University

Potchefstroom Campus

Appendix C: WorkWell ethics checklist

WorkWell
Research Unit for Economic and Management Sciences

North-West University
Faculty of Economic and Management Sciences

Student Statement on Research Ethics

(to be completed as part of the Proposal Defence)

Please answer each question by ticking the appropriate box[1]:

		Yes	No
1.	Does the study involve participants who are particularly vulnerable[2] or unable to give informed consent? (e.g. children, people with learning or other mental of physical disabilities, people who are incarcerated, unemployed or otherwise compromised in responding to your questions)	☐	X
2.	Are you planning on making use of NWU students or direct and secondary/contracted staff members in this research?	☐	X
3.	Will the study require the co-operation of a gatekeeper for initial access to the groups or individuals to be recruited? (e.g. students at school, members of self-help groups, residents of a nursing home, the Minister of Education, a tribal chief or village elder)	☐	X
4.	Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g. covert observation of people)	☐	X
5.	Will the study involve discussion of or questions about a sensitive topic? (e.g. sexual activity, drug use, crime, harassment, violence)	☐	X
6.	Are drugs, placebos or other substances (e.g. food substances, vitamins) to be administered to the study participants or will the study involve invasive, intrusive or potentially harmful procedures of any kind or any physical, psychological or socio-economic intervention?	☐	X
7.	Will blood or tissue samples be obtained from participants?	☐	X
8.	Could the study induce physical, psychological or social stress or anxiety or cause harm or negative consequences beyond the risks[3] encountered in normal life?	☐	X
9.	Will the study require the identification of individuals for follow-up evaluation?	☐	X
10.	Will financial inducements (other than reasonable expenses and compensation for time) or inducements of any other kind be offered to participants?	☐	X
11.	I have read the NWU's Manual for Postgraduate Studies and am familiar with the Guidelines for Research Ethics contained therein.	X	☐
12.	Could the image of the NWU, the relevant academic department, your employer, or any other institution however affected by/involved in the project be negatively affected	☐	X

[1] Adapted from Economic and Social Research Council (2005). Research Ethics Framework (REF). www.esrcsocietytoday.ac.uk

[2] ***Vulnerable groups*** raise special issues of informed consent and potential risk. "Vulnerable" participants are not clearly described, but have been noted to include "...children, prisoners, pregnant women, mentally disabled persons, economically or educationally disadvantaged persons" (Common Federal Policy, 1991). Weijer and Emanuel (2000) consider participants to be vulnerable if they are not in a position to provide informed consent, due to their position (such as being in prison), or not possessing adequate intellectual faculty (such as children or the mentally ill)."Children" here are defined as participants younger than 18 years of age.

[3] ***Risk***: These possible risks are described as an "...invasion of privacy, loss of confidentiality, psychological trauma, indirect physical harm, embarrassment, stigma, and group stereotyping" (Oakes, 2002: 449), and also risks posed to . "...a subject's personal standing, privacy, personal values and beliefs, their links to family and the wider community, and their position within occupational settings, as well as the adverse effects of revealing information that relates to illegal, sexual or deviant behaviour" (Economic and Social Research Council (ESRC), 2005: 21). Minimal risk may be defined as where "...the probability and magnitude of harm or discomfort anticipated in the proposed research are not greater, in and of themselves, than those ordinarily encountered in daily life" (Code of Federal Regulations, 2005).

WorkWell
Research Unit for Economic and Management Sciences

North-West University
Faculty of Economic and Management Sciences

Student Statement on Research Ethics

(to be completed as part of the Proposal Defence)

by this research or put in a bad light?

If you answered **no** to all questions, submit the completed and signed form with your title registration. Students should retain a copy of the form and submit it with their dissertation/thesis.

If you answered **yes** to any of the questions, you will need to describe more fully how you plan to deal with the ethical issues raised by your proposal. **This does not mean that you cannot do the research, only that your proposal will need to be approved by the Research Ethics Committee.** You will need to submit your plans for addressing the ethical issues raised by your proposal using the Ethics Approval Application Form. This may be obtained from: https://intranet.nwu.ac.za/opencms/export/intranet/html/en/in-im-rs/researchethics/index.html

Please note that it is your responsibility to follow NWU's Guidelines for Ethical Research as set out in the Manual for Postgraduate studies and any relevant academic or professional guidelines in the conduct of your study. **This includes providing appropriate information sheets and consent forms, and ensuring the confidentiality in the storage and use of data.** Any significant change in the question, design or conduct over the course of the research should be notified to the Study Leader and may require a new application for ethics approval.

Candidate

Name and Surname: DORIS N. ASIWE

Signature:

Supervisor

Name and Surname: J. Jorgensen

Signature:

Chair: Research Proposal Committee:

Name and Surname: J. PIENAAR

Signature:

Date: 21/10/09

Appendix D: Covariance matrix

ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	OS	CONTROL	GROWTH	JRES	LOAD
OS	0.534				
CONTROL	0.326	0.356			
GROWTH	0.378	0.340	0.657		
JRES	0.363	0.326	0.378	0.363	
LOAD	0.060	0.054	0.063	0.060	0.421
PBO	-0.125	-0.112	-0.130	-0.125	0.019
EBO	-0.168	-0.151	-0.175	-0.168	0.026
CBO	-0.181	-0.163	-0.189	-0.181	0.028
BURNOUT	-0.125	-0.112	-0.130	-0.125	0.019
MEAN	0.337	0.303	0.351	0.337	0.304
SAFE	-0.115	-0.104	-0.120	-0.115	-0.019
AVAIL	0.301	0.271	0.314	0.301	0.235
WES	0.289	0.260	0.301	0.289	0.150

ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	PBO	EBO	CBO	BURNOUT	MEAN
PBO	0.525				
EBO	0.386	0.616			
CBO	0.415	0.560	0.813		
BURNOUT	0.286	0.386	0.415	0.286	
MEAN	-0.151	-0.204	-0.219	-0.151	0.811
SAFE	0.084	0.114	0.122	0.084	-0.107
AVAIL	-0.142	-0.191	-0.205	-0.142	0.392
WES	-0.262	-0.353	-0.379	-0.262	0.431

ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	SAFE	AVAIL	WES
SAFE	0.185		
AVAIL	-0.096	0.613	
WES	-0.057	0.331	0.618

TWO-TAILED P-VALUE FOR ESTIMATED CORRELATION MATRIX FOR THE LATENT VARIABLES

	OS	CONTROL	GROWTH	JRES	LOAD
OS	0.000				
CONTROL	0.000	0.000			
GROWTH	0.000	0.000	0.000		
JRES	0.000	0.000	0.000	0.000	
LOAD	0.002	0.002	0.002	0.002	0.000
PBO	0.000	0.000	0.000	0.000	0.271
EBO	0.000	0.000	0.000	0.000	0.272
CBO	0.000	0.000	0.000	0.000	0.268
BURNOUT	0.000	0.000	0.000	0.000	0.270
MEAN	0.000	0.000	0.000	0.000	0.000
SAFE	0.000	0.000	0.000	0.000	0.001
AVAIL	0.000	0.000	0.000	0.000	0.000
WES	0.000	0.000	0.000	0.000	0.000

TWO-TAILED P-VALUE FOR ESTIMATED CORRELATION MATRIX FOR THE LATENT VARIABLES

	PBO	EBO	CBO	BURNOUT	MEAN
PBO	0.000				
EBO	0.000	0.000			
CBO	0.000	0.000	0.000		
BURNOUT	0.000	0.000	0.000	0.000	
MEAN	0.000	0.000	0.000	0.000	0.000
SAFE	0.000	0.000	0.000	0.000	0.000
AVAIL	0.000	0.000	0.000	0.000	0.000
WES	0.000	0.000	0.000	0.000	0.000

S.E. FOR ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	OS	CONTROL	GROWTH	JRES	LOAD
OS	0.045				
CONTROL	0.029	0.044			
GROWTH	0.028	0.032	0.056		
JRES	0.037	0.029	0.028	0.037	
LOAD	0.020	0.018	0.021	0.020	0.059
PBO	0.019	0.019	0.020	0.019	0.018
EBO	0.024	0.023	0.024	0.024	0.024
CBO	0.026	0.025	0.026	0.026	0.025
BURNOUT	0.019	0.019	0.020	0.019	0.018
MEAN	0.027	0.030	0.030	0.027	0.032
SAFE	0.018	0.016	0.019	0.018	0.006
AVAIL	0.026	0.028	0.026	0.026	0.029
WES	0.025	0.026	0.026	0.025	0.021

S.E. FOR ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	PBO	EBO	CBO	BURNOUT	MEAN
PBO	0.040				
EBO	0.029	0.041			
CBO	0.028	0.029	0.029		
BURNOUT	0.034	0.029	0.028	0.034	
MEAN	0.025	0.031	0.033	0.025	0.034
SAFE	0.015	0.020	0.021	0.015	0.016
AVAIL	0.023	0.028	0.030	0.023	0.027
WES	0.025	0.030	0.029	0.025	0.027

S.E. FOR ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	SAFE	AVAIL	WES
SAFE	0.038		
AVAIL	0.015	0.039	
WES	0.016	0.028	0.040

EST./S.E. FOR ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	OS	CONTROL	GROWTH	JRES	LOAD
OS	11.804				
CONTROL	11.260	8.030			
GROWTH	13.568	10.623	11.650		
JRES	9.747	11.260	13.568	9.747	
LOAD	3.064	2.966	3.052	3.064	7.135
PBO	-6.406	-6.009	-6.604	-6.406	1.091
EBO	-7.073	-6.639	-7.338	-7.073	1.098
CBO	-7.084	-6.542	-7.301	-7.084	1.102
BURNOUT	-6.406	-6.009	-6.604	-6.406	1.091
MEAN	12.400	10.258	11.865	12.400	9.371
SAFE	-6.530	-6.290	-6.241	-6.530	-3.152
AVAIL	11.495	9.696	11.863	11.495	8.183
WES	11.378	9.850	11.740	11.378	7.291

EST./S.E. FOR ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	PBO	EBO	CBO	BURNOUT	MEAN
PBO	13.017				
EBO	13.292	15.192			
CBO	14.923	19.429	28.308		
BURNOUT	8.519	13.292	14.923	8.519	
MEAN	-6.102	-6.523	-6.613	-6.102	24.199
SAFE	5.493	5.656	5.858	5.493	-6.560
AVAIL	-6.212	-6.887	-6.794	-6.212	14.404
WES	-10.306	-11.840	-13.289	-10.306	15.802

EST./S.E. FOR ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	SAFE	AVAIL	WES
SAFE	4.926		
AVAIL	-6.589	15.665	
WES	-3.539	11.837	15.454

TWO-TAILED P-VALUE FOR ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	OS	CONTROL	GROWTH	JRES	LOAD
OS	0.000				
CONTROL	0.000	0.000			
GROWTH	0.000	0.000	0.000		
JRES	0.000	0.000	0.000	0.000	
LOAD	0.002	0.003	0.002	0.002	0.000
PBO	0.000	0.000	0.000	0.000	0.275
EBO	0.000	0.000	0.000	0.000	0.272
CBO	0.000	0.000	0.000	0.000	0.271
BURNOUT	0.000	0.000	0.000	0.000	0.275
MEAN	0.000	0.000	0.000	0.000	0.000
SAFE	0.000	0.000	0.000	0.000	0.002
AVAIL	0.000	0.000	0.000	0.000	0.000
WES	0.000	0.000	0.000	0.000	0.000

TWO-TAILED P-VALUE FOR ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	PBO	EBO	CBO	BURNOUT	MEAN
PBO	0.000				
EBO	0.000	0.000			
CBO	0.000	0.000	0.000		
BURNOUT	0.000	0.000	0.000	0.000	
MEAN	0.000	0.000	0.000	0.000	0.000
SAFE	0.000	0.000	0.000	0.000	0.000
AVAIL	0.000	0.000	0.000	0.000	0.000
WES	0.000	0.000	0.000	0.000	0.000

TWO-TAILED P-VALUE FOR ESTIMATED COVARIANCE MATRIX FOR THE LATENT VARIABLES

	SAFE	AVAIL	WES
SAFE	0.000		
AVAIL	0.000	0.000	
WES	0.000	0.000	0.000

ESTIMATED CORRELATION MATRIX FOR THE LATENT VARIABLES

	OS	CONTROL	GROWTH	JRES	LOAD
OS	1.000				
CONTROL	0.749	1.000			
GROWTH	0.639	0.703	1.000		
JRES	0.825	0.908	0.775	1.000	
LOAD	0.127	0.140	0.119	0.154	1.000
PBO	-0.236	-0.259	-0.221	-0.286	0.041
EBO	-0.294	-0.323	-0.276	-0.356	0.051
CBO	-0.275	-0.302	-0.258	-0.333	0.047
BURNOUT	-0.319	-0.351	-0.300	-0.387	0.055
MEAN	0.513	0.564	0.481	0.622	0.520
SAFE	-0.367	-0.403	-0.344	-0.444	-0.068
AVAIL	0.527	0.580	0.495	0.639	0.462
WES	0.504	0.554	0.473	0.611	0.293

ESTIMATED CORRELATION MATRIX FOR THE LATENT VARIABLES

	PBO	EBO	CBO	BURNOUT	MEAN
PBO	1.000				
EBO	0.679	1.000			
CBO	0.635	0.792	1.000		
BURNOUT	0.738	0.920	0.861	1.000	
MEAN	-0.231	-0.288	-0.270	-0.313	1.000
SAFE	0.271	0.337	0.315	0.366	-0.276
AVAIL	-0.250	-0.311	-0.291	-0.338	0.556
WES	-0.459	-0.572	-0.535	-0.622	0.609

ESTIMATED CORRELATION MATRIX FOR THE LATENT VARIABLES

	SAFE	AVAIL	WES
SAFE	1.000		
AVAIL	-0.284	1.000	
WES	-0.167	0.538	1.000

TWO-TAILED P-VALUE FOR ESTIMATED CORRELATION MATRIX FOR THE LATENT VARIABLES

	SAFE	AVAIL	WES
SAFE	0.000		
AVAIL	0.000	0.000	
WES	0.000	0.000	0.000

Take note:

CONTROL = Control

GROWTH = Growth opportunities

JRES = Job resources

LOAD = overload

PBO = Fatigue

EBO = Emotional Exhaustion/Withdrawal

CBO = Cognitive weariness

BURNOUT = Burnout -

MEAN = Psychological meaningfulness

SAFE = Psychological safety

AVAIL = Psychological availability

WES = Work engagement