

WORK WELLNESS OF EMPLOYEES IN THE EARTHMOVING EQUIPMENT INDUSTRY

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

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Potchefstroom

2006

REMARKS

The reader is reminded of the following:

- The references and the editorial style as prescribed by the *Publication Manual (5th edition)* of the American Psychological Association (APA) were followed in this thesis. This practice is in line with the policy of the Programme in Industrial Psychology of the North-West University to use the APA style in all scientific documents as from January 1999.
- This thesis is submitted in the form of three research articles.

ACKNOWLEDGEMENTS

I wish to extend my gratitude to various individuals who, at various stages during the writing of this thesis, were prepared to help, guide and support me to complete this research successfully.

- I am deeply grateful to my Creator, Lord and Saviour who gave me the talent, opportunity and strength to complete this research.
- I owe a special debt of gratitude and appreciation to Dr. K. Mostert, my mentor, for her supportive, persistent and competent guidance as well as her motivation, insight and faith throughout the writing of this thesis. Thank you for the careful and hard work you put into preparing my statistical processing.
- I am very grateful to my husband Jan and my grandmother Violet for all their love, support, motivation and comfort throughout this time.
- Thank you to my parents for their support and love.
- A special word of thanks goes to the National Research Foundation (NRF) for their financial assistance.
- Thank you to the executive management for affording me the opportunity to conduct this study in the earthmoving equipment industry.
- I extend my grateful appreciation to Mrs. D. Rodrigues for the professional manner in which she did the language editing.

The financial assistance of the National Research Foundation (NRF) towards this research is hereby acknowledged. The opinions expressed and conclusions arrived at are those of the author and should not necessarily be attributed to the National Research Foundation.

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SUMMARY

Topic: Work wellness of employees in the earthmoving equipment industry

Key terms: Work-home interaction, burnout, engagement, job characteristics, construct validity, construct equivalence, reliability, prevalence, demographic differences, structural model, earthmoving equipment industry

Major changes that emphasise the importance of a balanced work and family life have occurred within organisations. Inability to manage this integration between the work and home domains can affect the performance of organisations and the wellbeing of their employees. In order to measure work-home interaction and wellbeing, it is important to use valid, equivalent and reliable instruments. However, there is a lack of empirical research when investigating work-home interaction, burnout and work engagement in the earthmoving equipment industry in South Africa. Furthermore, the earthmoving equipment industry is a multicultural environment and construct equivalence across subgroups therefore becomes important when measuring work-home interaction, burnout and work engagement across different cultural or language groups.

It also seems relevant to consider differences in the work-home interaction and work wellness levels between important demographic groups in the earthmoving equipment industry. It appears as if burnout and engagement can be seen as part of the total wellness continuum; and that job characteristics may be related to burnout and engagement through negative and positive work-home interaction. However, little information was found that included these factors in a structural model for the earthmoving equipment industry.

The objectives of this research were to test the psychometric properties of the Survey Work-Home Interaction – Nijmegen (SWING), the Maslach Burnout Inventory – General Survey (MBI-GS) and the Utrecht Work Engagement Scale (UWES); to determine if various demographic groups differ with regard to work-home interaction and wellbeing; and to test a structural model that includes job characteristics, work-home interaction and wellbeing for employees in the earthmoving industry.

A cross-sectional survey design was used. Random samples ($n = 528$) were taken from employees in the earthmoving equipment industry in Gauteng, the Limpopo Province, Mpumalanga, the Northern Cape, the Western Cape, the Eastern Cape, Kwa-Zulu Natal and the North West Province.

Structural equation modelling confirmed a four-factor model of work-home interaction which measures negative work-home interference, positive work-home interference, negative home-work interference and positive home-work interference. This factor structure was equivalent across language, ethnicity, gender, education, marital status and parental status. All four factors were reliable. The participants reported more negative WHI than negative HWI, and more positive HWI than positive WHI. It was found that statistically significant differences that are based on age, gender, language, ethnicity, a partner's contribution to household income and the different business units exist between the demographic groups.

The results confirmed a four-factor structure of burnout (exhaustion, cognitive weariness, cynicism and professional efficacy) and a two-factor structure of work engagement (including vigour and dedication). These structures were equivalent across language and education groups, and all scales were reliable. SEM analyses supported a two-factor structure for the wellness construct, consisting of burnout (exhaustion, cognitive weariness and cynicism) and engagement (vigour, dedication and professional efficacy), which was equivalent for the language and education groups. Statistically significant differences that are based on age, gender, language and the different business units were found between the demographic groups.

Structural equation modelling showed that job demands are associated with negative WHI and consequently with burnout, providing support for a full-mediation effect of negative WHI. Job resources were associated with negative WHI and consequently with burnout, providing support for partial mediation of negative WHI between job resources and burnout. Job resources were also associated with positive WHI and consequently with engagement, providing support for partial mediation of positive WHI between job resources and engagement.

Recommendations for the organisation and future research were made.

OPSOMMING

Onderwerp: Werkswelstand van werkers in die grondwerktuigindustrie

Sleuteltermes: Werk-huis-interaksie, ooreising, betrokkenheid, werkeienskappe, konstruktiewe geldigheid, konstruktiewe ekwivalensie, betroubaarheid, heersendheid, demografiese verskille, strukturele model, grondwerktuigindustrie

Groot veranderinge wat die belangrikheid van 'n gebalanseerde werk- en gesinslewe beklemtoon, het in organisasies plaasgevind. Onvermoë om hierdie integrasie tussen die werksdomein en die huisdomein te beheer kan die prestasie van organisasies en die welstand van hul werknemers beïnvloed. Ten einde werk-huis-interaksie en welstand te meet, is dit belangrik om geldige, ekwivalente en betroubare instrumente te hê. Daar is egter 'n gebrek aan empiriese navorsing by die ondersoek van werk-huis-interaksie, ooreising en werksbetrokkenheid in die grondwerktuigindustrie in Suid-Afrika. Boonop is die grondwerktuigindustrie 'n multikulturele omgewing en dus word konstruktiewe ekwivalensie oor subgroepe belangrik wanneer werk-huis-interaksie, ooreising en werksbetrokkenheid oor verskillende kulturele en taalgroepe gemeet word.

Dit wil ook voorkom of dit relevant is om verskille in die vlakke van werk-huis-interaksie en werkswelstand tussen belangrike demografiese groepe in die grondwerktuigindustrie te oorweeg. Dit lyk asof ooreising en betrokkenheid beskou kan word as deel van die totale welstandkontinuum; en dat werkeienskappe deur middel van negatiewe en positiewe werk-huis-interaksie gekoppel kan word aan ooreising en betrokkenheid. Min inligting is egter gevind wat hierdie faktore in 'n strukturele model vir die grondwerktuigindustrie ingesluit het.

Die doelwitte van hierdie navorsing was om die psigometriese eienskappe van die *Survey Work-Home Interaction – Nijmegen* (SWING), die *Maslach Burnout Inventory – General Survey* (MBI-GS) en die *Utrecht Work Engagement Scale* (UWES) te toets; om vas te stel of verskillende demografiese groepe verskil ten opsigte van werk-huis-interaksie en welstand; en om 'n strukturele model te toets wat werkseienskappe, werk-huis-interaksie en welstand vir werknemers in die grondwerktuigindustrie insluit.

'n Steekproefontwerp met 'n dwarsprofiel is gebruik. 'n Ewekansige streekproef ($n = 528$) is in Gauteng, die Limpopo-provinsie, Mpumalanga, die Noord-Kaap, die Wes-Kaap, die Oos-Kaap, KwaZulu-Natal en die Noordwes-provinsie onder werknemers in die grondwerktuigindustrie geneem.

Strukturvergelingsmodellering het 'n vierfaktormodel bevestig wat werk-huis-interaksie in terme van negatiewe werk-huis-inwerking, positiewe werk-huis-inwerking, negatiewe huis-werk-inwerking en positiewe huis-werk-inwerking meet. Hierdie faktorstruktuur was ekwivalent oor taal, ras, geslag, opvoeding, huwelikstaat en ouerstatus heen. Al vier faktore was betroubaar. Die deelnemers het meer negatiewe WHI as negatiewe HWI, en meer positiewe HWI as positiewe WHI, gerapporteer. Daar is gevind dat daar statisties beduidende verskille (wat gebaseer is op ouderdom, geslag, taal, ras, opvoeding, 'n lewensmaat se bydrae tot huishoudelike inkomste en die verskillende besigheidseenhede) was tussen die demografiese groepe.

Die resultate het 'n vierfaktorstruktuur van ooreising (uitputting, kognitiewe tamheid en sinisme) en 'n tweefaktorstruktuur van werksbetrokkenheid (vitaliteit, toewyding en professionele effektiwiteit) bevestig. Hierdie strukture was ekwivalent oor taal- en opvoedingsgroepe heen, en al die skale was betroubaar. SEM-ontledings het 'n tweefaktormodel vir die welstandkonstruk ondersteun, wat bestaan het uit ooreising (uitputting, kognitiewe tamheid en sinisme) en betrokkenheid (vitaliteit, toewyding en professionele effektiwiteit) wat ekwivalent was vir die taal- en opvoedingsgroepe. Statisties beduidende verskille wat gebaseer was op ouderdom, geslag, taal en die verskillende besigheidseenhede is tussen die demografiese groepe gevind.

Strukturvergelingsmodellering het aangetoon dat werkvereistes geassosieer kan word met negatiewe WHI en gevolglik met ooreising, wat 'n totale bemiddelingseffek ondersteun. Werkshulpbronne is geassosieer met negatiewe WHI en gevolglik met ooreising, wat 'n gedeeltelike bemiddeling van negatiewe WHI tussen werkshulpbronne en ooreising ondersteun. Werkshulpbronne is ook geassosieer met positiewe WHI en gevolglik met betrokkenheid, wat gedeeltelike bemiddeling van positiewe WHI tussen werkshulpbronne en betrokkenheid ondersteun.

Aanbevelings vir die organisasie en toekomstige navorsing is gemaak.

CHAPTER 1

INTRODUCTION

This thesis is about the work-home interaction and wellbeing of employees in the earthmoving equipment industry. In this chapter, the problem statement is discussed and the research objectives (which include the general objective and specific objectives) are set out. Following this, the research method is explained and the division of chapters is given.

1.1 PROBLEM STATEMENT

The earthmoving equipment industry has been described as stressful and competitive (Deacon & Smallwood, 2003; Lingard, 2003; Lingard & Francis, 2005; Smallwood, 1997) because the environment is driven by continuous improvement on productivity and efficiencies (Singh, 1997). Employees are exposed to long working hours, increased job demands, a dangerous working environment, reduced organisational commitment, injuries and accidents (Djebarni, 1996; Lingard, 2003; Lingard & Sublet, 2002). Organisations have realised that employees play an important role in their overall functioning. Conflict between the working demands, behaviour and inputs that are expected from organisations in various roles creates work-family conflict, which in turn may affect the wellbeing of individuals and the performance of organisations (Barnett, 1996; Kotze, 2005; Montgomery, Peeters, Schaufeli, & Den Ouden, 2003). If organisations do not manage these conflicting roles and changes effectively, it can result in work-family conflict that influences both individuals and organisations negatively (Frone, Russel, & Cooper, 1992; Greenhaus & Beutell, 1985).

Major changes that have occurred over the past few years (including an increased number of women, working couple families and single mothers entering the workforce) have had an impact on work-home interaction (Brink & De la Rey, 2001; Gerber, 2000; Smit, 2001; Schreuder & Theron, 2001; Theunissen, Van Vuuren, & Visser, 2003; Wallis & Price, 2003). Furthermore, technological advancements (Duxbury & Higgins, 2001; Russell, 2002), economic pressures and the nature of work itself (Geurts, Kompier, Roxburgh, & Houtman, 2003; Peeters, Montgomery, Bakker, & Schaufeli, 2005; Russell, 2003) can lead to higher levels of work-family conflict. Therefore, the integration and management of work and

family demands have become increasingly important for organisations and individuals (Brink & De la Rey, 2001; Geurts & Demerouti, 2003).

Work-family conflict is related to several organisational and individual outcomes such as increased work stress, lower levels of organisational commitment, increased absenteeism, decreased job satisfaction, high turnover (Allen, Herst, Bruck, & Sutton, 2000; Grandey & Cropanzano, 1999; Duxbury, 2004; Duxbury & Higgins, 2001; Kirkmeyer & Cohen, 1999) poor performance (Geurts & Demerouti, 2003), general wellbeing (Burke, 1998, Frone, 2002; Grandey & Cropanzano, 1999; Kinnunen & Mauno, 1998), sleeping disorders (Geurts, Rutte, & Peeters, 1999) and burnout (Koekemoer & Mostert, 2006; Montgomery et al., 2003). Consequently, organisations have realised that work-life balance is an important concept to understand because it can affect their competitiveness (Hall & Mirvis, 1995) and influence the development and growth of intellectual capital and return on investment (Barnett, 1996; Kotze, 2005; Parasuraman & Greenhaus, 1999). The improvement of wellness of employees in the earthmoving industry can therefore increase organisations' profits.

Although several studies focused on the work-home interface during the past few years, research with regard to work-home interaction is characterised by various limitations. Firstly, the majority of research focused almost solely on the negative impact from work to home (Carlson, Dacmar, & Williams, 2000; Netemeyer, Boles, & McMurrin, 1996; Stephens & Sommer, 1996), while very few studies addressed the possibility that home can also interfere with work or that the interaction between the domains can be positive (Geurts & Demerouti, 2003; Grzywacz & Marks, 2000). Secondly, many instruments are available to measure negative work-home interaction. However, not many instruments exist for measuring positive interaction (Carlson, Kacmar, Wayne, & Grzywacz, in press; Kirchmeyer, 1992), and even fewer instruments are available to measure both negative and positive interaction (Geurts, Taris, Kompier, Dijkers, Van Hooff, & Kinnunen, 2005). Finally, many researchers have not based their theories and findings on sound theoretical frameworks.

These limitations were overcome by the development of the Survey Work-Home Interaction - Nijmegen (SWING) (Geurts et al., 2005). This questionnaire is theoretically based on the Effort Recovery (E-R) model (Meijman & Mulder, 1998) and was developed to enhance and promote the existing knowledge on work-home interaction. The SWING distinguishes between the direction (i.e., work-to-home and home-to-work interference) and quality (i.e.,

negative or positive) of influence, and was successfully used in various internationally studies (Bakker & Geurts, 2004; Demerouti, Geurts, & Kompier, 2004; Montgomery et al., 2003; Peeters et al., 2005).

In South Africa, one study was found that investigated the psychometric properties of the SWING in the earthmoving equipment industry (Pieterse & Mostert, 2005). Although the study of Pieterse and Mostert (2005) is an important initiative, the sample was relatively small ($n = 326$), exploratory factor analysis was used to determine the psychometric properties of the SWING and the equivalence was determined for only two language groups (English vs. other language groups). The current study therefore seeks to investigate the psychometric properties of the SWING more intensively by using a more representative sample ($n = 528$) and the advantages of structural equation modelling (SEM) to test competing factor models and the equivalence of the factor structure across relevant subgroups.

According to Geurts and Demerouti (2003), it is important to investigate the prevalence of work-home interaction. In this regard, several findings have revealed that interference originates more often from work than from home, but that positive experiences will more likely originate from home than from work (Geurts et al., 2005; Grzywacz & Marks, 2000). Furthermore, it is also important to determine the differences between important demographic groups. Relatively little information is available on the significant difference between work-home interaction levels and demographic groups. The demographic groups that could differ with regard to work-home interaction include age, gender, language, ethnicity, education, marital status, parental status, a partner's contribution to household income and different business units in the earthmoving industry.

A productive, engaged and motivated workforce is an important contributor to the success of organisations in the earthmoving equipment industry. Therefore, two aspects of wellbeing that are important to consider in the earthmoving equipment industry are burnout and work engagement. Whereas burnout is characterised by a loss of motivation, fatigue, depletion of emotional resources and long-term health problems (Schaufeli & Enzmann, 1998; Maslach, Leiter, & Schaufeli, 2001); engagement is concerned with high levels of organisational commitment, enthusiasm and positive attitude (Schaufeli & Bakker, 2003; Schaufeli, Salanova, Gonzáles-Romá, & Bakker, 2002).

According to Schaufeli and Enzmann (1998, p. 36) burnout is defined as "a persistent, negative, work-related state of mind in 'normal' individuals that is primarily characterised by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work". In addition, researchers have recently argued that the burnout construct should be supplemented by including a scale that assesses cognitive weariness, because it is believed that burnout is also associated with impaired cognitive functioning (Sandström, Rhodin, Lundberg, Olsson, & Nyberg, 2005). Cognitive weariness refers to a lack of concentration, forgetfulness and the inability to adequately solve a problem (Hoogduin, Schaap, Methorst, Peters, Van Neyenhof, & Van Grient, 2001); and is characterised by memory loss and lack of concentration (Van Horn, Taris, Schaufeli, & Shreurs, 2004).

Engagement is considered the opposite of burnout (Maslach, Leiter, & Schaufeli, 2001; Schaufeli & Bakker, 2001; Schaufeli, Martinez, Pinto, Salanova, & Bakker, 2002) and has been defined as a "positive, rewarding, work-related state of mind that is characterised by three dimensions, namely vigour, dedication, and absorption" (Schaufeli et al., 2002, p. 295). Whereas burnout is characterised by the depletion of emotional resources, loss of motivation, fatigue and long-term health problems (Schaufeli & Enzmann, 1998; Schaufeli et al., 2002), engagement is concerned with enthusiasm, a positive attitude and high levels of organisational commitment.

Two different viewpoints in the literature have emerged with regard to burnout and engagement, and have become the focal point of an important debate. The important question that arose was whether burnout and engagement are part of the total wellness continuum (Maslach & Leiter, 1997) or two separate constructs (Rothmann, Steyn, & Mostert, 2005; Schaufeli & Bakker, 2004; Schaufeli et al., 2002). The study of Maslach and Leiter (1997) considered burnout and engagement as the opposite poles of the continuum. However, other researchers argue that burnout and engagement are two different, albeit negatively related, constructs (Demerouti et al., 2004; Schaufeli & Bakker, 2004; Schaufeli et al., 2002). Various studies revealed, with the inspection of factor loadings of the two measuring instruments (MBI-GS and UWES), that burnout and engagement loaded on separate but negative related scales instead of on one single wellness dimension. The wellness construct consisted of a burnout construct (i.e., exhaustion and cynicism) and an enlarged engagement construct (i.e.,

vigour, dedication, absorption and professional efficacy). Based on this, it seems important to determine the underlying structure of a wellbeing construct.

It also seems important to investigate the differences between important demographic groups with regard to wellbeing. These differences between demographic groups could be an indicator of the work wellness construct within the earthmoving equipment industry. They can assist with a risk analysis for organisations and for developing and enhancing strategies to promote engagement and reduce burnout. Several demographic groups that could differ with regard to work wellness are important to investigate. These include age, gender, language, ethnicity, education, marital status, parental status and different business units in the earthmoving industry.

Several studies have shown that certain aspects of a job can have an impact on work-home interaction (Bakker & Geurts, 2004; Janssen, Peeters, de Jonge, Houkes, & Tummers, 2004, Montgomery et al., 2003), burnout (Demerouti et al., 2001; Janssen et al., 2004; Peeters, Montgomery, Bakker & Schaufeli, 2005) and engagement (Montgomery et al., 2003; Mostert, 2006; Mostert, Cronje, & Pienaar, 2006; Schaufeli & Bakker, 2004). The Job Demands-Resources (JD-R) model (Bakker et al., 2003; Demerouti et al., 2001) and the Effort-Recovery (E-R) model are relevant theoretical frameworks that can be used to investigate the associations between job characteristics, work-home interference (WHI) and wellbeing.

The JD-R model is a useful model that can be used to investigate the influence of job characteristics on work-related outcomes. Job characteristics consist of two variables that are eminent in a job. Firstly, job demands refer to the physical, psychological and organisational dimensions of the job which require mental and psychical effort that is associated with physiological or/and psychological costs (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). The second dimension (namely job resources) refers to those physical, psychological, social or organisational aspects of the job that can be functional in meeting task requirements (and may thus reduce the associated physiological and or psychological costs) and at the same time stimulate personal growth and development. Job resources can be located in the tasks itself (e.g., performance feedback, autonomy and variety of skills), in the context (e.g., organisational resources such as career opportunities and job insecurity) and in social resources (e.g., supervisory support) (Demerouti et al., 2001).

The E-R model describes the interaction that can occur between work and private life whereby mechanisms' well-being can be affected (Geurts et al., 2003). It proposes that effort expenditure is associated with specific load reactions that developed within the individual. These load reactions can include physiological, behavioural and subjective responses and are, in principle, reversible. When the exposure to load is reduced, recovery can begin and the respective psychological systems begin to stabilise at a specific baseline level within a certain period of time (Drenth, Thierry, & De Wolff, 1998). The recovery process results in a reduction of fatigue and other stressful situations. However, recovery cannot occur unless the demands cease, or the originally adaptive responses will develop into negative load reactions (e.g., strain, short-term psychosomatic health complaints and sustained activation) that can spill over to the home environment.

The presuppositions put forward by the E-R model can enhance our understanding of positive work-home interaction, because effort expenditure may also be accompanied by positive load reactions. When individuals are able to keep their effort investments within acceptable limits by utilising opportunities for control and support (e.g., taking ownership of work; asking support from a supervisor, colleagues or spouse), energy resources can be recharged rather than exhausted. Furthermore, in order to stabilise energy generation, it is necessary to consume energy (Marks, 1977) and people tend to find energy for the things they prefer to do. People will produce rather than consume energy, which will result in tasks being completed with excellence.

Several studies reported that job demands have an impact on burnout (Demerouti et al., 2001; Janssen et al., 2004; Peeters et al., 2005). However, the findings also showed that job characteristics (such as work pressure) can be rooted in negative spillover, leading to higher levels of burnout (Bakker & Geurts, 2004; Geurts & Demerouti, 2004; Geurts et al., 2004; Janssen et al., 2004). In contrast, job resources have a relationship with positive WHI and engagement (Montgomery et al., 2003; Schaufeli & Bakker, 2004). Adequate job resources can help individuals to balance their work and home demands. This can lead to positive reactions that build up at work and spill over to the home domain (in addition to the effect of job resources), and may lead to higher levels of engagement (Montgomery et al., 2003; Mostert, 2006; Mostert et al., 2006). On the other hand, a lack of resources can hinder employees in balancing the demands of work and home, which could lead to negative

interference from work to home and consequently to burnout (Geurts et al., 2004; Janssen et al., 2004; Peeters et al., 2005). In order to test these relationships, a structural model is constructed with structural equation modelling (see figure 1).

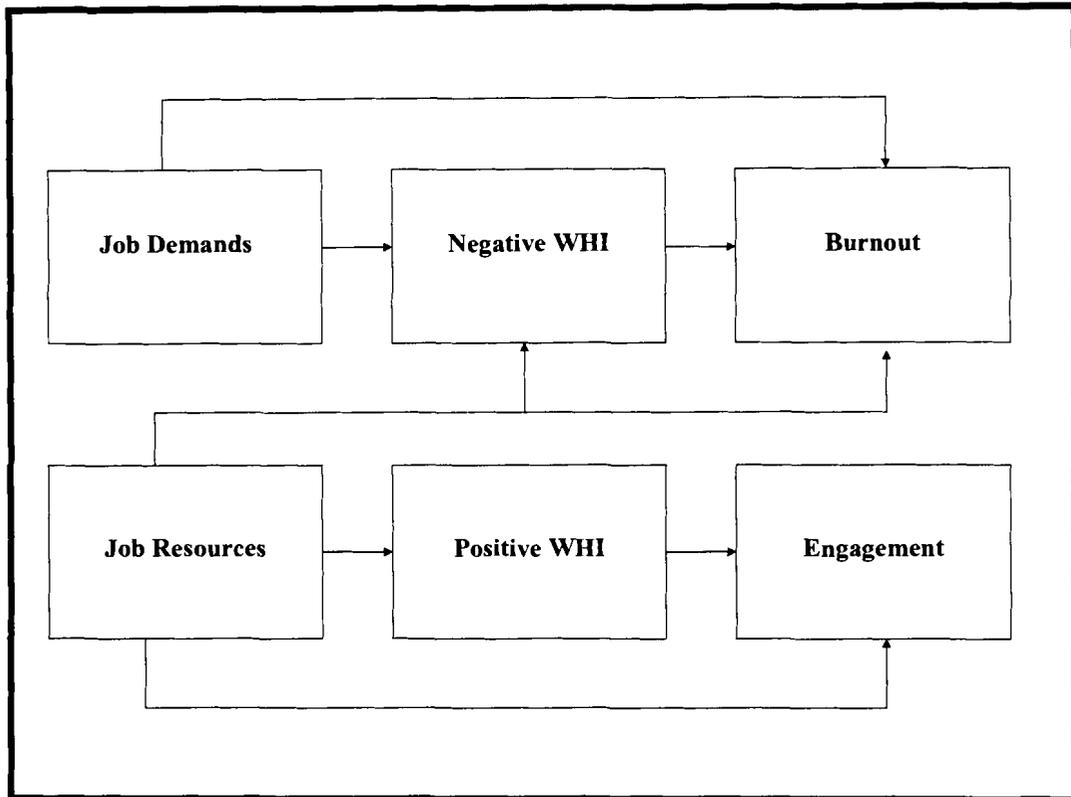


Figure 1: A structural model of job characteristics, work-home interference and wellbeing

The following research questions emerge from the problem statement:

- What are the construct validity, construct equivalence and reliability of the SWING?
- What is the prevalence of work-home interaction?
- Do important demographic groups differ with regard to work-home interaction?
- What are the construct validity, construct equivalence and reliability of the MBI-GS and UWES?
- What is the underlying structure of a wellbeing construct that includes burnout and engagement?
- Do important demographic groups differ with regard to wellbeing?
- Can a structural model be tested that includes job characteristics, positive and negative WHI, and wellbeing?

- Which recommendations regarding the wellbeing of employees in the earthmoving industry can be made for future research and practice?

This research will make the following contributions to the subject of Industrial Psychology and its practice in organisations:

- It will result in a standardised measuring instrument for work-home interaction that has been proven to be valid, equivalent and reliable for different demographic groups in the earthmoving equipment industry.
- It will result in a standardised measuring instrument for adapted measuring instruments of burnout and work engagement that has been proven to be valid, equivalent and reliable for different demographic groups in the earthmoving equipment industry.
- A profile will exist for the earthmoving industry that indicates demographic risk groups in terms of negative WHI and burnout, and demographical groups that experience positive WHI and work engagement. This information could be used to determine a risk profile for organisations in order to put strategies in place to address negative WHI and burnout; and, most importantly, to retain engaged employees.
- A structural model of job characteristics, WHI and wellbeing will exist which could be used to explain the associations between the study variables.

1.2 RESEARCH OBJECTIVES

The research objectives are divided into a general objective and specific objectives.

1.2.1 General objective

With reference to the above formulation of the problem, the general objective of this research is to test the psychometric properties of the SWING, MBI-GS and UWES; to determine if various demographic groups differ with regard to work-home interaction and wellbeing; and to test a structural model that includes job characteristics, WHI and wellbeing for employees in the earthmoving industry.

1.2.2 Specific objectives

The specific research objectives of this research are to

- determine the construct validity, construct equivalence and reliability of the SWING;
- determine the prevalence of work-home interaction;
- determine whether important demographic groups differ with regard to work-home interaction;
- determine the construct validity, construct equivalence and reliability of the MBI-GS and UWES;
- determine the underlying structure of a wellbeing construct that includes burnout and engagement;
- determine whether important demographic groups differ with regard to wellbeing;
- test a structural model that includes job characteristics, positive and negative WHI and wellbeing; and
- make recommendations with regard to the wellbeing of employees in the earthmoving industry for future research and practice.

1.3 RESEARCH METHOD

The research method for each of the three articles which are submitted for the purposes of this thesis consists of a brief literature review and an empirical study. Because separate chapters were not targeted for literature reviews, this section focuses on aspects that are relevant to the empirical studies that were conducted. The reader should note that a literature study was conducted for the purposes of each article.

1.3.1 Research design

A survey design is used to reach the research objectives. The specific design is the cross-sectional design whereby a sample is drawn from a population at one time (Shaughnessy & Zechmeister, 1997). Information collected is used to describe the population at that time. This design can also be used to assess the interrelationships among the variables within a

population. According to Shaughnessy and Zechmeister (1997), this design is ideally suited to the descriptive and predictive functions that are associated with correctional research.

1.3.2 Participants and procedure

Random samples are taken among employees in the earthmoving equipment industry ($n = 528$) in Gauteng, the Limpopo Province, Mpumalanga, the Northern Cape, the Western Cape, the Eastern Cape, Kwa-Zulu Natal and the North West Province (response rate = 53%). After permission is obtained from executive management, the managers, human resources department and employee/employer committees are informed of the study during management meetings. Thereafter, all employees receive paper-and-pencil questionnaires and return envelopes at their work that could be returned to the researchers involved. A letter explaining the purpose of the research accompanies the questionnaire. The employees are kindly requested to fill in the questionnaire in private and to send it to the Human Resources Department, where the researchers involved collect all the completed questionnaires. The participation is voluntary, and the confidentiality and anonymity of the answers are emphasised.

1.3.3 Measuring battery

The following measuring instruments are administered to obtain the research objectives:

Demographical characteristics. A biographical questionnaire is used to determine the biographical characteristics of the employees in the earthmoving equipment industry. The biographical characteristics that are measured include gender, language, age, ethnicity, educational level, household situation (e.g., single, without children living at home/married/living with a partner), working hours, permanent and part-time employment, use of annual leave, the contribution that the partner makes to the total household income; and the business unit and personnel area in which the employee operates.

Job characteristics include job pressure, job control and job support. These characteristics are selected because of their central position in various leading job stress theories and the crucial role they play in effort expenditure and recovery in the job setting (Kompier, 2003). *Job pressure* is measured by six items that are adapted from the Job Content Questionnaire

(JCQ, Karasek, 1985). The original statements are rephrased as questions (e.g., "Are you asked to do an excessive amount of work?", 1 = *almost never*, 4 = *always*), with higher scores indicating higher job pressure. *Job control* is measured by six items from the validated questionnaire on experience and evaluation of work (Van Veldhoven, Meijman, Broersen, & Fortuin, 1997) (e.g., "Can you decide for yourself how to carry out your work?", 1 = *almost never*, 4 = *always*). Higher scores signify a higher level of job control. Seven items from the JCQ measure job support. Four items address supervisor support (e.g., "My supervisor is helpful in getting the job done", 1 = *totally disagree*, 5 = *totally agree*), while three items address support from colleagues (e.g., "My colleagues are helpful in getting the job done", 1 = *totally disagree*, 5 = *totally agree*), with higher scores denoting higher social support.

Burnout. The Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli et al., 1996) is used to measure burnout. Two subscales of the MBI-GS are used in this study, namely Exhaustion (five items, e.g., "I feel used up at the end of the workday") and Cynicism (five items, e.g., "I have become less enthusiastic about my work"). All items are scored on a seven-point frequency-rating scale that ranged from 0 (*never*) to 6 (*daily*). High scores on Exhaustion and Cynicism are indicative of burnout. Internal consistencies found by Leiter and Schaufeli (1996) and Schaufeli, Van Diederendonck and Van Gorp (1996) ranged from 0,73 (Cynicism) to 0,91 (Exhaustion). Test-retest reliabilities after one year were 0,65 for Exhaustion and 0,60 for Cynicism (Schaufeli et al., 1996). Test-retest reliability from three months to one year ranged from 0,50 – 0,82 (Leiter & Durup, 1996). The following Cronbach alpha coefficients were obtained for the two scales of the MBI-GS in a South African police sample: Exhaustion: 0,88; Cynicism: 0,79 (Storm & Rothmann, 2003a). In addition, the Cognitive Weariness Scale (CWS) is used. The CWS was developed by Van Horn, Taris, Schaufeli, and Shreurs (2004) to measure cognitive wellbeing. The scale refers to the capacity to take up new information and loss of concentration at work (e.g., "I have trouble concentrating"). It is scored on a seven-point frequency scale with 0 (*never*) to 6 (*daily*). Van Horn et al. (2004) reported a Cronbach alpha coefficient of 0,92; while Coetzee and Rothmann (2004) reported a Cronbach alpha coefficient of 0,76.

Engagement. The Utrecht Work Engagement Scale (UWES) (Schaufeli et al., 2002) is used to measure work engagement and consists of three scales (namely Vigour, Dedication and Absorption). In this study, the "core dimensions" of work engagement are used, namely Vigour and Dedication (see Schaufeli & Bakker 2001, 2004). Five items are used to measure

Vigour (e.g., “I am bursting with energy every day in my work”) and five items to measure Dedication (“I am enthusiastic about my job”). The UWES is scored on a seven-point frequency rating scale, varying from 0 (*never*) to 6 (*always*). Alpha coefficients range between 0,78 and 0,89 (Schaufeli et al. 2002). Storm and Rothmann (2003b) obtained the following alpha coefficients for the core engagement dimensions in a sample of 2 396 members of the SAPS: Vigour: 0,78; Dedication: 0,89.

Work-home interaction. The Survey Work-Home Interference – Nijmegen (SWING) is used to measure work-home/home-work interference (Geurts et al., in press; Wagena & Geurts, 2000). The SWING is a 27-item work-home interference measure. It measures four types of work-home interference: (1) negative interference from “work” with “home” (negative WHI), referring to a negative impact of the work situation on one’s functioning at home (e.g. “your work schedule makes it difficult to fulfil domestic obligations”); (2) negative interference from “home” with “work” (negative HWI), referring to a negative impact of the home situation on one’s job performance (e.g. “you have difficulty concentrating on your work because you are preoccupied with domestic matters”); (3) positive interference from “work” with “home” (positive WHI), referring to a positive impact of the work situation on one’s functioning at home (e.g. “you come home cheerfully after a successful day at work, thereby positively affecting the atmosphere at home”); (4) positive interference from “home” with “work” (positive HWI), referring to a positive impact of the home situation on one’s job performance (e.g. “you are able to have better interaction with your colleague/supervisor as a result of the environment at home”). All items are scored on a four-point frequency rating scale, ranging from “0” (never) to “3” (always). Pieterse and Mostert (2005) confirmed the four-factor structure of the SWING in a sample of workers employed in the earthmoving equipment industry in South Africa and obtained the following Cronbach alpha coefficients for the SWING: Negative WHI: 0,87; Negative HWI: 0,79; Positive WHI: 0,79; Positive HWI: 0,76.

1.3.4. Statistical analysis

The statistical analysis is carried out with the SPSS-program (SPSS Inc., 2005) and the Amos-program (Arbuckle, 2003). Structural equation modelling (SEM) methods, as implemented by AMOS (Arbuckle, 2003), are used to test the construct validity and construct equivalence of the measuring instruments, the second-order factor structure of the wellness

construct and the structural model of job characteristics, WHI and wellbeing. The maximum likelihood estimation method is used. A multi-group confirmatory factor analysis is used in order to test the construct equivalence of the factor structures and the equivalence of parameter estimates (i.e., factor loadings, factor covariances and item error variances) for the SWING, MBI-GS and the UWES across relevant subgroups. The χ^2 and several other goodness-of-fit indices are used to summarise the degree of correspondence between the implied and observed covariance matrices. The following goodness-of-fit indices are used as adjuncts to the χ^2 statistics: (a) χ^2/df ratio; (b) the Goodness-of-Fit Index (GFI); (c) the Incremental Fit Index (IFI); (d) the Tucker-Lewis Index (TLI); (e) the Comparative Fit Index (CFI); (f) the Root Mean Square Error of Approximation (RMSEA). Values greater than 0,90 for relative fit indices (GFI, IFI, TLI and CFI) and lower than 0,08 for RMSEA are considered a good fit (Byrne, 2001; Hoyle, 1995).

Cronbach alpha coefficients are used to assess the reliability of the scales and product-moment correlations are used to determine the relationship between the dimensions. Descriptive statistics (e.g., means and standard deviations) are used to describe the data. Pearson product-moment correlation coefficients are used to specify the relationship between the variables. In terms of statistical significance, it is decided to set the value at a 95% confidence interval level ($p \leq 0,05$).

Paired-samples *t*-tests are used to determine the prevalence of work-home interaction. Multivariate analysis of variance (MANOVA) is used to determine the significance of the differences between the work-home interaction and wellbeing levels of different demographic groups. MANOVA tests whether mean differences among groups on a combination of dependent variables likely occurred by chance (Tabachnick & Fidell, 2001). In MANOVA a new dependent variable that maximises group differences is created from the set of dependent variables. Wilk'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. When an effect is significant in MANOVA, one-way analysis of variance (ANOVA) is used to discover which dependent variables had been affected. A Bonferroni-type adjustment is made for inflated Type 1 error. The Games-Howell procedure is used to determine if there are statistical differences between the groups.

1.4 OVERVIEW OF CHAPTERS

In chapter 2 the psychometric properties of the SWING, the prevalence of work-home interaction and the differences between demographic groups with regard to the work-home interaction of employees in the earthmoving industry are measured and discussed. Chapter 3 deals with the measurement of burnout and work engagement, and the differences between demographic groups with regard to wellbeing. In Chapter 4 a structural model is tested for job characteristics, WHI and wellbeing. The conclusions, limitations and recommendations of the study follow in chapter 5.

1.5 CHAPTER SUMMARY

This chapter discussed the problem statement and research objectives of this study. The measuring instruments and research method that were used in the research were then explained, followed by a brief overview of the other chapters.

**The Work-Home Interaction of Employees in the
Earthmoving Equipment Industry:
Measurement, Prevalence and Differences between Demographic Groups**

ABSTRACT

The objectives of this study were to determine the psychometric properties of the Survey Work-home Interaction-Nijmegen (the SWING), to determine the prevalence of work-home interaction and to determine if differences regarding work-home interaction exist between different demographic groups. Random samples ($n = 528$) were taken of employees in the earthmoving equipment industry in eight provinces in South Africa. The SWING and a biographical questionnaire were administered. Structural equation modelling showed that a four-factor model (which measures negative work-home interference, positive work-home interference, negative home-work interference and positive home-work interference) fitted the data best. This factor structure was equivalent across important subgroups. Cronbach alpha coefficients showed that all four factors were reliable. Multivariate analysis of variance and one-way analysis of variance were used to determine the differences between work-home interaction and various demographic characteristics. The results indicated that there were statistically significant differences between the demographic groups based on age, gender, language, ethnicity, a partner's contribution to household income and the different business units.

OPSOMMING

Die doelwitte van hierdie studie was om die psigometriese eienskappe van die Survey Work-home Interaction-Nijmegen (die SWING) te bepaal, om die algemene voorkoms van werk-huis-interaksie te bepaal en om vas te stel of daar verskille rakende werk-huis-interaksie tussen verskillende demografiese groepe bestaan. 'n Ewekansige steekproef ($n = 528$) is in agt provinsies in Suid-Afrika onder werknemers in die grondwerktuigindustrie geneem. Die SWING en 'n biografiese vraelys is gebruik. Strukturele vergelykingsmodellering het aangetoon dat 'n vierfaktormodel (wat negatiewe werk-huis-inmenging, positiewe werk-huis-inmenging, negatiewe huis-werk-inmenging en positiewe huis-werk-inmenging meet) die data die beste pas. Hierdie faktorstruktuur het in verskillende subgroepe ooreengestem. Cronbach alfa-koeffisiënte het gewys dat al vier faktore betroubaar is. Meerveranderlike variasieontleding en eenrigting-variasieontleding is gebruik om die verskille tussen werk-huis-interaksie en verskeie demografiese karaktereenskappe te bepaal. Die resultate het aangedui dat daar statisties beduidende verskille tussen die demografiese groepe was wat gebaseer was op ouderdom, geslag, taal, ras, opvoeding, 'n lewensmaat se bydrae tot die huishoudelike inkomste en die verskillende besigheidseenhede.

In the past decade organisations have focused with renewed interest on the interaction between work and family. This is mainly because of major changes that took place in the composition of the labour market, not only internationally, but also in South Africa. The workplace has become progressively diverse due to transformation developments, including Employment Equity and Affirmative Action, impacting on the financial performance of organisations (Cavaleros, Van Vuuren, & Visser, 2002). These changes have resulted in an increased number of women and working couple families entering the workforce, thereby changing the traditional role of men (Brink & De la Rey, 2001; Gerber, 2000; Smit, 1995; Smit, 2001; Schreuder & Theron, 2001; Theunissen, Van Vuuren, & Visser, 2003; Wallis & Price, 2003). As a result, one of the major challenges that organisations and employees face is managing the integration of family and work demands (Brink & De la Rey, 2001; Geurts & Demerouti, 2003).

Work and family integration for employees has become vital as they are increasingly forced to deal with family and work demands simultaneously. Greenhaus and Beutell (1985, p. 77) define work-family conflict as “a form of inter-role conflict in which the role pressures from the work and family domains are mutually incompatible in some respect. That is, participation in the work (family) role is made more difficult by virtue of participation in the family (work) role”. Work-family conflict is related to several organisational outcomes such as increased work stress, lower levels of commitment to the organisation, increased absenteeism, decreased job satisfaction, high turnover (intention of leaving the organisation), low levels of performance and fewer constructive perceptions of the organisation (Allen, Herst, Bruck, & Sutton, 2000; Duxbury, 2004; Duxbury & Higgins, 2001; Geurts & Demerouti, 2003; Grandey & Cropanzano, 1999; Kirchmeyer & Cohen, 1999). Consequently, organisations have realised that work-family conflict is an important concept to consider for the welfare of their employees, and that it is in the organisation’s best interest to address work-family issues because this may result in the development and growth of intellectual capital and return on investment (Barnett, 1996; Kotzé, 2005; Parasuraman & Greenhaus, 1999).

The importance of work-home interaction can also be seen in the earthmoving equipment industry. Construction, mining and agriculture were ranked fourth, second and first respectively on the list of the 10 most dangerous occupations in the United States. This industry has a competitive, stressful work environment and many work-related stressors will

likely be relevant to the work of managers, supervisors and professionals (Lingard, 2003; Smallwood, 1997). Employees are expected to work long hours, which causes stress and influences productivity (Goldenhar, Hecker, Moir, & Rosecrance, 2003; Lingard, 2003; Lingard & Francis, 2005; Lingard & Sublet, 2002). There is also constant pressure to improve safety, productivity and efficiency (Singh, 1997). Working under these stressful conditions can create fatigue in individuals and thus make it difficult for them to get actively involved in changing working conditions (Djebarni, 1996). Factors such as safety, a stressful working environment and long working hours may have major implications for employees, who could find it difficult to balance work and family demands.

Although it is important to investigate the work-home interaction of employees, research in this field has been characterised by several limitations. Firstly, the majority of research has focused almost exclusively on the negative impact of work on home (Carlson, Dacmar, & Williams, 2000; Netemeyer, Boles, & McMurrian, 1996; Stephens & Sommer, 1996), while very few studies addressed the reversed process (interference from the home domain on the work domain) or the possibility that the interaction between work and home can also be *positive* (Geurts & Demerouti, 2003; Grzywacz & Marks, 2000). Secondly, many instruments are available to measure negative work-home interaction. However, not many instruments exist for measuring positive work-home interaction (Carlson, Dacmar, Wayne, & Grzywacz, in press; Kirchmeyer, 1992), and even fewer instruments are available to measure both negative and positive interaction.

Currently, two measuring instruments exist that measure both negative and positive interaction (Grzywacz & Marks, 2000; Geurts et al., 2005). Although Grzywacz and Marks's instrument measures negative and positive spillover, a concern is that some of its items confound work-family spillover with its possible consequences (e.g., fatigue and sleep quality) and antecedents (e.g., spouse's support). The other instrument, the Survey Work-Home Interaction-Nijmegen (SWING), was recently developed by Geurts et al. (2005). This questionnaire is theoretically based on the Effort-Recovery (E-R) Model (Meijman & Mulder, 1998) and was designed to enhance and extend the existing knowledge on work-home interaction. The SWING differentiates between the direction (work → home and home → work) and the quality of influence (negative and positive).

Since no South African instrument that measures negative and positive interaction between work and home is available, the SWING seems to be a psychometrically sound instrument to use and to adapt for South African conditions. The SWING was successfully used in several studies in Europe (e.g., Bakker & Geurts, 2004; Demerouti, Geurts, & Kompier, 2004; Montgomery, Peeters, Schaufeli, & Den Ouden, 2003; Peeters, Montgomery, Bakker, & Schaufeli, 2005; Van Hooff et al., 2005) and was validated extensively by Geurts et al. (2005). However, only one study could be found that investigated the psychometric properties of the SWING in the earthmoving equipment industry in South Africa (e.g., Pieterse & Mostert, 2005). This study confirmed the four-factor structure of the SWING and found it to be an equivalent and unbiased instrument.

Although the study of Pieterse and Mostert (2005) was an important initiative, the sample was relatively small ($n = 326$), exploratory factor analysis was used to determine the psychometric properties of the SWING and the equivalence was determined for only two language groups (English vs. other languages). Therefore, the current study seeks to investigate the psychometric properties of the SWING more intensively by using a more representative sample ($n = 528$), by using the advantages of structural equation modelling (SEM) to test competing factor models and by testing the equivalence of the factor structure across six important subgroups (i.e., language, ethnicity, gender, education, marital status and parental status). In addition, the prevalence of work-home interference (WHI) and home-work interference (HWI) will be determined, and also the differences between important demographic groups.

In view of the above, the objectives of this study are therefore: (1) to determine the psychometric properties of the SWING (construct validity, construct equivalence and reliability) by using SEM; (2) to determine the prevalence of work-home interaction; and (3) to determine if important demographic groups differ with regard to work-home interaction.

The Survey Work-Home Interaction – Nijmegen (SWING)

The SWING was developed at the Radboud University in Nijmegen, the Netherlands, to measure work-home interaction. This instrument is theoretically sound and is based on a strong theoretical perspective, namely the Effort-Recovery (E-R) model (Meijman & Mulder, 1998). The E-R model describes by which mechanisms the interaction that can occurs

between work and private life can affect an individual's well-being (Geurts, Kompier, Roxburgh, & Houtman, 2003). The E-R model proposes that effort expenditure is associated with specific load reactions that developed within the individual. These load reactions can include physiological, behavioural and subjective responses and are, in principle, reversible. When the exposure to load is reduced, recovery can begin and the respective psychological systems begin to stabilise at a specific baseline level within a certain period of time (Drenth, Thierry, & De Wolff, 1998). The recovery process results in a reduction of fatigue and other stressful situations. However, recovery cannot occur unless the demands cease – otherwise the originally adaptive responses will develop into negative load reactions (e.g., strain, short-term psychosomatic health complaints and sustained activation) that may spill over to the home environment.

The presuppositions put forward by the E-R model can also enhance our understanding of positive work-home interaction, since effort expenditure may also be accompanied by positive load reactions. When individuals are able to keep their effort investments within acceptable limits by utilising opportunities for control and support (e.g., by alternating high-effort and low-effort, or unpleasant and pleasant tasks; by taking a “time out” when necessary; and by asking support from significant others such as a supervisor, colleagues or a spouse), energy resources may be recharged rather than exhausted. Furthermore, in order to stabilise energy generation, it is necessary to consume energy (Marks, 1977); and people tend to find energy for the things they like doing. People will produce rather than consume energy, which will result in tasks being completed with excellence.

Based on the E-R model, Geurts et al. (2005, p. 322) define the work-home interface as “an interactive process in which a worker's functioning in one domain (e.g., home) is influenced by (negative or positive) load reactions that have built up in the other domain (e.g., work)”. This definition implies four types of work-home interaction, namely negative WHI (when negative load reactions built up at work hamper functioning at home); positive WHI (when positive load reactions built up at work facilitate functioning at home); negative HWI (when negative load reactions developed at home impede functioning at work); and positive HWI (when positive load reactions developed at home facilitate functioning at work). These four types of work-home interaction are measured using a 22-item survey, which includes 13 self-developed items (Geurts et al., 2005). The items of the SWING are divided into a four-response format which varies from 0 (*never*) to 3 (*always*).

The psychometric properties of the SWING

Originally, the SWING consisted of 27 items. Nine items covered negative WHI, including five items that measured strain-based interference (e.g., “How often does it happen that you are irritable at home because your work is demanding?”) and four items that covered time-based interference (e.g., “How often does it happen that you have to work so hard that you do not have time for any of your hobbies?”). Six items measured positive WHI, of which five items were self-developed; four items covered the transfer of skills learned at work (e.g., “How often does it happen that you are better able to keep appointments at home because your job requires this as well?”); two items captured the spillover of positive mood (e.g., “How often does it happen that after a pleasant working day/working week, you feel more in the mood to engage in activities with your spouse/family/friends?”). Six items were developed to measure Negative HWI (e.g., “you have difficulty concentrating on your work because you are worried about your home situation?”), of which five were parallel to the negative WHI scale. Six items measured positive HWI, of which five items were self-developed and parallel to the five positive WHI-items; three items measured the transfer of skills learned at home (e.g., “How often does it happen that you take responsibilities at work more seriously because you are required to do the same at home?”); and two items covered the spillover of positive mood (e.g., “How often does it happen that you manage your time at work more efficiently because at home you have to do that as well?”).

Geurts et al. (2005) tested the construct validity of the SWING by comparing competing models for the relationships among the 27 items. Compared to the other three competing models, the hypothesised model fitted the data best. This model identified the four expected dimensions (i.e., negative WHI, positive WHI, negative HWI and positive HWI), although five problematic items had to be removed. The final version of the SWING consisted of 22 items, of which 13 items were newly developed (Geurts et al., 2005). With regard to the construct validity of the SWING in South Africa, two South African studies obtained similar results. Pieterse and Mostert (2005) extracted four factors by means of exploratory factor analysis. Van Tonder (2005) tested the construct validity of the SWING by using structural equation modelling (SEM). After modifications were made to the hypothesised model and three items were deleted, the final model fit was satisfactory. Both studies found that work-home interaction can be characterised as a four-dimensional construct.

Geurts et al. (2005) used confirmatory analyses to test the construct equivalence across five Dutch samples and relevant subgroups (i.e., gender, parental status and full-time/part-time status). They reported that the SWING items did not function differently in any of the five samples or subgroups, as was confirmed by invariant factor loadings, factor covariances and item errors variances. Pieterse and Mostert (2005) used exploratory factor analysis with target rotations to determine construct equivalence. The construct equivalence of the four scales was not satisfactory because three items were problematic. After removing the three items, they demonstrated construct equivalence for the four factors of the two language groups (English and non-English groups). Based on these results, it can be hypothesised that the SWING has a four-dimensional structure (e.g., negative WHI, positive WHI, negative HWI and positive HWI) (*hypothesis 1a*) and that this structure will be equivalent for the subgroups in this study (*hypothesis 1b*).

Geurts et al. (2005) found the alpha coefficients of the SWING to be acceptable (Negative WHI = 0,84; Positive WHI = 0,75; Negative HWI = 0,75; Positive HWI = 0,81). Pieterse and Mostert (2005) also found the SWING to be a reliable instrument, where the Cronbach alpha coefficients were acceptable for all four factors (NHWI = 0,87; NWHI = 0,79; PWHI = 0,79; and PHWI = 0,76). A study conducted by Van Tonder (2005) indicated that all the scales were reliable, although the Positive WHI scale had a Cronbach alpha coefficient of 0,67. Based on these results, it can be hypothesised that the SWING will be a reliable measuring instrument (*hypothesis 1c*).

The prevalence of work-home interaction

Various research and empirical studies indicate that negative interference from work to home is more prevalent than negative interference from home to work (Bond, Galinsky, & Swanberg, 1998; Frone, 2002; Geurts & Demerouti, 2003; Grzywacz & Marks, 2000; Montgomery et al., 2003). These findings suggest that workers are more prone to arrange work over family matters, thereby reducing their effort investment at home rather than at work. This implies that the work domain is less flexible than the home domain (Frone, Russell, & Cooper, 1992; Gutek, Klepa, & Searle, 1991). Furthermore, the results of Geurts et al. (2005) indicate that the highest mean score ($M = 1,15$) was obtained for positive HWI, compared to the mean score of positive WHI ($M = 0,81$). The lowest mean score ($M = 0,46$) was obtained for negative HWI, compared to negative WHI ($M = 0,86$). In all the samples,

negative WHI was more prevalent than negative HWI. Grzywacz and Marks (2000) also reported that positive spillover originated more often from home than from work. Based on these results, it is expected that negative interference will originate more often from work than from home (*hypothesis 2a*) and that positive interference will originate more often from home than from work (*hypothesis 2b*).

Differences between demographic groups

The demographic groups that could differ with regard to work-home interaction include age, gender (males vs. gender), language (English vs. Afrikaans vs. African), ethnicity (White vs. African vs. Coloured vs. Indian), education (school education, i.e., Grades 9-11 vs. higher education such as a technikon diploma, technical college qualification, university degree or postgraduate degree), marital status (married vs. unmarried), parental status (parents vs. not parents), a partner's contribution to household income (less than 25% vs. approximately 25% vs. approximately 50% vs. more than 50%) and different business units in the earthmoving industry (Construction vs. Shared Services vs. Mining vs. Rental vs. Handling vs. Energy vs. Agriculture).

With regard to age, most studies found no relationship between different age groups (Frone, Russell, & Cooper, 1997; Kinnunen & Mauno, 1998; Pieterse & Mostert, 2005; Van Tonder, 2005). Grzywacz and Marks (2000) found that younger men experienced a less positive spillover from family to work and a higher negative spillover between home and work. Furthermore, Grzywacz and Marks (2000) indicated that older women reported a lower positive spillover from work to home than younger women. Duxbury and Higgins (2001) reported that participants between the ages of 36 and 55 experienced more interference from work to home. It can therefore be expected that age groups will differ on the basis of work-home interaction in this study (*hypothesis 3a*).

Various studies reported similar or hardly any difference between females and males in their experience of work-to-family conflict and family-to-work conflict (e.g., Demerouti et al., 2004; Eagle, Miles, & Icenogle, 1997; Frone, 2002; Kinnunen & Mauno, 1998; Kirchmeyer, 1992; Grandey & Cropanzano, 1999; Burke, 1988). However, the results of Geurts et al. (2005) and Pieterse and Mostert (2005) found that males reported more negative WHI than females. Furthermore, Grzywacz and Marks (2000) found that women reported more positive

spillover from work to home than men. It therefore seems that work-home interaction levels will differ for males and females (*hypothesis 3b*).

Research on the impact of language and work-home interaction is largely absent. The study of Pieterse and Mostert (2005) found no differences between different language groups. It therefore seems that language groups will not differ with regard to work-home interaction (*hypothesis 3c*).

Kinnunen and Mauno (1998) and Frone et al., (1997) found no long-term relationship between race and conflict in either the work or home domain. The results of Pieterse and Mostert (2005) also showed no statistically significant differences with regard to ethnicity. However, Grzywacz and Marks (2000) found that Black women reported less negative spillover from family to work than other women. The study of Van Tonder (2005) found that White nurses experienced higher negative spillover from home to work than African nurses. It therefore seems that ethnic groups will differ on the basis of work-home interaction (*hypothesis 3d*).

Regarding educational level, Frone et al. (1997) and Pieterse and Mostert (2005) found no significant differences between individuals with different levels of education. However, Grzywacz and Marks (2000) found that women with lower levels of education experienced lower levels of positive spillover from work to home. Van Tonder (2005) also reported significantly different levels of negative WHI for different education groups. Employees with a technician diploma experienced higher negative spillover from work to home than employees with a Grade 10 or Grade 11 education. It therefore seems that individuals with different educational levels will differ with regard to work-home interaction (*hypothesis 3e*).

The impact of marital status (household situation) requires future investigation. Most studies include a large percentage of married employees (Geurts & Demerouti, 2003). According to Grzywacz and Marks (2000), the status of being single was associated with negative WHI. Frone et al. (1992) found that social support was directly and negatively linked to HWI. The results from Grzywacz and Marks (2000) indicated that unmarried participants experienced less negative spillover from work to family and also less positive spillover from the family to the work domain. It is therefore expected that differences will exist on the basis of marital status (*hypothesis 3f*).

Research on parental status indicated that the number of children living at home and their ages have an influence on work-home interaction (work to family and vice versa) (Grandey & Cropanzano, 1999; Kinnunen & Mauno, 1998; Higgins, Duxbury, & Lee, 1994; Netemeyer et al., 1996). Higgins et al. (1994) reported that working women with children younger than 12 years experienced more negative spillover between both domains compared to working women with older children. It was also reported that men with children in high school experienced less WHI than men with younger children. Grzywacz and Marks (2000) reported that working parents with children experienced higher levels of negative HWI than working parents without children. Geurts et al. (2005) found that working parents and part-timers reported higher levels of positive HWI than parents without children. It can therefore be hypothesised that there will be differences that are based on parental status (*hypothesis 3g*).

Although little information is available on the difference of work-home interaction that is based on a partner's contribution to the household income or different business units in the earthmoving equipment industry, these variables seem important to be considered in this study and will therefore also be included in the analyses.

METHOD

Participants and procedure

A cross-sectional survey was conducted among employees in the earthmoving equipment industry ($n = 528$) in Gauteng, the Limpopo Province, Mpumalanga, the Northern Cape, the Western Cape, the Eastern Cape, Kwa-Zulu Natal and the North West Province (response rate = 53%). After permission was obtained from executive management, the managers, human resources department and employee/employer committees were informed of the study during management meetings. Thereafter, all employees received paper-and-pencil questionnaires and return envelopes at their work that could be returned to the researchers involved. A letter explaining the purpose of the research accompanied the questionnaire. The employees were kindly requested to fill in the questionnaire in private and to send it to the Human Resources Department, where the researchers involved collected all the completed questionnaires. The participation was voluntary, and the confidentiality and anonymity of the answers were emphasised. Table 1 gives an indication of the characteristics of the participants that were included in the study.

Table 1

Characteristics of the Participants (n = 528)

Item	Category	Frequency	Percentage
Gender	Male	380	72,0
	Female	141	26,7
Race	White	329	62,3
	African	109	20,6
	Coloured	60	11,4
	Indian	16	3,0
	Other	2	0,4
Age	1940-1949 (56 – 65 years)	44	8,3
	1950-1959 (46 – 55 years)	108	20,5
	1960-1969 (36 – 45 years)	137	25,9
	1970-1979 (26 – 35 years)	158	29,0
	1980-1987 (18 – 25 years)	63	11,9
Language	Afrikaans	233	44,1
	English	192	36,4
	Zulu	18	3,4
	Tsonga	6	1,1
	Sepedi	30	5,7
	Sesotho	12	2,3
	Setswana	8	1,5
	Venda	5	0,9
	Ndebele	7	1,3
	Xhosa	11	2,1
	Other languages	1	0,2
Household situation	Single without children	81	15,3
	Single with children	44	8,3
	Married without children	77	14,6
	Married with children	266	50,4
	Living with parents	35	6,6
	Other	18	3,4
Education level	Grade 10	77	14,6
	Grade 12	217	41,1
	Technikon diploma	44	8,3
	Postgraduate	11	2,1
	Grade 11	16	3,0
	Technical/College diploma	128	24,2
Employment status	Other	1	0,2
	Full time	412	78,0
	Part time	93	17,6

According to Table 1, the sample was predominately male (72%); 62,3% were White and 20,6% were African. Most of the participants spoke Afrikaans (44,1%) and English (36,4%) and were married with children (50,4%). With regard to age, most of the participants were born in the years 1970 to 1979 (26 – 35 years). A total of 41% of the participants held a Grade 12 certificate and 24,2% held a technical college diploma. Most of the employees in the industry worked full-time (78%).

Measuring battery

The following questionnaires were used in the empirical study:

The *Survey Work-Home Interaction – Nijmegen* (SWING) was used to measure work-home interaction (Geurts et al., 2005; Wagena & Geurts, 2000). The SWING is a 22-item work-home interference measure that measures four types of work-home interference, namely (1) negative WHI (eight items, e.g., “you do not have the energy to engage in leisure activities with your spouse/family/friends because of your job?”); (2) positive WHI (five items, e.g., “you fulfill your domestic obligations better because of the things you have learned on the job?”); (3) negative HWI (four items, e.g., “you have difficulty concentrating on your work because you are preoccupied with domestic matters”); and (4) positive HWI (five items, e.g., “you take your responsibilities at work more seriously because you are required to do the same at home?”). All items are scored on a four-point frequency rating scale, which ranges from “0” (never) to “3” (always).

A *Biographical Questionnaire* was used to determine the biographical characteristics of the employees in the earthmoving equipment industry. The biographical characteristics that were measured were gender, language, age, ethnicity, educational level, household situation (e.g., single, without children living at home/married/living with a partner), working hours, permanent and part-time employment, use of annual leave, the contribution that the partner makes to the total household income; and the business unit and personnel area in which the employee operates.

Statistical analysis

The statistical analysis was carried out with the SPSS-program (SPSS Inc., 2005) and the

Amos-program (Arbuckle, 2003). Structural equation modelling (SEM) methods, as implemented by Amos (Arbuckle, 2003), were used to test the construct validity and construct equivalence of the SWING by using the maximum likelihood estimation method. A multi-group confirmatory factor analysis was used in order to test the construct equivalence of the factor structure and the equivalence of parameter estimates (i.e., factor loadings, factor covariances and item error variances) across six important subgroups, namely language (English vs. other African languages), ethnicity (White vs. indigenous groups), gender (males vs. females), education (employees with a school diploma vs. employees with a tertiary qualification), marital status (married vs. not married) and parental status (parents vs. not parents).

The χ^2 and several other goodness-of-fit indices were used to summarise the degree of correspondence between the implied and observed covariance matrices. The following goodness-of-fit indices were used as adjuncts to the χ^2 statistics: (a) χ^2/df ratio; (b) the Goodness-of-Fit Index (GFI); (c) the Incremental Fit Index (IFI); (d) the Tucker-Lewis Index (TLI); (e) the Comparative Fit Index (CFI); (f) the Root Mean Square Error of Approximation (RMSEA). Values greater than 0,90 for relative fit indices (GFI, IFI, TLI and CFI) and lower than 0,08 for RMSEA are considered a good fit (Byrne, 2001; Hoyle, 1995).

Cronbach alpha coefficients were used to assess the reliability of the scales and product-moment correlations were used to determine the relationship between the dimensions. Descriptive statistics (e.g., means and standard deviations) were used to describe the data.

Paired-samples *t*-tests were used to determine the prevalence of work-home interaction. Multivariate analysis of variance (MANOVA) was used to determine the significance of the differences between the work-home interaction levels of different demographic groups. MANOVA tests whether mean differences among groups on a combination of dependent variables likely occurred by chance (Tabachnick & Fidell, 2001). In MANOVA a new dependent variable that maximises group differences is created from the set of dependent variables. 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 identical to those of the sample mean vectors for the different groups. When an effect was significant in MANOVA, one-way analysis of variance

(ANOVA) was used to discover which dependent variables had been affected. A Bonferroni-type adjustment was made for inflated Type 1 error. The Games-Howell procedure was used to determine if there were statistical differences between the groups.

RESULTS

Construct validity

In accordance with Geurts et al. (2005), the construct validity of the SWING was tested by comparing four models for the relationships among the 22 items. *Model 1* proposes that all 22 items load on the same underlying latent dimension, assuming that the items cannot be distinguished on the basis of direction or quality of influence. *Model 2* (“direction model”) is a two-factor model which distinguishes between items that refer to either influence from work or influence from home (irrespective of its quality). *Model 3* (“quality model”) also distinguishes between two factors. The first factor includes all items that refer to positive interaction and the second factor includes all items that refer to negative interaction (irrespective of the originating domain). Lastly, *Model 4* (“hypothesised model”) represents the four-factor model and distinguishes between the four expected dimensions: negative WHI, negative HWI, positive WHI and positive HWI. Table 2 presents the fit-statistics of the four competing factorial models that were tested.

Table 2

Goodness-of-fit Statistics for the Comparison of Factorial Models

Model		χ^2	χ^2/df	GFI	IFI	TLI	CFI	RMSEA
M ₁	One-factor	2162,20	10,35	0,61	0,49	0,43	0,48	0,13
M ₂	Two-factor ("direction model")	1727,30	8,27	0,71	0,60	0,56	0,60	0,12
M ₃	Two-factor ("quality model")	989,91	4,74	0,83	0,79	0,77	0,79	0,08
M ₄	Four-factor ("hypothesised model")	826,58	3,96	0,87	0,84	0,82	0,84	0,08
M ₅	Four-factor ("final model")	531,45	2,58	0,91	0,91	0,90	0,90	0,06

From Table 2, it is clear that model 1 did not fit well to the data ($\chi^2 = 2162,20$; GFI, IFI, TLI and CFI $< 0,90$ and RMSEA $> 0,08$). Model 2 ("directional model") and model 3 ("quality model") explained the associations among the items significantly better than model 1 (M₂ vs. M₁: $\Delta \chi^2 = 434,90$ ($N = 528$), $df = 1,00$, $p < 0,01$; M₃ vs. M₁: $\Delta \chi^2 = 1172,29$ ($N = 528$), $df = 1,00$, $p < 0,01$). However, both models still fell short of what is acceptable. The four-factor hypothesised model, which distinguished between the four proposed dimensions of work-home interaction, explained the associations among the items significantly better than the other three competing models (M₄ vs. M₁: $\Delta \chi^2 = 1335,62$ ($N = 528$), $df = 1,00$, $p < 0,01$; M₄ vs. M₂: $\Delta \chi^2 = 900,72$ ($N = 528$), $df = 1,000$, $p < 0,01$; M₄ vs. M₃: $\Delta \chi^2 = 163,43$ ($N = 528$), $df = 1,00$, $p < 0,01$).

Although model 4 explained the associations among items significantly better than the other models, the GFI, IFI, TLI and CFI lower than 0,90 are indicative of failure to confirm the hypothesised model. In order to pinpoint possible areas of misfit, modification indexes were considered which revealed that the two positive (Positive WHI and Positive HWI) and the two negative (Negative WHI and Negative HWI) latent factors should be correlated. Considering the high covariances (M.I. of Positive WHI and Positive HWI = 151,63; M.I. of Negative WHI and Negative HWI = 69,14), it was decided to re-specify the model in order to allow these factors to correlate. The modification indices also indicated a correlated error between item 3 and item 9 (M.I. = 27,05). Compared with the M.I. values of the other error covariance parameters, this value is relatively high. It was therefore decided to allow the errors of this item pair to correlate. It can be seen from Table 2, that model 5 fitted the data significantly better than model 4 (M₅ vs. M₄: $\Delta \chi^2 = 295,13$ ($N = 528$), $df = 3,00$, $p < 0,01$). From a practical perspective, it also seems that the re-specified model indicates a relatively good fit ($\chi^2/df < 5,00$; GFI, IFI, TLI and CFI $> 0,90$; RMSEA $< 0,08$). Since this model fit was satisfactory and the results agreed with the theoretical assumptions underlying the structure of the SWING, no further modifications of the model were deemed necessary. Based on these results, it appears that the SWING has a four-dimensional structure that distinguishes between the direction (work-to-home and home-to-work) and quality (negative and positive) of influence, which supports *hypothesis 1a*.

Construct equivalence

Next, the hypotheses relating to the equivalence for factor loadings, factor variances and covariances of the four-factor structure of the SWING were tested for the six relevant subgroups. At the statistical level, the test for the equivalence of factor loading and covariances involves using the χ^2 statistics to determine the difference in statistical fit between the unconstrained and constrained models. Non-significant differences between the models indicate statistical support for the hypotheses that were tested. Equivalence can also be examined by comparing the other indices (e.g., IFI, TLI, CFI and RMSEA) of the models that were compared. Such comparisons provide a test for equivalence at the practical level, where small differences are indicative of equivalence for the groups that were compared. The results are presented in Table 3.

Table 3

Equivalence of the Factor Structure for the Five Subgroups

Model	χ^2	χ^2/df	GFI	IFI	TLI	CFI	RMSEA
Language							
Unconstrained model	765,82	1,86	0,88	0,91	0,91	0,90	0,04
Constrained model	795,76	1,82	0,88	0,91	0,90	0,91	0,04
	$\Delta \chi^2 = 29,94$ ($N = 528$), $df = 25,00$ ($p < 0,01$)						
Ethnicity							
Unconstrained model	852,71	2,07	0,87	0,89	0,87	0,89	0,05
Constrained model	881,26	2,02	0,87	0,86	0,88	0,88	0,04
	$\Delta \chi^2 = 28,55$ ($N = 528$), $df = 25,00$ ($p < 0,01$)						
Gender							
Unconstrained model	777,87	1,89	0,88	0,91	0,89	0,90	0,04
Constrained model	828,39	1,90	0,88	0,90	0,89	0,90	0,04
	$\Delta \chi^2 = 50,52$ ($N = 528$), $df = 25,00$ ($p < 0,01$)						
Education							
Unconstrained model	794,12	1,93	0,88	0,90	0,89	0,90	0,04
Constrained model	836,78	1,92	0,87	0,90	0,89	0,89	0,04
	$\Delta \chi^2 = 42,66$ ($N = 528$), $df = 25,00$ ($p < 0,01$)						
Marital status							
Unconstrained model	732,15	1,78	0,88	0,91	0,89	0,91	0,04
Constrained model	754,26	1,73	0,87	0,91	0,90	0,91	0,04
	$\Delta \chi^2 = 22,11$ ($N = 528$), $df = 25,00$ ($p < 0,01$)						
Parental status							
Unconstrained model	749,70	1,82	0,88	0,90	0,89	0,90	0,04
Constrained model	777,08	1,78	0,87	0,90	0,90	0,90	0,04
	$\Delta \chi^2 = 27,38$ ($N = 528$), $df = 25,00$ ($p < 0,01$)						

Table 3 shows the results of analyses for testing the measurement and structural equivalence across language, ethnicity, gender, education, marital status and parental status. As can be seen, the practical fit indices of the unconstrained models were very good, thereby supporting the equivalence for the number of factors. The indices for the constrained models also showed a very good fit and their values were very close to those for the unconstrained model. In addition, the differences between the models that were based on the χ^2 value were also non-significant ($p < 0,01$). These results provide support for the equivalence in the pattern of

factor loadings of the SWING across the subgroups, which provides support for *hypothesis 1b*.

Table 4

Descriptive Statistics, Alpha Coefficients and Product- Moment Correlations for the SWING

Item	<i>M</i>	<i>SD</i>	α	NWHI	PWHI	NHWI
Negative WHI	1,00	0,57	0,86	1,00	-	-
Positive WHI	1,55	0,66	0,77	-0,17*	1,00	-
Negative HWI	0,55	0,53	0,71	0,37**	-0,13*	1,00
Positive HWI	1,87	0,69	0,79	-0,15*	0,56**	-0,18*

* Correlation is statistically significant at the 0,01 level

+ Correlation is practically significant, $r > 0,30$ (medium effect)

** Correlation is practically significant, $r > 0,50$ (large effect)

From the results in Table 4, it can be seen that all four scales are reliable when compared to the guideline of $\alpha > 0,70$ (Kline, 1999; Nunnally & Bernstein, 1994), providing support for *Hypothesis 1c*. Furthermore, the correlations between the two negative scales ($r = 0,37, p < 0,01$) and between the two positive scales ($r = 0,56, p < 0,01$) were the highest.

A post-hoc confirmatory analysis with SEM was conducted to exclude the possibility that the items belonging to the different negative and positive components actually tapped the same underlying dimension. Two models were tested for the negative items and for the positive items. In the one-factor model (M_1) it was assumed that all the items load on one factor, while it was assumed that two different dimensions can be distinguished in the two-factor model (M_2). For the negative items, the results indicated that the two-factor solution ($\chi^2 = 183,91; \chi^2/df = 3,47; GFI = 0,94; IFI = 0,94; TLI = 0,92; CFI = 0,94; RMSEA = 0,07$) fitted the data significantly better than the one-factor solution ($\chi^2 = 429,28; \chi^2/df = 7,95; GFI = 0,86; IFI = 0,82; TLI = 0,78; CFI = 0,82; RMSEA = 0,12$), indicating that negative WHI and negative HWI are two empirically different constructs (although they are related). The same was true for the positive items, where a two-factor solution ($\chi^2 = 107,53; \chi^2/df = 3,16; GFI = 0,96; IFI = 0,95; TLI = 0,94; CFI = 0,95; RMSEA = 0,06$) fitted the data significantly better than the one-factor solution ($\chi^2 = 283,61; \chi^2/df = 8,10; GFI = 0,88; IFI = 0,84; TLI = 0,80; CFI = 0,84; RMSEA = 0,12$), implying that positive WHI and positive HWI are two empirically different (albeit related) constructs.

Prevalence and differences between demographic groups

Regarding the prevalence of work-home interaction, paired-samples *t*-tests revealed that the employees reported more negative WHI ($M = 1,00$) than negative HWI ($M = 0,55$, $t_{(528)} = 16,89$, $p < 0,01$); and more positive HWI ($M = 1,87$) than positive WHI ($M = 1,55$, $t_{(528)} = -11,81$, $p < 0,01$). These results provide evidence for *hypothesis 2a* and *hypothesis 2b*.

Next, MANOVA was used to determine the differences between the demographic groups with regard to work-home interaction. Demographic groups that were included were age, gender, language, ethnicity, education, marital status, parental status, a partner's contribution to household income and different business units. The results were first analysed for statistical significance by using Wilk's Lambda statistics. ANOVA was used to determine specific differences whenever statistical differences were found. The results of the MANOVA analysis are given in Table 5.

Table 5

MANOVA – Differences in Work-Home Interaction Levels of Demographic Groups

Variable	Value	<i>F</i>	Df	<i>p</i>	Partial Eta Squared
Age	0,93	2,21	16	0,00*	0,02
Gender	0,91	6,36	8	0,00*	0,05
Language	0,96	2,77	8	0,01*	0,02
Ethnicity	0,94	2,89	12	0,00*	0,02
Education	0,99	1,36	4	0,25	0,01
Marital status	0,99	1,17	4	0,33	0,01
Parental status	0,99	1,29	4	0,27	0,01
Partner's contribution to household income	0,93	1,97	20	0,01*	0,02
Business unit	0,86	2,19	36	0,00*	0,04

* $p < 0,05$ = significant effect

In an analysis of Wilk's Lambda values, statistically significant differences ($p \leq 0,05$) regarding the work-home interaction levels were found between all the variables, except for

education, marital status and parental status. On the basis of these results, *hypothesis 3e*, *hypothesis 3f* and *hypothesis 3g* are rejected. The relationship between work-home interaction and the demographic variables levels that showed a statistically significant difference was further analysed by using ANOVA. Because the sample sizes were different, the Games-Howell procedure was used to determine whether there were any statistical differences between the groups.

The results of the ANOVA, based on age, are given in Table 6.

Table 6

Differences in Work-Home Interaction Levels Based on Age

Item	56-65 years	46-55 years	36-45 years	26-35 years	18-25 years	<i>p</i>	Partial Eta Squared
Negative WHI	0,80 ^a	0,91	1,08 ^b	1,07 ^b	0,99	0,01*	0,03
Positive WHI	1,79 ^a	1,66	1,51	1,43 ^b	1,57	0,01*	0,03
Negative HWI	0,49	0,46 ^a	0,55	0,65 ^b	0,45	0,02*	0,02
Positive HWI	2,05 ^b	2,00 ^b	1,84	1,73 ^a	1,92	0,01*	0,03

* Statistically significant difference: $p \leq 0,05$

^a Group differs statistically significantly from type (in row) where ^b is indicated

Table 6 shows that statistically significant differences exist between all four work-home interaction dimensions. It appears that the participants between 56 and 65 years of age experienced statically significant lower levels of Negative WHI than participants who were between 36 and 45 years of age and participants who were between 26 and 35 years of age. Regarding Positive WHI, it seems that the participants between the ages of 56 and 65 experienced higher levels of Positive WHI compared to participants between the ages of 26 and 35 years. Furthermore, participants between the ages of 26 and 35 experienced statistically significant higher levels of Negative WHI than participants between the ages of 46 and 55 years. Finally, younger employees (between 26 and 35 years of age) also experienced statistically significant lower levels of Positive WHI than older employees (between 46 and 65 years of age). These results support *hypothesis 3a* (that age groups will differ on the basis of work-home interaction).

The results of the ANOVA, based on gender, are given in Table 7.

Table 7

Differences in Work-Home Interaction Levels Based on Gender

Item	Males	Females	<i>p</i>	Partial Eta Squared
Negative WHI	1,11	0,73	0,00*	0,08
Positive WHI	1,54	1,55	0,73	0,00
Negative HWI	0,57	0,48	0,24	0,01
Positive HWI	1,88	1,86	0,88	0,00

* Statistically significant difference: $p \leq 0,05$

Table 7 shows that there are statistically significant differences between the levels of Negative WHI that are based on gender. It seems that males experience statistically significant higher levels of Negative WHI than females. These results support *hypothesis 3b* (that males and females will differ on the basis of NWHI).

The results of the ANOVA, based on language, are given in Table 8.

Table 8

Differences in Work-Home Interaction Levels Based on Language

Item	Afrikaans	English	African	<i>p</i>	Partial Eta Squared
Negative WHI	1,08 ^b	0,88 ^a	1,06 ^b	0,00*	0,03
Positive WHI	1,50	1,60	1,56	0,29	0,01
Negative HWI	0,57	0,51	0,55	0,59	0,00
Positive HWI	1,82	1,86	2,01	0,08	0,01

* Statistically significant difference: $p \leq 0,05$

^a Group differs statistically significantly from type (in row) where ^b is indicated

Table 8 shows that there are statistically significant differences between the levels of Negative WHI that are based on language. It seems that the Afrikaans and African groups experienced statistically significant higher levels of Negative WHI compared to the English-speaking employees. These results do not support *hypothesis 3c*.

The results of the ANOVA, based on race, are given in Table 9.

Table 9

Differences in Work-Home Interaction Levels Based on Ethnicity

Item	White	African	Coloured	Indian	<i>p</i>	Partial Eta Squared
Negative WHI	1,04 ^a	1,07 ^a	0,82 ^b	0,65 ^b	0,00 [*]	0,03
Positive WHI	1,49 ^a	1,56	1,73	1,94 ^b	0,01 [*]	0,03
Negative HWI	0,56	0,57	0,45	0,42	0,39	0,06
Positive HWI	1,78 ^a	1,97	2,11 ^b	2,21	0,00 [*]	0,04

* Statistically significant difference: $p \leq 0,05$

^a Group differs statistically significantly from type (in row) where ^b is indicated

Table 9 shows statistically significant levels between Negative WHI, Positive WHI and Positive HWI. Compared to the White and African participants, the Coloured and Indian participants experienced lower levels of Negative WHI. The White participants experienced lower levels of Positive WHI than the Indian participants and lower Positive HWI than the Coloured participants. Based on these results, differences in work-home interaction levels exist between different ethnic groups (providing support for *hypothesis 3d*).

The results of the ANOVA, based on a partner's contribution to household income, are given in Table 10.

Table 10

Differences in Work-Home Interaction Levels Based on a Partner's Contribution to Household Income

Item	Less than 25%	Aprox. 25%	Aprox. 50%	More than 50%	<i>p</i>	Partial Eta Squared
Negative WHI	1,17 ^b	1,01	1,13 ^b	0,78 ^a	0,00 [*]	0,05
Positive WHI	1,53	1,54	1,31 ^b	1,68 ^a	0,04 [*]	0,02
Negative HWI	0,56	0,59	0,55	0,48	0,87	0,00
Positive HWI	1,89	1,90	1,70	1,93	0,28	0,01

* Statistically significant difference: $p \leq 0,05$

^a Group differs statistically significantly from type (in row) where ^b is indicated

According to Table 10, there is a significant difference between Negative WHI and Positive WHI levels that are based on a partner's contribution to household income. Employees whose partners contributed more than 50% have lower levels of Negative WHI than partners who contribute less than 25%. Employees with partners who contributed more than 50% experienced more positive WHI than employees with partners who contributed approximately 50%.

Table 11

Differences in Work-Home Interaction Levels Based on Business Units

Item	Construct	Shared Services	Mining	Rental	Handling	Energy	Agri-culture	Other	<i>p</i>	Partial Eta Squared
NWHI	0,93 ^b	0,81 ^b	1,20 ^a	1,22	0,85 ^b	1,09	0,63	1,15	0,00 [*]	0,07
PWHI	1,67 ^b	1,41	1,46	1,34 ^a	1,64	1,35	1,70	1,68	0,02 [*]	0,04
NHWI	0,48 ^a	0,39 ^c	0,62 ^d	0,91 ^b	0,53	0,65	0,50	0,72	0,00 [*]	0,05
PHWI	1,95 ^a	1,81	1,86	1,47 ^b	1,96	1,64	2,20	2,20	0,02 [*]	0,04

* Statistically significant difference: $p \leq 0,05$

^a Group differs statistically significantly from type (in row) where ^b is indicated; ^c differs statistically significantly from type (in row) where ^b and ^d are indicated.

According to Table 11, employees in the Mining business unit experienced statistically significant higher levels of Negative WHI than employees in the Construction, Shared Services and Handling business units. With regards to Positive WHI, the Rental business unit experienced lower levels of Positive WHI compared to employees in the Construction business unit. Regarding Negative HWI, employees in the Rental business unit experienced statistically significant higher negative HWI than employees in the Construction business unit. Employees in the Shared Services business unit experienced statistically significant lower levels of Negative HWI than employees in the Rental and Mining business units. Finally, it seems that employees in the Rental business unit experienced statistically significant lower levels of Positive WHI compared to employees in the Construction business unit.

DISCUSSION

The focus on work and family issues in the earthmoving equipment industry has become increasingly important for organisations and individuals, because this competitive industry operates in a stressful environment. However, only two measuring instruments measure the broad spectrum of work-home interaction, one of them being the SWING (Geurts et al., 2005). Relatively little information is known about the prevalence of work-home interaction in the earthmoving equipment industry in South Africa and the differences between demographic groups with regard to work-home interaction. The objectives of this study were therefore to determine the psychometric properties of the SWING, to determine the prevalence of work-home interaction and to investigate if important demographic groups differ with regard to work-home interaction.

With regard to the psychometric properties of the SWING, three aspects were investigated, namely (1) the construct validity, (2) the construct equivalence and (3) the reliability of the scales. With regard to the construct validity, it was hypothesised that work-home interaction (as measured by the SWING) is a four-dimensional construct that consists of negative and positive interference from work to home, and also negative and positive interference from home to work. In order to test this hypothesis, four competing structural models were tested for the relationship among the 22 items. The results indicated that the four-factor model explained the associations between the items significantly better compared to the alternative models. However, inspection of the standardised regression weights, modification indices and standardised residual covariances indicated that correlations between positive WHI and positive HWI should be allowed, as well as between negative WHI and negative HWI – indicating that these factors are in some way related to each other. Furthermore, errors were allowed to correlate between two items, namely item 3 (“you find it difficult to fulfil your domestic obligations?”) and item 9 (“your work takes up time that you would have liked to spend with your spouse/family/friends”). After these modifications were made, the model fitted satisfactory to the data. This confirmed the hypotheses that work-home interaction can be characterised as a four-dimensional construct that distinguishes between the direction and quality of influence between work and home. These findings are congruent with previous research (Geurts et al., 2005; Pieterse & Mostert, 2005; Van Tonder, 2005).

South Africa is a multicultural society and the earthmoving equipment industry employs individuals from diverse cultural backgrounds. It is therefore important to determine the equivalence of the SWING because one cannot automatically assume that scores obtained in one culture can be compared across other cultural groups. In this study the structure of the SWING was equivalent for the six relevant subgroups (language, ethnicity, gender, education, marital status and parental status). In a similar vein, Pieterse and Mostert (2005) confirmed the construct equivalence of the four dimensions for two language groups (English and non English) by using exploratory analyses, while Geurts et al. (2005) confirmed the construct equivalence of the SWING across five subgroups (i.e., occupation, gender, parental status and full-time/part-time status).

With regard to the third aspect of the psychometric properties of the SWING, it was hypothesised that all the scales were reliable. Acceptable Cronbach alpha coefficients were obtained for all four scales, providing support for the reliability of the SWING. These results are in line with the findings of Geurts et al. (2005), Pieterse and Mostert (2005), and Van Tonder (2005), who all found acceptable reliability coefficients for the SWING.

The prevalence of the WHI/HWI in this research revealed that interference originated more often from work than from home and that positive HWI is more prevalent than positive WHI. These findings support the results of Geurts et al. (2005), Grzywacz and Marks (2000) and Montgomery et al. (2003). The results may suggest proneness to arrange work over family matters, resulting in reduced efforts at home; and that home activities are more favourable than work activities. It could also be that the time to recover and to relax is more obtainable in the home domain because efforts are recharged rather than depleted at home.

The last objective of this study was to determine if important demographic groups differed with regard to work-home interaction. MANOVA analysis was used to determine the significance of differences between the work-home interaction levels and the various demographic characteristics. The results showed that statistically significant differences were found for age, gender, language, ethnicity, a partner's contribution to household income and the different business units. No statistically significant differences were found with regard to education, marital status and parental status.

The results for the different age groups showed that significant differences exist between all four work-home interaction dimensions. It seems that younger employees (between 26 and 35 years of age) experienced statistically significant lower levels of positive WHI than older employees (between 46 and 65 years of age). It also appears that older participants experienced statically significant lower levels of negative WHI than younger participants. These results support the findings of Grzywacz and Marks (2000) and Duxbury and Higgins (2001). The results may imply that the younger participants had not yet obtained the necessary skills to manage the integration between personal life and work as compared to older participants. The different work and home activities of the participants may also have influenced the integration of these demands, since the younger employees might have been earlier in their careers and might have been working very hard to prove themselves.

With regard to differences based on gender, it seems that males experienced statistically significant higher levels of negative WHI than females. These results are similar to previous findings regarding the difference between males and females (e.g., Duxbury & Higgins, 2001; Geurts et al., 2005; Grzywacz & Marks, 2000; Pieterse & Mostert, 2005). This may imply that the work situation of females is more favourable than the work situation of males. On the other hand, males may find it difficult to separate their personal and work lives. The traditional role of men has also changed. An increased number of women and dual earners entered the workforce, placing more focus on work activities than home activities, which could imply that men also have to contribute to the household, resulting in a negative spillover from work to home.

The results obtained for the language groups revealed that the Afrikaans and African groups experienced statistically significant higher negative spillover from work to home compared to English-speaking employees. Differences based on ethnicity indicated that White and African participants experienced higher levels of negative WHI compared to Coloured and Indian participants. This was reiterated by the findings of Grzywacz and Marks (2000) and Van Tonder (2005). These findings may suggest that White and African participants experience their work environment as more stressful, resulting in fewer opportunities to recover at home. The different cultural differences and backgrounds may also influence the way in which the work environment is perceived. These findings are in contrast with the findings of Kinnunen and Mauno (1998), Frone et al. (1997), and Pieterse and Mostert (2005), who found no differences with regard to work-home interaction.

Significant differences exist for negative and positive WHI levels based on a partner's contribution to income. The results obtained from this study revealed that employees with partners who contributed more than 50% experienced more positive WHI than employees with partners who contributed approximately 50%. It can be assumed that a household with a single earner have more stress and more responsibilities than a household that relies on the income of both partners.

Results based on business units showed statistically significant differences between all four dimensions. Employees in the mining business unit experienced statistically significant higher levels of negative WHI than employees in the construction, shared services and handling business units. This may suggest that employees in the mining business unit experience more negative spillover from work to home, resulting in reduced investments at home. Most employees operate on mining sites, work far from home and experience extensive travelling and long hours. The time they spend at home is often minimal, resulting in a negative spillover from work to home. With regard to positive WHI, employees in the construction business unit experienced higher levels of positive WHI compared to employees in the rental business unit. These results may imply that the work domain is less favourable for employees in the rental unit.

In conclusion, the results obtained in this study revealed that the SWING is a valid, equivalent and reliable measuring instrument for measuring the work-home interaction of workers in the earthmoving equipment industry. The SWING can also be used to determine if important demographic groups differ with regard to work-home interaction, consequentially leading to better insights for preventative strategies within the industry.

This study had various limitations. Firstly, the results were obtained solely through self-report questionnaires. This can create problems, because participants might not understand the questions or the meaning of specific words. A further limitation was the size and homogeneity of the sample. Pieterse and Mostert (2005) indicate that unique characteristics (such as the organisational culture and climate) probably exist within the earthmoving equipment industry which could influence the participants' responses. Not only was the sample taken from the earthmoving equipment industry, but most of the respondents were White males. It is therefore difficult to generalise the results to other occupational groups and subgroups.

RECOMMENDATIONS AND LIMITATIONS

With regard to the results obtained from this study, the SWING is recommended as a measuring instrument to measure work-home interaction in the South African earthmoving equipment industry. However, it is highly recommended that the SWING should be translated into other official languages in order to prevent misunderstanding the items. Furthermore, although English is regarded as the business language in organisations, for a number of employees English is a second language. It could therefore be difficult for these employees to understand the content of the questions.

Future research may enhance existing knowledge on the processes between the home and the work environment. Since this study was conducted among a relatively homogenous group, other studies that comprise a greater variety of demographic characteristics will enhance the reliability and usefulness of the SWING. Future research that uses longitudinal studies will also enhance assumptions regarding the relationships and consequences of work-home interaction with other relevant variables. A study of the processes of work-home interaction will ensure the best application of the different and specific influences and outcomes found in the earthmoving equipment industry. Furthermore, future research may enhance the existing knowledge of the processes between the work and home domains, and may assist with the development and design of organisational policies to create a better integration of family and work roles within the earthmoving equipment industry.

Author's Note

The material described in this article is based on work that was supported by the National Research Foundation under reference number 20050801000025.

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The Wellbeing of Employees in the Earthmoving Equipment Industry

ABSTRACT

The objectives of this study were to determine (1) the construct validity, construct equivalence and reliability of an adapted version of the *Maslach Burnout Inventory – General Survey* (MBI-GS) and the *Utrecht Work Engagement Scale* (UWES); (2) the underlying structure of a total wellbeing construct, including burnout and engagement; and (3) whether important demographic groups differ with regard to wellbeing. Random samples ($n = 528$) were taken of employees in the earthmoving equipment industry in eight provinces in South Africa. The MBI-GS, UWES and a biographical questionnaire were administered. Structural equation modelling (SEM) confirmed the four-factor structure of burnout (including exhaustion, cognitive weariness, cynicism and professional efficacy) and the two-factor structure of work engagement (including vigour and dedication). These factor structures were equivalent across language and education groups. All the scales were found to be reliable. Regarding the validity and equivalence of the total wellness construct, SEM analyses supported a two-factor model that consisted of burnout (exhaustion, cognitive weariness and cynicism) and engagement (vigour, dedication and professional efficacy), which was equivalent for the language and education groups. Finally, multivariate analysis of variance and one-way analysis of variance were used to determine if demographic groups differ with regard to wellbeing. The results indicated that there were statistically significant differences between the demographic groups based on age, gender, language and the different business units.

OPSOMMING

Die doelwitte van hierdie studie was om die volgende vas te stel: (1) die konstrugeldigheid, -ekwivalensie en -betroubaarheid van 'n aangepaste weergawe van die *Maslach Burnout Inventory – General Survey* (MBI-GS) en die *Utrecht Work Engagement Scale* (UWES); (2) die onderliggende struktuur van 'n totale welstandskonstruk, insluitende ooreising en betrokkenheid; en (3) of belangrike demografiese groepe verskil met betrekking tot welstand. 'n Ewekansige streekproef ($n = 528$) is in agt provinsies in Suid-Afrika onder werknemers in die grondwerktuigindustrie geneem. Die MBI-GS, UWES en 'n biografiese vraelys is toegepas. Struktuurvergelykingsmodellering het die vierfaktorstruktuur van ooreising (insluitende uitputting, kognitiewe tamheid, sinisme en professionele effektiwiteit) en die tweefaktorstruktuur van werksbetrokkenheid (insluitende vitaliteit en toewyding) bevestig. Hierdie faktorstrukture was ekwivalent oor taal- en opvoedingsgroepe heen. Daar is bevind dat al die skale betroubaar was. Betreffende die geldigheid en ekwivalensie van die totale welstandskonstruk, het die SEM-ontledings 'n tweefaktormodel ondersteun wat bestaan het uit ooreising (uitputting, kognitiewe tamheid en sinisme) en betrokkenheid (vitaliteit, toewyding en professionele effektiwiteit) wat ekwivalent was vir die taal- en opvoedingsgroepe. Laastens, is meerveranderlike ontleding en eenrigtingvariensieontleding gebruik om vas te stel of demografiese groepe verskil met betrekking tot welstand. Die resultate het aangedui dat daar statisties betekenisvolle verskille was tussen die demografiese groepe in terme van ouderdom, geslag, taal en die verskillende ondernemingseenhede.

The earthmoving equipment industry has been described as stressful and competitive (Deacon & Smallwood, 2003; Smallwood, 1997; Lingard & Francis, 2005) and is driven by continuous improvement on productivity and efficiencies (Singh, 1997). Stress in the construction industry has been described as a regular phenomenon (Deacon & Smallwood, 2003; Lingard & Francis, 2005) because employees are exposed to stressors such as long working hours, a difficult working environment, increased job demands, health and safety factors, and physical fatigue. When employees are exposed to these kinds of stressors on a continuous basis, it can lead to reduced productivity and motivation, job dissatisfaction, accidents and injuries (Deacon & Smallwood, 2003; Djebarni, 1996; Lingard, 2003; Lingard & Sublet, 2002; Smallwood, 1997). This could influence the wellbeing of employees.

Two aspects of wellbeing that are important to consider are burnout and work engagement. According to Schaufeli and Enzmann (1998, p. 36) burnout is defined as "a persistent, negative, work-related state of mind in 'normal' individuals that is primarily characterised by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work". In addition, recent findings indicate that burnout is also associated with impaired cognitive functioning (Sandström, Rhodin, Lundberg, Olsson, & Nyberg, 2005) and include cognitive weariness as a measurable burnout construct (Coetzee & Rothmann, 2004; Van Horn, Taris, Schaufeli, & Schreurs, 2004). Engagement is considered the opposite of burnout (Maslach, Schaufeli, & Leiter, 2001; Schaufeli & Bakker, 2001; Schaufeli, Martínez, Pinto, Salanova, & Bakker, 2002) and has been defined as a "positive, rewarding, work-related state of mind" that consists of three dimensions namely, vigour, dedication, and absorption" (Schaufeli et al., 2002, p. 295). Whereas burnout is characterised by the depletion of emotional resources, loss of motivation, fatigue and long-term health problems (Schaufeli & Enzmann, 1998; Schaufeli, Salanova, Gonzáles-Romá, & Bakker, 2002), engagement is concerned with enthusiasm, positive attitude and high levels of organisational commitment.

Burnout is related to several organisational outcomes such as intention to leave the organisation, low levels of morale, organisational costs, reduced organisational performance, lower levels of productivity, influence on quality of service, less innovative ideas, reduced organisational commitment and absenteeism (e.g., Cordes & Dougherty, 1993; Levert, Lucas, & Ortlepp, 2000; Maslach et al., 2001; Schaufeli & Bakker, 2004; Schaufeli & Enzmann, 1998; Sammut, 1997). However, burnout is also related to negative outcomes for the

individual and as result can lead to ill-health (Maslach et al., 2001; Montgomery, Mostert, & Jackson, 2005; Schaufeli & Buunk, 2002; Schaufeli & Enzmann, 1998), substance abuse, marital problems (Maslach & Jackson, 1986), fatigue, depression, anxiety, low self-esteem, less motivation, poor memory and attention problems (Schaufeli & Enzmann, 1998; Maslach et al., 2001; Van Horn et al., 2004).

In contrast to burnout, engagement is indicative of higher job satisfaction, commitment, low intention to leave the organisation (Demerouti, Bakker, De Jonge, Janssen, & Schaufeli, 2001), better performance, good health, and low levels of depression and psychosomatic complaints (Demerouti et al., 2001; Rothbard, 2001). Engaged employees are also inspired, enthusiastic and better equipped to deal with stressful situations (Schaufeli & Bakker, 2004; Schaufeli et al., 2002). It is therefore in the interest of organisations to enhance engagement levels in order to ensure optimal functioning for both the employee and the organisation.

Before burnout and engagement of employees in the earthmoving industry can be assessed, it is necessary to demonstrate the validity and reliability of the measuring instruments. The Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli, Leiter, Maslach, & Jackson, 1996) is the most widely known measuring instrument for measuring burnout in occupations outside the human services realm, while the Utrecht Work Engagement Scale (UWES) (Schaufeli et al., 2002) was developed to measure work engagement. The construct validity, construct equivalence and reliability of the MBI-GS and UWES have been confirmed internationally (Roelofs, Verbraak, Keijsers, De Bruin, & Schmidt, 2005; Schaufeli et al., 2002) and nationally (Jackson & Rothmann, 2005; Naudé, 2003; Rothmann, Jackson, & Kruger, 2003; Rothmann & Malan, 2003; Storm & Rothmann, 2003a). However, only a few international studies (Van Horn et al., 2004) and only one study in South Africa (Coetzee & Rothmann, 2004) investigated the construct validity of the enhanced wellness construct where the cognitive weariness scale is included. Furthermore, no studies could be found that investigated the construct validity and equivalence of the adapted MBI-GS and UWES for a sample of employees in the earthmoving equipment industry for different language and education groups.

Transformation developments in South Africa (such as affirmative action and employment equity) play a major role in organisations (Calveros, Van Vuuren, & Visser, 2002). This is also applicable to the earthmoving equipment industry because this industry employs

individuals from different cultures, populations and language groups. Even though few researchers indicated that there is no significant difference between burnout and culture groups (Schutte, Toppinen, Kalimo, & Schaufeli, 2000), South Africa has eleven official languages and one cannot assume that the measurement of constructs for one language group is necessarily applicable for the next (Van de Vijver & Leung, 2001; Van de Vijver & Tanzer, 2004). Although English is recognised as the language of business in South Africa, for a number of individuals it is their second language making it difficult for employees to understand the wording of some items, which could lead to invalid conclusions (Van de Vijver & Rothmann, 2004). It is therefore reasonable to expect that individuals with a higher level of education will more easily understand the questionnaire. Therefore, before valid and reliable conclusions can be made regarding employees' experience of burnout and engagement, the construct equivalence of the measuring instruments should be tested for different language and education groups.

Two different viewpoints with regard to burnout and engagement have emerged and have become an important debate in the literature. The important question that arises is whether burnout and engagement are part of the total wellness continuum (Maslach & Leiter, 1997) or two separate constructs (Rothmann, Steyn, & Mostert, 2005; Schaufeli & Bakker, 2004; Schaufeli et al., 2002). In their study, Maslach and Leiter (1997) considered burnout and engagement as the opposite poles of the continuum. However, other researchers argue that burnout and engagement should be seen as two different, albeit negatively related, constructs (Demerouti et al., 2001; Schaufeli & Bakker, 2004; Schaufeli et al., 2002). Various studies revealed, with the inspection of factor loadings of the two measuring instruments (MBI-GS and UWES), that burnout and engagement loaded on separate but negative related scales instead of loading on one single wellness dimension. The wellness construct consisted of a burnout construct (i.e., exhaustion and cynicism) and an enlarged engagement construct (i.e., vigour, dedication, absorption and professional efficacy). Based on this, it seems important to determine the underlying structure of a wellbeing construct.

In view of the above discussion, the objectives of this study are therefore to determine (1) the construct validity, construct equivalence and reliability of an adapted version of the *Maslach Burnout Inventory – General Survey* (MBI-GS) and the *Utrecht Work Engagement Scale* (UWES); and (2) the underlying structure of a total wellbeing construct that includes burnout and engagement. In addition, it seems important to investigate the differences between

important demographic groups with regard to wellbeing. These differences between demographic groups could be an indicator of the work wellness construct in determining a risk analysis for an organisation and their employees (Coetzee & Rothmann, 2004) in order to develop strategies to promote engagement and to reduce burnout. The third objective is therefore to determine if important demographic groups differ with regard to wellbeing.

The MBI-GS and UWES

Burnout has been exclusively measured in the human services sector (Maslach et al., 1996; Schaufeli & Enzmann, 1998; Van Dierendonk, Schaufeli, & Buunk, 1993) and the need to measure it in other occupational groups was overcome by the development of the MBI-GS (Schaufeli et al., 1996). The MBI-GS consists of three subscales, namely exhaustion, cynicism and a lack of professional efficacy. Exhaustion consists of six items (e.g., “I feel burned out from work”) and refers to individual stress which results in the depletion of emotional and physical resources that is accompanied by fatigue. Cynicism reflects the interpersonal dimension and refers to a negative attitude of indifference towards an aspect of work. It is measured by five items (e.g., “I have become more cynical about whether my work contributes to anything”). Professional efficacy covers the self-evaluation dimension of burnout. This dimension refers to feelings of incompetence and lack of achievement at work, and is measured by six items (e.g., “I can effectively solve the problems that arise in my work”). All the items are scored on a seven-point frequency rating scale that ranges from 0 (*never*) to 6 (*every day*).

Recently, researchers have argued that the burnout construct (as measured by the MBI-GS) should be supplemented by including a scale that assesses cognitive weariness. Cognitive weariness is an important aspect to consider. In today’s modern world, organisations and job functions require problem solving and decision making – all of which are relevant to cognitive functioning (Van Horn et al., 2004). Cognitive weariness refers to a lack of concentration, forgetfulness and an inability to adequately solve a problem (Hoogduin et al., 2001) that occurs specifically when employees are exhausted. In order to measure cognitive weariness, Van Horn et al. (2004) developed a scale to measure cognitive wellbeing. The scale refers to loss of concentration at work and solving complex problems (e.g., “I have trouble concentrating” and “I am forgetful and absent-minded”).

Two trends or views emerged with regard to engagement. Mashlach and Leiter (1997) define burnout as “an erosion of work engagement” (i.e., in other words the opposite of burnout) because engagement consists of energy, involvement and efficacy the opposite of exhaustion, cynicism and lack of professional efficacy respectively. Lower scores on cynicism and exhaustion, and higher scores on professional efficacy, are indicative of engagement. However, Schaufeli et al. (2002) argue that engagement and burnout are two different concepts that should be measured by different measuring instruments. As a result, they developed the Utrecht Work Engagement Scale (UWES) to measure work engagement.

The UWES consists of 17 items and three subscales. Six items measure vigour (e.g., “At my job, I feel that I’m bursting with energy”), which is characterised by high levels of energy and mental toughness even in the face of difficulties. Five items measure dedication (e.g., “My job inspires me”), which refers to feelings of pride, enthusiasm, inspiration and a sense of being ready to meet challenges. Absorption is characterised by being contentedly engrossed in one’s work and unaware of time; and is measured by six items (e.g., “I get carried away when I’m working”). The UWES is scored on a seven-point frequency rating scale that varies from 0 (*never*) to 6 (*always*).

Construct validity of the MBI-GS and UWES

The three-factor structure of the MBI-GS has been confirmed internationally (Roelofs et al., 2005; Schaufeli et al., 2002) and nationally (Jackson & Rothmann, 2005; Naudé, 2003; Rothmann et al., 2003; Storm & Rothmann, 2003b). However, only two studies investigated the construct validity of the adapted MBI-GS where the cognitive weariness scale is included. Van Horn et al. (2004) tested and confirmed, in a study among teachers, four different models that included a one-factor model (where all facets of occupational wellbeing load on one underlying factor), a five-factor orthogonal model (representing five uncorrelated factors), a five-factor oblique model (representing five correlated factors), and a five-factor orthogonal model with a second-order overall factor on which the five first-order factors loaded. The final model verified a new five-factor structure of burnout, including exhaustion, cognitive weariness, cynicism, professional efficacy and psychosomatic complaints.

In South Africa only one study confirmed the four dimensional structure of the MBI-GS. The study of Coetzee and Rothmann (2004) tested three structural models. The first model was a

one-factor model of burnout where all the factors (exhaustion, cognitive weariness, cynicism and professional efficacy) loaded on the same factor. The second model was a three-factor model that included burnout, where exhaustion and cognitive weariness loaded on a factor and cynicism and professional efficacy represented the other two factors. The final model was a four-factor structure that consisted of exhaustion, cognitive weariness, cynicism and professional efficacy. The results indicated that the four-factor model explained the associations between the items significantly better compared to the alternative models. Based on these results, it can be hypothesised that the adapted MBI-GS has a four-dimensional structure (e.g., exhaustion, cognitive weariness, cynicism and professional efficacy) (*hypothesis 1a*).

With regard to the construct validity of the UWES, the study of Schaufeli et al. (2002) confirmed a three-factor structure for the UWES. These results were confirmed by various South African studies (Barkhuizen & Rothmann, 2006; Rothmann et al., 2005; Storm & Rothman, 2003a) in contrast with the one-factor structure obtained by Sonnetag (2003) and Maslach et al. (2001). The study of Naudé and Rothmann (2004) extracted a two-factor structure that consisted of Vigour/Dedication and Absorption.

Several researchers regard vigour and dedication as the "core dimensions of engagement", while absorption is considered a relevant aspect of engagement that most likely plays a less central role in the engagement concept (Schaufeli, 2005; Schaufeli & Bakker, 2001). Rothmann (2005) indicates that South African studies obtained much lower alpha coefficients on the absorption scale than international research, indicating that this scale is problematic and not entirely suitable for use in South Africa. Absorption is also seen as a "flow" (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2002) where high concentration, complete control and natural enjoyment are experienced (Schaufeli et al., 2002); and seems to act as a consequence of work engagement (González-Romá, Schaufeli, Bakker, & Lloret, 2006; Rothmann, 2005; Schaufeli & Bakker, 2004; Schaufeli et al., 2002). Consequently, researchers are inclined to disregard the absorption scale and to only use the vigour and dedication dimensions to assess engagement. For the purpose of this study, the factor structure will be tested for the core dimensions of engagement (i.e., vigour and dedication). Based on previous findings, it is expected that engagement consists of two factors, namely vigour and dedication (*hypothesis 1b*).

Construct equivalence of the MBI-GS and UWES

The findings of Schaufeli et al. (2002) revealed that the construct equivalence of the three-factor MBI-GS were equivalent across countries; but was not equivalent across the Dutch, Portuguese and Spanish samples. In South Africa, Storm and Rothmann (2003b) confirmed the construct equivalence for the three-factor structure for MBI-GS for members of the South African Police Service (SAPS). Furthermore, Jackson and Rothmann (2005) used structural equation modelling to test the construct equivalence for MBI-GS for language groups and demonstrated the construct equivalence for two language groups (Afrikaans and African languages). Based on these results, it can be hypothesised that this MBI-GS will be equivalent for the subgroups (language and education) in this study (*hypothesis 2a*).

Internationally, Schaufeli et al. (2002) confirmed the invariance of the UWES across countries (Spain, Portugal and the Netherlands). However, the factor loadings of vigour were invariant for only two of the subgroups (Schaufeli et al., 2002). The study of Naudé and Rothmann (2004) confirmed construct equivalence for the UWES for two ethnic groups (White and Black) in a sample of emergency workers. Furthermore, Storm and Rothmann (2003a) confirmed the construct equivalence across four ethnic groups (White, Black, Coloured and Indian). Based on these results, it can be hypothesised that the UWES will be equivalent for the subgroups (language and education) in this study (*hypothesis 2b*).

Reliability of the MBI-GS and UWES

Several studies confirmed the reliability of the MBI-GS. The Cronbach alpha coefficients reported by Schaufeli et al. (1996) varied from 0,87 to 0,89 for Exhaustion; from 0,73 to 0,84 for Cynicism; and from 0,76 to 0,84 for Professional Efficacy. The internal consistencies (Cronbach alpha coefficient) obtained by Storm and Rothmann (2003b) for the MBI-GS were 0,88 for Exhaustion, 0,79 for Cynicism and 0,78 for Professional Efficacy. Jackson and Rothmann (2005) also found acceptable coefficients (Exhaustion 0,79; Mental Distance 0,73 and Professional Efficacy 0,73). With regard to the cognitive weariness scale's reliability and validity, Van Horn et al. (2004) reported a Cronbach alpha coefficient of 0,92; while Coetzee and Rothmann (2004) reported a Cronbach alpha coefficient of 0,76. Based on these results, it can be hypothesised that all four scales of the MBI-GS will be reliable (*hypothesis 3a*).

Internationally, the alpha coefficients of the UWES were found to be acceptable by Schaufeli et al. (2002) (Vigour = 0,68 and 0,80; Dedication = 0,91 in both samples of employees and undergraduate students; Absorption = 0,73 and 0,75). Demerouti et al. (2001) also showed that the three engagement scales had sufficient internal consistencies since the Cronbach's alpha values range between 0,78 and 0,90. In South Africa, Storm and Rothmann (2003a) reported the following alpha coefficients for the UWES in a sample of 2 396 members of the SAPS: Vigour: 0,78; Dedication: 0,89; Absorption: 0,78. The study of Barkhuizen and Rothmann (2006) indicated that the vigour ($\alpha = 0,75$) and dedication ($\alpha = 0,85$) scales were reliable, but that the absorption scale had a low Cronbach alpha coefficient ($\alpha = 0,69$). In a similar vein, the results of Naudé and Rothmann (2004) reported acceptable Cronbach coefficients for Vigour/Dedication ($\alpha = 0,87$), but also reported a below average value for Absorption ($\alpha = 0,61$). This study therefore expects that the UWES will be a reliable measuring instrument for measuring the core dimensions of engagement (*hypothesis 3b*).

Burnout and engagement as part of a total wellness continuum

Schaufeli and Bakker (2004) indicated that burnout and engagement are indicators of wellbeing. Rothmann (2003) argued that burnout and engagement should be structured together in order to expand our understanding of the work wellness concept. However, various researchers debated whether burnout and engagement are opposite poles or one underlying dimension that ranges from positive to negative wellbeing. Furthermore, Schaufeli and Bakker (2004) showed that when combining the factor loading of these two different but related constructs, burnout and engagement loaded on two separate but negative related scales instead of on one single wellness dimension. These findings were congruent with previous research (Demerouti et al., 2001; Rothmann, 2005; Schaufeli et al., 2002).

Several findings indicate that this combined wellness construct consists of burnout (i.e., exhaustion and cynicism) and an enlarged engagement construct (i.e., vigour, dedication, absorption and professional efficacy) (Naudé & Rothmann, 2004; Rothmann et al., 2005; Schaufeli & Bakker, 2004). Based on these findings, it can be hypothesised that work wellness will be a two-factor structure that includes a burnout factor (consisting of exhaustion, cognitive weariness and cynicism) and an engagement factor (consisting of vigour, dedication and professional efficacy) (*hypothesis 4a*); and that the two factors of work wellness will be equivalent for language and education groups (*hypothesis 4b*).

Differences between demographic groups

The demographic groups that could differ with regard to work wellness (burnout and engagement) include age, gender (males vs. gender), language (English vs. Afrikaans vs. African), education (school education vs. higher education), marital status (married vs. unmarried) and business units (Construction vs. Shared Services vs. Mining vs. Rental vs. Handling vs. Energy vs. Agriculture).

With regard to age, most studies found a relationship between different age groups (Cherniss, 1980; Friedman, 1991; Künzel & Schulte, 1986; Maslach et al., 1996). These studies found that younger employees experience higher levels of burnout than older employees with more experience. Jackson and Rothmann (2005) found that younger educators have higher levels of exhaustion and cynicism than older participants. Byrne (1991) obtained similar results. According to Schaufeli et al. (2002), engagement levels are higher among older students. In contrast with the above, Barkhuizen and Rothmann (2006) and Storm and Rothmann (2003a) found no relationship with regard to age and engagement. It can therefore be expected that age groups will differ on the basis of work wellness (burnout and engagement) in this study (*hypothesis 5a*).

Jackson and Rothmann (2005) found no differences for males and females with regard to levels of burnout. Coetzee and Rothmann (2004) obtained similar results. Barkhuizen and Rothmann (2006) found no difference between gender and engagement. Schaufeli and Bakker (2004) reported that males seemed to be more engaged in their work than females. However, although males scored high on all three dimensions (vigour, dedication and absorption), the differences were small and lacked practical significance. It therefore seems that no difference with regard to wellbeing will exist for males and females (*hypothesis 5b*).

Coetzee and Rothmann (2004) found that Afrikaans-speaking and English-speaking groups experience higher levels of exhaustion and cognitive weariness compared to African language groups. They found that rapid transformation in the organisation affected these two groups more than the African language groups. With regard to engagement, Coetzee and Rothmann (in press) found that indigenous language groups experienced higher levels of vigour compared to the Afrikaans-speaking group. This may suggest that Afrikaans-speaking groups are less engrossed and immersed in their work compared to indigenous language

groups. It therefore seems that language groups will differ with regard to wellbeing (*hypothesis 5c*).

The research of Maslach et al. (2001) indicated that individuals with higher education levels experienced higher levels of burnout compared to less educated individuals. The results of Schaufeli and Enzmann (1998) revealed similar results. The study of Cannizzo and Liu (1995) revealed the exact opposite results and found that less educated individuals experienced higher levels of burnout. Fletcher (1988) confirmed this with similar results. Storm and Rothmann (2003a) found that higher educated individuals experienced higher levels of professional efficacy compared to individuals with lower levels of education. Van Horn et al. (2004) indicated that secondary school teacher students experienced higher levels of burnout compared to elementary school teacher students. Regarding the relationship with engagement, it seems that higher educated employees (e.g., employees with a doctoral degree) are more engaged in their work compared to individuals with a honours degree. They also experience higher levels of vigour and absorption (Barkhuizen & Rothmann, 2006; Gilbert, 2001). However, Storm and Rothmann (2003a) found no relationship with regard to education and engagement. Based on the above findings, it seems that employees with different educational levels will differ with regard to wellbeing (*hypothesis 5d*).

According to Maslach et al. (2001), unmarried men experience higher levels of burnout compared to married men; while divorced individuals experience lower levels of burnout compared to single individuals. In a similar vein, Maslach and Jackson (1985) indicated that singles are more prone to burnout compared to employees who are living with a partner. Rothmann and Malan (2003) found that marital status predicted emotional exhaustion and cynicism. However, Rush (2003) found no relationship with regard to marital status and burnout. Research with regard to engagement and marital status requires future investigation. However, in this study it is expected that differences will exist between married and single individuals with regard to wellness (*hypothesis 5e*). Although little information is available on the difference of work wellness that is based on the different business units in the earthmoving equipment industry, this variable seems important to consider in this study and will therefore be included in the analyses.

METHOD

Participants and procedure

A cross-sectional survey was conducted among employees in the earthmoving equipment industry ($n = 528$) in Gauteng, the Limpopo Province, Mpumalanga, the Northern Cape, the Western Cape, the Eastern Cape, Kwa-Zulu Natal and the North West Province (response rate = 53%). After permission was obtained from executive management, the managers, human resources department and employee/employer committees were informed of the study during management meetings. Thereafter, all employees received paper-and-pencil questionnaires, and return envelopes, at their work that could be returned to the researchers involved. A letter explaining the purpose of the research accompanied the questionnaire. The employees were requested to fill in the questionnaire in private and to send it to the Human Resources Department, where the researchers involved collected all the complete questionnaires. Participation was voluntary, and the confidentiality and anonymity of the answers were emphasised. Table 1 gives an indication of the characteristics of the participants who were included in this study.

Table 1

Characteristics of the Participants (N = 528)

Item	Category	Frequency	Percentage
Gender	Male	380	72,0
	Female	141	26,7
Race	White	329	62,3
	African	109	20,6
	Coloured	60	11,4
	Indian	16	3,0
	Other	2	0,4
Age	1940-1949 (56- 65 years)	44	8,3
	1950-1959 (46-55 years)	108	20,5
	1960-1969 (36-45 years)	137	25,9
	1970-1979 (26-35 years)	158	29,0
	1980-1987 (18-25 years)	63	11,9
Language	Afrikaans	233	44,1
	English	192	36,4
	Zulu	18	3,4
	Tsonga	6	1,1
	Sepedi	30	5,7
	Sesotho	12	2,3
	Setswana	8	1,5
	Venda	5	0,9
	Ndebele	7	1,3
	Xhosa	11	2,1
Other languages	1	0,2	
Education level	Grade 10	77	14,6
	Grade 12	217	41,1
	Technikon diploma	44	8,3
	Postgraduate	11	2,1
	Grade 11	16	3,0
	Technical/College diploma	128	24,2
	Other	1	0,2
Employment status	Full-time	412	78,0
	Part-time	93	17,6

According to Table 1, the sample was predominately male (72%): 62,3% were White and 20,6% were African. Most of the participants spoke Afrikaans (44,1%) and English (36,4%), and were married with children (50,4%). With regard to age, most of the participants were born from 1970 to 1979 (26-35 years). A total of 41% of the participants held a grade 12

certificate and 24,2% held a technical college diploma. Most of the employees in this industry worked full-time (78%).

Measuring battery

The following questionnaires were used in the empirical study:

The *Maslach Burnout Inventory – General Survey* (MBI-GS) (Schaufeli et al., 1996) was used to measure burnout. The MBI-GS consists of three subscales namely Exhaustion (EX) (six items, e.g., “I feel burned out from work”); Cynicism (CY) (five items, e.g., “I have become more cynical about whether my work contributes to anything”); and Professional Efficacy (PE) (six items, e.g., “I can effectively solve the problems that arise in my work”). The Cronbach alpha coefficients reported by Schaufeli et al. (1996) varied from 0,87 to 0,89 for Exhaustion; from 0,73 to 0,84 for Cynicism; and from 0,76 to 0,84 for Professional Efficacy. The test-retest reliabilities after one year were 0,65 (Exhaustion), 0,60 (Cynicism) and 0,67 (Professional Efficacy) (Schaufeli et al., 1996). All the items were scored on a seven-point frequency rating scale ranging from 0 (*never*) to 6 (*every day*). Storm and Rothmann (2003b) confirmed the three-factor structure and construct equivalence of the MBI-GS in a sample of 2 396 SAPS members. Internal consistencies (Cronbach alpha coefficients) obtained by Storm and Rothmann (2003b) for the MBI-GS were 0,88 for Exhaustion, 0,79 for Cynicism and 0,78 for Professional Efficacy. In addition, the Cognitive Weariness Scale (CWS) was used. The CWS was developed by Van Horn et al. (2004) to measure cognitive wellbeing. Initially this scale consisted of seven items, but the authors recommended that (due to the high internal consistency of items 3 and 7) item 7 be dropped in the general six-item version. The scale refers to the capacity to take in new information and loss of concentration at work (e.g., “I have trouble concentrating”). It was scored on a seven-point frequency scale with 0 (*never*) to 6 (*daily*). Van Horn et al. (2004) reported a Cronbach alpha coefficient of 0,92; while Coetzee and Rothmann (2004) reported a Cronbach alpha coefficient of 0,76.

The *Utrecht Work Engagement Scale (UWES)* (Schaufeli et al., 2002) was used to measure work engagement. The UWES consists of three dimensions, namely Vigour, Dedication and Absorption. Six items measure Vigour (e.g., “At my job, I feel that I’m bursting with energy”), five items measure Dedication (e.g., “My job inspires me”) and six items measure

Absorption (e.g., "I get carried away when I'm working"). The UWES is scored on a seven-point frequency rating scale that varies from 0 (*never*) to 6 (*always*). The Cronbach alpha values range between 0,78 and 0,90 (Demerouti et al., 2001; Schaufeli et al., 2002). Storm and Rothmann (2003a) reported the following alpha coefficients for the UWES in a sample of 2 396 members of the SAPS: Vigour: 0,78; Dedication: 0,89; Absorption: 0,78.

A *Biographical Questionnaire* was used to determine the biographical characteristics of the employees in the earthmoving equipment industry. The biographical characteristics that were measured by this questionnaire were gender, language, age, ethnicity, educational level, household situation (e.g., single, without children living at home/married/living with a partner without children), working hours, permanent and part-time employment, use of annual leave, the contribution that the partner makes to the total household income, and the business unit and personnel area in which the employee operates.

Statistical analysis

The statistical analysis was carried out with the SPSS-program (SPSS Inc., 2005) and the Amos-program (Arbuckle, 2003). Structural equation modelling (SEM) methods as implemented by AMOS (Arbuckle, 2003) were used to test the construct validity and construct equivalence of adapted MBI-GS and UWES by using the maximum likelihood estimation method. Multigroup confirmatory factor analysis was used to test the construct equivalence of the factor structure and the equivalence of parameter estimates (i.e., factor loadings, factor covariances and item error variances) across two important subgroups, namely language (English vs. African languages) and education (employees with a school certificate vs. employees with a higher education qualification).

The χ^2 and several other goodness-of-fit indices were used to summarise the degree of correspondence between the implied and observed covariance matrices. The following goodness-of-fit-indices were used as adjuncts to the χ^2 statistics: (a) χ^2/df ratio; (b) the Goodness-of-Fit Index (GFI); (c) the Incremental Fit Index (IFI); (d) the Tucker-Lewis Index (TLI); (e) the Comparative Fit Index (CFI); (f) the Root Mean Square Error of Approximation (RMSEA). Values greater than 0,90 for relative fit-indices (GFI, IFI, TLI and CFI) and lower than 0,08 for RMSEA are considered a good fit (Byrne, 2001; Hoyle, 1995).

At the statistical level, the test for the equivalence of factor loading and covariances involves using the χ^2 statistics to determine the difference in statistical fit between the unconstrained and constrained models. Non-significant differences between models indicate statistical support for the hypotheses being tested. Equivalence can also be examined by comparing the other indices (e.g., IFI, TLI, CFI and RMSEA) of the models that are being compared. Such comparisons provide a test for equivalence at the practical level, where small differences are indicative of equivalence for groups compared.

Cronbach alpha coefficients were used to assess the reliability of the scales and product-moment correlations were used to determine the relationship between the dimensions. Descriptive statistics (e.g., means and standard deviations) were used to describe the data.

Multivariate analysis of variance (MANOVA) was used to determine the significance of differences in the wellness of different 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 maximises group differences is created from the set of dependent variables. 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 identical to those of the sample mean vectors for the different groups. When an effect was significant in MANOVA, one-way analysis of variance (ANOVA) was used to discover which dependent variables had been affected. A Bonferroni type adjustment was made for inflated Type 1 error. The Games-Howell procedure was used to determine if there were statistically significant differences between the groups.

RESULTS

Construct validity of the MBI-GS and UWES

The construct validity of the adapted MBI-GS and UWES was tested by using structural equation modelling. For the MBI-GS, four competing models were tested. *Model 1* is a one-factor model that proposes that all 20 items load on the same underlying latent dimension. *Model 2* is a three-factor model that distinguishes between three factors. The first factor

includes all items that refer to fatigue, including exhaustion and cognitive weariness; the second factor includes all items that refer to cynicism; and the third factor includes items that refer to professional efficacy. Lastly, *model 3* represents the four-factor model and distinguishes between the four expected dimensions (i.e., Exhaustion, Cognitive Weariness, Cynicism and Professional Efficacy). Two competing models were tested for engagement: *model 1* assumes that all the items load on one latent factor, while *model 2* assumes that work engagement consist of two related factors (namely Vigour and Dedication). Table 2 presents the results of the SEM analyses.

Table 2

Goodness-of-fit Statistics for the Comparison of Factorial Models

Model		χ^2	χ^2/df	GFI	IFI	TLI	CFI	RMSEA
MBI-GS								
M ₁	One-factor model	1395,65	8,21	0,74	0,66	0,62	0,66	0,12
M ₂	Three-factor model	788,15	4,72	0,84	0,83	0,80	0,83	0,08
M ₃	Four-factor model	524,89	3,20	0,91	0,90	0,88	0,90	0,07
M ₄	Final model	438,02	3,00	0,92	0,92	0,90	0,92	0,06
UWES								
M ₁	One-factor model	233,62	5,31	0,92	0,91	0,89	0,91	0,09
M ₂	Two-factor model	225,82	5,25	0,92	0,92	0,89	0,92	0,09
M ₃	Final model	135,90	4,25	0,95	0,95	0,93	0,95	0,08

From Table 2, it is clear that the one-factor MBI-GS model did not fit well to the data ($\chi^2 = 1395,65$; GFI, IFI, TLI and CFI < 0,90 and RMSEA > 0,08). Model 2 explained the associations among the items significantly better than model 1 (M₂ vs. M₁: $\Delta \chi^2 = 607,50$ ($N = 528$), $df = 1,00$, $p < 0,01$), although this model still fell short of what is acceptable. The four-factor model (model 3), which distinguished between the four proposed dimensions of burnout, explained the associations among the items significantly better than the other two competing models (M₃ vs. M₁: $\Delta \chi^2 = 870,76$ ($N = 528$), $df = 1,00$, $p < 0,01$; M₃ vs. M₂: $\Delta \chi^2 = 263,26$ ($N = 528$), $df = 1,000$, $p < 0,01$).

Although model 4 explained the associations among the items significantly better than the other models, inspection of the standardised regression weights showed that one Professional Efficacy item ("I feel exhilarated when I accomplish something at work") did not load

adequately on the factor (loading = 0,29). As can be seen in Table 2, after omitting this item from further analyses, model 4 fitted the data significantly better than model 3 (M_4 vs. M_3 : $\Delta \chi^2 = 86,87$ ($N = 528$), $df = 3,00$, $p < 0,01$). From a practical perspective, it seems that the re-specified model indicates a good fit ($\chi^2/df < 5,00$; GFI, IFI, TLI and CFI $> 0,90$; RMSEA $< 0,08$). Since this model fit was satisfactory and the results agreed with the theoretical assumptions underlying the structure of the MBI-GS, no further modifications of the model were deemed necessary. Based on these results, the MBI-GS has a four-dimensional structure that distinguished between four dimensions (namely Exhaustion, Cognitive Weariness, Cynicism and Professional Efficacy). *Hypothesis 1a* is therefore confirmed.

Regarding the construct validity of engagement, Table 2 shows that there is no statistically significant difference between model 1 (one-factor model) and model 2 (two-factor model) (M_1 vs. M_2 : $\Delta \chi^2 = 7,8$ ($N = 528$), $df = 3,00$, $p < 0,01$). However, several researchers regard vigour and dedication as the “core” components of engagement (González-Romá et al., 2005; Schaufeli & Bakker, 2001; Schaufeli & Bakker, 2004). Based on these findings, it was decided to measure work engagement as two factors (namely Vigour and Dedication). Inspection of the standardised regression weights, modification indices and standardised residual covariances showed that there was one problematic item (“At my job, I am very resilient mentally”). It was therefore decided to omit this item. Furthermore, the modification indices showed two correlated errors between item 4 (“At my job, I feel strong and vigorous” and item 5 (“I am enthusiastic about my job”); and also between item 10 (“I am proud of the work that I do”) and item 12 (“I can continue working for very long periods at a time”). These items showed a high overlap, which indicated highly correlated errors. After modifications were made to the final model, the fit was satisfactory (M_3 vs. M_2 : $\Delta \chi^2 = 89,92$ ($N = 528$), $df = 3,00$, $p < 0,01$). These results provide support for *hypothesis 1b*.

Construct equivalence of the MBI-GS and UWES

Next, the hypotheses relating to the equivalence for factor loadings, factor variances and covariances of the four-factor structure of the MBI-GS and the two-factor structure of the UWES were tested for the language (English vs. African) and education (school education vs. higher education) groups. First, baseline models were tested for each subgroup, followed by the test for the equivalence of factor loadings and covariances to determine the difference in fit between the unconstrained and constrained models. The results are presented in Table 3.

Table 3

Testing for Construct Equivalence of the MBI-GS and UWES

MODEL	χ^2	χ^2/df	GFI	PGFI	IFI	TLI	CFI	RMSEA
<u>MB-GS</u>								
Language								
Baseline model (English)	262,00	1,80	0,88	0,67	0,92	0,91	0,92	0,06
Baseline model (African)	368,46	2,52	0,90	0,69	0,89	0,88	0,89	0,07
Unconstraint model	630,52	2,16	0,89	0,68	0,91	0,89	0,91	0,05
Constraint model	653,68	2,09	0,88	0,73	0,91	0,90	0,91	0,05
$\Delta \chi^2 = 23,16$ ($N = 528$), $df = 21,00$ ($p < 0,01$)								
Education								
Baseline model (school)	385,13	2,64	0,89	0,68	0,90	0,88	0,90	0,07
Baseline model (higher education)	246,00	1,69	0,87	0,67	0,91	0,89	0,91	0,06
Unconstraint model	631,21	2,16	0,88	0,69	0,90	0,88	0,90	0,05
Constraint model	668,74	2,14	0,88	0,72	0,90	0,89	0,90	0,05
$\Delta \chi^2 = 37,53$ ($N = 528$), $df = 21,00$ ($p < 0,01$)								
<u>UWES</u>								
Language								
Baseline model (English)	83,56	2,61	0,92	0,53	0,93	0,90	0,93	0,09
Baseline model (African)	113,34	3,54	0,93	0,54	0,94	0,92	0,94	0,09
Unconstraint model	196,93	3,07	0,93	0,54	0,94	0,91	0,94	0,06
Constraint model	229,58	3,06	0,92	0,62	0,93	0,91	0,93	0,06
Constraint model	214,02	2,93	0,92	0,61	0,94	0,92	0,94	0,06
$\Delta \chi^2 = 17,09$ ($N = 528$), $df = 9,00$ ($p < 0,01$)								
Education								
Baseline model (school)	101,73	3,18	0,94	0,55	0,95	0,93	0,95	0,08
Baseline model (higher education)	71,55	2,24	0,92	0,54	0,94	0,92	0,94	0,08
Final baseline model (higher education)	55,01	2,92	0,93	0,50	0,96	0,93	0,95	0,09
Unconstraint model	133,55	2,78	0,95	0,50	0,96	0,94	0,96	0,06
Constraint model	159,44	2,75	0,94	0,60	0,95	0,94	0,95	0,06
Constraint model without errors	153,74	2,75	0,94	0,58	0,95	0,94	0,95	0,06
$\Delta \chi^2 = 25,89$ ($N = 528$), $df = 10,00$ ($p < 0,01$)								

Regarding the equivalence of the MBI-GS, Table 3 shows that the practical fit indices of the unconstrained models were very good, supporting the equivalence for the number of factors. The indices for the constrained models also showed very good fit and their values were very close to those for the constrained model. In addition, differences between the models that were based on the χ^2 value were also non-significant ($p < 0,01$). These results provide support for the equivalence in the pattern of factor loadings of the MBI-GS across language and education (*hypothesis 2a*).

The SEM results for the two-factor baseline models of the UWES showed excellent fit for the language groups (English: $\chi^2 = 83,56_{(n = 528)}$, $df = 32,00$, $p < 0,01$; African: $\chi^2 = 113,34_{(n = 528)}$, $df = 32,00$, $p < 0,01$) and for the group with a school education level ($\chi^2 = 101,73_{(n = 528)}$, $df = 32,00$, $p < 0,01$). However, inspection of the standardised regression weights showed that one Vigour item (item 17: "At my work I always persevere, even when things do not go well) does not load adequately on the factor (loading = 0,23) for the higher education group. As can be seen in table 3, after omitting this item from further analyses, the model fitted the data significantly better ($\Delta \chi^2 = 25,89_{(N = 528)}$, $df = 10,00$, $p < 0,01$). Consequently, the two-factor model (with item 17 omitted) was used as the baseline model for the equivalence analyses. As can be seen in table 3, the differences between the models that were based on the χ^2 value were non-significant and the practical fit indices of the unconstrained models were also very good, supporting the invariance for the number of factors. These results provide support for the invariance in the pattern of factor loadings of the UWES across language and education, providing support for *hypothesis 2b*.

Descriptive statistics, reliability, and the relationship between burnout and engagement

Table 4 shows the means, standard deviations, internal consistencies and product-moment correlations between the variables.

Table 4

Descriptive Statistics, Cronbach Alpha Coefficients and Product-Moment Correlations for the MBI-GS and UWES

Item	<i>M</i>	<i>SD</i>	α	EX	CW	CY	PE	VI
Exhaustion	2,50	1,39	0,82	1,00	-	-	-	-
Cognitive Weariness	1,94	1,18	0,73	0,47**	1,00	-	-	-
Cynicism	1,75	1,43	0,73	0,47**	0,52**	1,00	-	-
Professional Efficacy	4,99	1,10	0,80	-0,34**	-0,36**	-0,47**	1,00	-
Vigour	4,59	1,13	0,73	-0,37**	-0,31**	-0,53**	0,70**	1,00**
Dedication	4,96	1,19	0,85	-0,43**	-0,31**	-0,57**	0,74**	0,74**

* Correlation is statistically significant at the 0,01 level

+ Correlation is practically significant, $r > 0,30$ (medium effect)

** Correlation is practically significant, $r > 0,50$ (large effect)

From the results in Table 4, it can be seen that all the scales are reliable compared to the guideline of $\alpha > 0,70$ (Nunnally & Bernstein, 1994). Furthermore, the correlations between Cynicism and Cognitive Weariness ($r = 0,52$, $p < 0,01$) were the highest, which was statistically and practically significant (large effect). Exhaustion was positively, statistically and practically significant (medium effect) related to Cognitive Weariness ($r = 0,47$, $p < 0,01$) and Cynicism ($r = 0,47$, $p < 0,01$); and negatively, statistically and practically significant (medium) related to Professional Efficacy ($r = -0,34$, $p < 0,01$), Vigour ($r = -0,37$, $p < 0,01$) and Dedication ($r = -0,43$, $p < 0,01$). Furthermore, the relationships between Professional Efficacy, Vigour and Dedication were all positively, statistically and practically significant related to each other. Cognitive weariness is positive, statistically and practically significant (large effect) related to Cynicism ($r = 0,52$, $p < 0,01$) and negatively, statistically and practically significant (medium effect) related to Vigour ($r = -0,31$, $p < 0,01$) and Dedication ($r = -0,31$, $p < 0,01$). In addition, Cynicism is negatively, statistically and practically significant (medium effect) related to Professional Efficacy ($r = -0,47$, $p < 0,01$); and negatively, statistically and practically related to Vigour ($r = -0,53$, $p < 0,01$) and Dedication ($r = -0,57$, $p < 0,01$) (large effect). These results provided support for *hypothesis 3a and hypothesis 3b*.

Second-order factor analyses and equivalence of the wellness construct

A post-hoc confirmatory analysis with SEM was conducted to exclude the possibility that the items belonging to the Burnout and Engagement dimensions actually tapped the same underlying dimension. Two models were tested. It was assumed that in the one-factor model (model 1) all the factors load on one latent factor, while the two-factor model (model 2) differentiates between *Burnout* (Exhaustion, Cognitive Weariness and Cynicism) and *Engagement* (Engagement and Professional Efficacy). The equivalence for factor loadings, factor variances and covariances of the superior model was also tested. The results are reported in Table 5.

Table 5

Goodness-of-Fit Indices for the Construct Validity and Construct Equivalence of the Total Wellness Construct

MODEL	χ^2	χ^2/df	GFI	PGFI	IFI	TLI	CFI	RMSEA
Construct validity								
One-factor model	187,10	20,80	0,89	0,38	0,88	0,80	0,88	0,19
Two-factor model	54,22	6,77	0,97	0,37	0,97	0,94	0,97	0,12
Construct equivalence								
<i>Language</i>								
Unconstraint model	64,16	4,01	0,97	0,37	0,97	0,94	0,97	0,08
Constraint model	79,73	3,47	0,96	0,53	0,96	0,95	0,96	0,07
$\Delta \chi^2 = 15,58$ ($N = 528$), $df = 7,00$ ($p < 0,01$)								
<i>Education</i>								
Unconstraint model	63,50	3,97	0,94	0,91	0,97	0,94	0,97	0,08
Constraint model	82,21	3,57	0,95	0,52	0,96	0,95	0,96	0,07
$\Delta \chi^2 = 18,71$ ($N = 528$), $df = 7,00$ ($p < 0,01$)								

From Table 5, it is clear that the one-factor model did not fit well to the data ($\chi^2 = 187,10$; GFI, IFI, TLI and CFI $< 0,90$ and RMSEA $> 0,08$). However, the two-factor model which differentiate between the burnout and engagement dimensions explained the associations significantly better than the one-factor model (M2 vs. M1: $\Delta \chi^2 = 132,88$ ($N = 685$), $df = 1,00$, $p < 0,01$). Based on these results, wellness can be seen as a two-dimensional that distinguishes between Burnout and Engagement, providing support for *hypothesis 4a*. Regarding the

equivalence analyses, Table 5 shows that the practical fit indices of the unconstrained models were very good, supporting the equivalence for the number of factors. The indices for the constrained models also showed a good fit and their values were very close to those for the unconstrained models. In addition, the differences between the models that were based on the χ^2 value were also non-significant. These results provide support for the equivalence of the two-factor wellness construct across language and education, providing support for *hypothesis 4b*.

Differences between demographic groups

MANOVA was used to determine differences between the demographic groups with regard to wellness. The demographic groups that were included were age, gender, language, education, marital status and different business units. The results were first analysed for statistical significance by using Wilk's Lambda statistics. ANOVA was then used to determine specific differences whenever statistical differences were found. The results of the MANOVA analysis are given in Table 6.

Table 6

MANOVA – Differences in Wellness of Demographic Groups

Variable	Value	F	Df	p	Partial Eta Squared
Age	0,88	2,61	24	0,00*	0,03
Gender	0,93	2,86	12	0,00*	0,03
Language	0,94	2,56	12	0,00*	0,03
Education	0,99	1,33	6	0,24	0,02
Marital status	0,99	0,68	6	0,67	0,01
Business unit	0,75	4,90	30	0,00*	0,04

* $p < 0,05$ = significant effect

In an analysis of Wilk's Lambda values, statistically significant differences ($p \leq 0,05$) regarding burnout levels were found between all the variables (except for education and marital status). Based on these results, support was found for *hypothesis 5a and hypothesis 5c*. However, *hypotheses 5b, 5d and 5e are rejected*. The relationships between wellness and

the demographic variable levels that showed a statistically significant difference were further analysed by means of ANOVA. Because the sample sizes were different, the Games-Howell procedure was used to determine whether there were any statistical differences between the groups.

The results of the ANOVA, based on age, are given in Table 7.

Table 7
Differences in Wellness Based on Age

Item	56-65 years	46-55 years	36-45 years	26-35 years	18-25 years	<i>p</i>	Partial Eta Squared
EX	2,28	2,04 ^a	2,67 ^b	2,73 ^b	2,34	0,00*	0,04
CW	1,88	1,63 ^a	2,06 ^b	1,98	2,25 ^b	0,01*	0,03
CY	1,35 ^c	1,30 ^a	2,07 ^{bd}	1,87 ^b	1,82	0,00*	0,04
PE	5,42 ^a	5,31 ^c	4,88 ^{bd}	4,77 ^{bd}	4,97 ^b	0,00*	0,05
VI	4,95 ^a	4,91 ^a	4,36 ^b	4,37 ^b	4,72	0,00*	0,05
DE	5,46 ^a	5,31 ^a	4,69 ^b	4,80 ^b	4,95	0,00*	0,05

* Statistically significant difference: $p \leq 0,05$

^a Group differs statistically significantly from type (in row) where ^b is indicated

^c Group differs statistically significantly from type (in row) where ^d is indicated

Table 7 shows that statistically significant differences exist for all the wellness dimensions. With regard to Exhaustion, it seems that the younger participants (between 26 and 35 years, and between 36 and 45 years) experienced statistically higher levels of exhaustion compared to participants who were 46 to 55 years old. It also appears that the participants between 18 and 25 years, and between 36 and 45 years, experienced more cognitive weariness than older participants (46-55 years). Furthermore, it seems that individuals between 46 and 55 years of age experienced statistically significantly lower levels of cynicism compared to individuals between 36 and 45, and 26 and 35, years of age. Employees between 56 and 65 years of age experienced lower levels of cynicism compared to employees between 36 and 45 years. With regard to professional efficacy, older employees (56-65 years) experienced more professional efficacy compared to younger employees (between 18 and 36 years). It also seems that older employees (46-55 years) experienced more vigour and dedication compared to younger employees (26-35 years).

The results of the ANOVA, based on gender, are given in Table 8.

Table 8

Differences in Wellness Based on Gender

Item	Males	Females	<i>p</i>	Partial Eta Squared
EX	2,48	2,50	0,08	0,01
CW	1,94	1,96	0,97	0,00
CY	1,80	1,57	0,17	0,01
PE	5,00	4,97	0,95	0,00
VI	4,58	4,61	0,60	0,00
DE	5,01	4,80	1,53	0,01

* Statistically significant difference: $p \leq 0,05$

Although there were statistically significant differences between males and females in the MANOVA analysis, it seems that no statistically significant differences exist between males and females for individual scales.

Table 9

Differences in Wellness Based on Language

Item	Afrikaans	English	African	<i>p</i>	Partial Eta Squared
EX	2,48	2,56	2,39	0,59	0,00
CW	2,04	1,90	1,77	0,15	0,01
CY	1,90 ^a	1,50 ^b	1,81	0,01*	0,02
PE	4,91	5,13	4,90	0,07	0,01
VI	4,44 ^a	4,81 ^b	4,50	0,00*	0,02
DE	4,89	5,06	4,92	0,30	0,01

* Statistically significant difference: $p \leq 0,05$

^a Group differs statistically significant from type (in row) where ^b is indicated

Table 9 shows that there are statistically significant differences between levels of Cynicism and Vigour that are based on language. The Afrikaans-speaking employees experienced

higher levels of cynicism and lower levels of vigour compared to the English-speaking employees.

The results of the ANOVA, based on education levels, are given in Table 10.

Table 10
Differences in Wellness Based on Business Units

Item	Construction	Shared	Mining	Rental	Handling	Energy	<i>p</i>	Partial Eta Squared
EX	2,33 ^b	2,18 ^b	2,58 ^b	3,70 ^a	2,61 ^b	2,73	0,00 [*]	0,06
CW	1,78 ^b	1,69 ^b	2,07 ^b	3,00 ^a	1,88 ^b	2,34	0,00 [*]	0,07
CY	1,42 ^a	1,45 ^c	1,98 ^b	2,98 ^{bd}	1,83	2,51 ^{bd}	0,00 [*]	0,09
PE	5,19 ^b	5,11 ^b	5,00 ^b	3,33 ^a	5,12 ^b	4,67 ^b	0,00 [*]	0,16
VI	4,85 ^{bc}	4,63 ^b	4,52 ^{bd}	3,39 ^a	4,44	4,13	0,00 [*]	0,09
DE	5,25 ^{bc}	4,74 ^d	4,95 ^b	3,60 ^a	5,14 ^b	4,50	0,00 [*]	0,11

* Statistically significant difference: $p \leq 0,05$

^a Group differs statistically significantly from type (in row) where ^b is indicated

^c Group differs statistically significantly from type (in row) where ^d is indicated

According to Table 10, statistically significant differences between business units exist between all the dimensions. Overall, the Rental business unit experienced the highest level of exhaustion, cynicism and cognitive weariness. Construction had the lowest level of cynicism, and Shared Services had the lowest level with regards to exhaustion and cognitive weariness. The Construction business unit experienced the highest level of dedication, vigour and professional efficacy compared to the Rental business unit. They had the lowest levels of dedication, vigour and professional efficacy.

DISCUSSION

Stress has been identified as a regular phenomenon in the earthmoving equipment industry. Therefore, the measurement of wellness within this industry needs the required attention. Little information is known about the differences between important demographic groups and work wellness within the earthmoving equipment industry in South Africa. The objectives of this study were therefore to determine the psychometric properties of the MBI-GS and

UWES, and to determine whether differences exist between demographic groups regarding wellness.

The first specific objective of this study was to determine the psychometric properties of the MBI-GS and UWES. With regard to the construct validity of the MBI-GS, it was hypothesised that burnout (as measured by the MBI-GS) is a four-dimensional construct that consists of exhaustion, cognitive weariness, cynicism and professional efficacy. In order to test this hypothesis, three competing structural models were tested for the relationship among 20 items. The results indicated a poor fit for a one-factor and three-factor model, while an acceptable fit was found for a four-factor model. Although the four-factor model explained the associations among the items considerably better than the other two models, one problematic item (“I feel exhilarated when I accomplish something at work”) had to be removed to improve the fit. This may suggest that participants with English as a second language may have struggled with the meaning of the word “exhilarated” and could have experienced difficulty with the wording of this item. After this item was omitted, the model fit was acceptable. This confirmed the hypothesis that the MBI-GS can be characterised as a four-dimensional construct that distinguishes between exhaustion, cognitive weariness, cynicism and professional efficacy. This is supported by the findings of Van Horn et al. (2004) and Coetzee and Rothmann (2004).

SEM analyses regarding the construct validity of the UWES indicated that there were no statistically significant differences between a one-factor model and a two-factor model. Based on previous research, it was decided to use the core dimensions of engagement (namely vigour and dedication) (González-Romá et al., 2005; Schaufeli & Bakker, 2001; Schaufeli & Bakker, 2004). However, one problematic item (“At my job, I am very resilient mentally”) had to be removed; and two correlated errors had to be allowed between item 4 (“At my job, I feel strong and vigorous”) and item 5 (“I am enthusiastic about my job”) and between item 10 (“I am proud of the work that I do”) and item 12 (“I can continue working for very long periods at a time”). These items showed a high overlap, which indicated highly correlated errors or high content overlap, implying different wording but more or less the same meaning (Byrne, 2001). After all the modifications were made, the final model supported the hypothesis that UWES is a two-factor structure consisting of vigour and dedication. This is in line with previous research (Barkhuizen & Rothmann, 2006; Schaufeli et al. 2002; González-Romá et al., 2005; Naudé & Rothmann, 2004; Schaufeli & Bakker, 2004).

With regard to the construct equivalence of the four-factor structure of the MBI-GS and UWES, the results provided support for the equivalence in the pattern of factor loading for language and education groups. These findings seem to support previous research and to confirm that burnout and work engagement are measured in a similar way for different language and education groups (Jackson & Rothmann, 2005; Naudé & Rothmann, 2004; Schaufeli et al., 2002; Storm and Rothmann, 2003b). Furthermore, acceptable Cronbach alpha coefficients were obtained for all the four scales of the MBI-GS and the two UWES scales, providing support for the reliability of these instruments. These results are also in line with previous research findings (Barkhuizen & Rothmann, 2006; Coetzee & Rothmann, 2004; Demerouti et al., 2001; Jackson & Rothmann, 2005; Naudé & Rothmann, 2004; Schaufeli et al., 1996; Schaufeli et al., 2002; Storm & Rothmann, 2003a, 2003b; Van Horn et al., 2004),

It was important to determine the construct validity of the total wellness construct. A post-hoc confirmatory analysis with SEM was conducted and two models were tested. The one-factor model assumed that all the factors loaded on one latent factor (assuming that burnout and engagement are part of the same wellness construct), while the two-factor model differentiated between burnout (exhaustion, cognitive weariness and cynicism) and engagement (engagement and professional efficacy). However, this was as a result of artificial loadings of the factors, where negative loadings formed one factor and positive loadings formed the other factor. Based on these results, the hypothesis was accepted that wellness can be seen as a two-dimensional construct that distinguishes between burnout and engagement. Regarding the equivalence analyses, it supported the invariance of the number of factors across the relevant groups, indicating that the underlying structure of the second order factor analysis manifests in a similar way for the different language and education groups.

The last objective was to determine if important demographic groups differ with regard to wellness. MANOVA analyses were used to determine the significance of differences between the wellness levels and the various demographic characteristics. The results showed that statistically significant differences were found for age, gender, language and business units. No statistically significant differences were found for education and marital status.

In general, it seems that the younger participants experienced higher levels of burnout and lower levels of engagement. This is in line with previous research (Byrne, 1991; Jackson & Rothmann, 2005; Schaufeli et al., 2002). These results may suggest that younger participants are eager to prove themselves and are, at first, optimistic about their jobs; but may get overwhelmed with challenges and excessive demands. On the other hand, older participants have gained the necessary skills to deal with working demands and therefore experience lower levels of burnout. They may also have reached a stage in their career where they are satisfied compared to younger participants who are still growing in their careers, leading to the experience of higher work engagement.

The MANOVA analyses indicated significant differences between gender and wellness. However, the ANOVA analyses showed no significant difference between individual scales and gender. This is in line with previous research that found no relationship between gender and wellness (Barkhuizen & Rothmann, 2006; Coetzee & Rothmann, 2004; Jackson & Rothmann, 2005). However, with a closer investigation of the individual scales, it appears that females almost experienced statistically higher levels of exhaustion than men. This may suggest that women experience higher levels of fatigue than men.

Regarding language, Afrikaans-speaking employees experienced higher levels of cynicism and lower levels of vigour compared to English-speaking employees. These results are similar to those of Coetzee and Rothmann (2004). These results may suggest that Afrikaans-speaking employees are less engaged in their work than English-speaking employees; and that certain changes and transformation may have influenced their perception with regard to the work environment, leading to increased levels of cynicism and lower energy levels.

Overall, the Rental business unit experienced the highest burnout levels; while the Construction and the Shared Services business units showed generally lower levels of burnout. Construction also experienced the highest level of dedication, vigour and professional efficacy compared to the Rental business unit that had the lowest levels of dedication, vigour and professional efficacy. This may suggest that the employees in the Rental business unit may be prone to leave the organisation because they are not engrossed in their work and might experience low morale and less motivation. They might also experience lack of concentration and memory loss, influencing their overall performance

In conclusion, the results obtained in this study revealed that the MBI-GS and UWES are valid, equivalent and reliable measuring instruments for measuring the wellness of employees in the earthmoving equipment industry. The MBI-GS and UWES can be used in future research with regard to wellness levels in other occupations in South Africa. Furthermore, the instruments can be used to determine important differences between demographic groups.

This study had two important limitations. The first limitation was the homogeneity of the sample. Characteristics such as the organisational culture and climate within the earthmoving equipment industry could have influenced the participants' responses and their perceptions. It is therefore difficult to generalise the results to other occupational groups and subgroups. Also, the results were obtained exclusively by means of self-report questionnaires. This way of reporting can create problems because participants might not understand the questions or the meaning of specific words due to the "common method".

RECOMMENDATIONS

On the basis of the results obtained from this study, the MBI-GS and UWES are recommended as reliable measuring instruments to measure wellness levels in the earthmoving equipment industry in South Africa. Although errors were encountered in some of the items of the MBI-GS and UWES, the scales of the MBI-GS and UWES can be successfully employed to measure work wellness. However, the MBI-GS and UWES should be translated into the other official languages of South Africa in order to prevent misunderstanding of items because it could be difficult for employees to understand the content of the questions. Future research with regard to problematic items should also be investigated. Since this study was conducted among a relatively homogenous group, future studies that comprise a greater variety of demographic characteristics will enhance the reliability and usefulness of these measuring instruments. Future research might also assist in the development and design of organisation policies to enhance and promote work wellness within the earthmoving equipment industry.

Author's note

The material described in this article is based upon work that was supported by the National Research Foundation under reference number 20050801000025.

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A STRUCTURAL MODEL OF JOB CHARACTERISTICS, WORK-HOME INTERACTION AND WELLBEING

ABSTRACT

The objective of this study was to test a structural model that included job characteristics, work-home interaction and wellbeing (engagement and burnout). Random samples ($n = 528$) were taken of employees in the earthmoving equipment industry in eight provinces in South Africa. Job characteristics (including job pressure, job control and job support) were measured by items that were adapted from the Job Content Questionnaire and a validated questionnaire on experience and evaluation of work. The Survey Work-Home Interaction – Nijmegen, Maslach Burnout Inventory – General Survey and Utrecht Work Engagement Scale were used to measure work-home interaction, burnout and engagement respectively. Structural equation modelling showed that job demands (i.e., job pressure) are associated with negative work-home interference (WHI) and consequently with burnout, providing support for a full-mediation effect of negative WHI. Job resources (i.e., autonomy, social support and colleague support) were associated with negative WHI and consequently with burnout, providing support for partial mediation of negative WHI between job resources and burnout. Job resources were also associated with positive WHI and consequently with engagement, providing support for partial mediation of positive WHI between job resources and engagement.

OPSOMMING

Die doel van hierdie studie was om 'n strukturele model te toets wat werkseienskappe, werk-huis-interaksie en welstand (betrokkenheid en ooreising) ingesluit het. 'n Ewekansige streekproef ($n = 528$) is in agt provinsies in Suid-Afrika onder werknemers in die grondwerktuigindustrie geneem. Werkseienskappe (insluitende werksdruk, -kontrolle en -ondersteuning) is gemeet met behulp van items wat aangepas is uit die *Job Content Questionnaire* en 'n geldige vraelys oor ondervinding en werksevaluering. Die *Survey Work-Home Interaction – Nijmegen*, *Maslach Burnout Inventory – General Survey* en *Utrecht Work Engagement Scale* is gebruik om onderskeidelik werk-huis-interaksie, ooreising en betrokkenheid te meet. Struktuurvergelykingsmodellering het aangetoon dat werkvereistes (d.w.s. werksdruk) geassosieer kan word met negatiewe werk-huis-interaksie (WHI) en gevolglik met ooreising, wat 'n totale bemiddelingseffek van negatiewe WHI ondersteun. Werkshulpbronne (d.w.s. outonomie, sosiale ondersteuning en die ondersteuning van kollegas) is geassosieer met negatiewe WHI en gevolglik met ooreising, wat 'n gedeeltelike bemiddeling van negatiewe WHI tussen werkshulpbronne en ooreising ondersteun. Werkshulpbronne is ook geassosieer met positiewe WHI en gevolglik met betrokkenheid, wat gedeeltelike bemiddeling van positiewe WHI tussen werkshulpbronne en betrokkenheid ondersteun.

The ability to balance work and family life has become more important due to economic pressures, demographic changes, technological advancement, higher levels of employment, more dual earner couples, single parents and women entering the workforce (e.g., Duxbury, 2004; Duxbury & Higgins, 2001; Theunissen, Van Vuuren, & Visser, 2003; Schreuder & Theron, 2001; Smit, 1995; Wallis & Price, 2003). Overall, certain characteristics in the working environment can be seen as stressful (e.g., high pressure, lack of autonomy, and poor support from supervisors and colleagues) and could have an impact on the way family and work life is integrated (Geurts, Kompier, Roxburgh, & Houtman, 2003; Peeters, Montgomery, Bakker, & Schaufeli, 2005; Russell, 2003). An imbalance in an employee's life with regard to work and family demands could lead to high levels of work interfering with his/her family life (e.g., Brink & De la Rey, 2001; Kirchmeyer, 1992; Kotzè, 2005; Mangeni & Slabbert, 2005; Smit, 2001; Wallen, 2002; Wallis & Price, 2003). Many researchers have shown that work-home interference (WHI) has implications for organisations and undesirable psychological outcomes for individuals, including poor health (Burke, 1988; Frone, 2002; Grandey & Cropanzano, 1999; Kinnunen & Mauno, 1998), low organisational commitment, reduced life satisfaction (Duxbury & Higgins, 2001), lower levels of engagement (Montgomery, Peeters, Schaufeli, & Van Ouden, 2003; Mostert, 2006; Mostert, Cronje, & Pienaar, 2006) and burnout (Koekemoer & Mostert, 2006; Montgomery et al., 2003; Peeters et al., 2005).

According to Lingard and Francis (2005), few researchers have investigated the impact of WHI in the construction industry. The earthmoving equipment industry is a demanding industry that constantly improves efficiencies and productivity, and this leads to high levels of stress (Singh, 1997). Work-related stressors such as long working hours, a difficult working environment and increased job demands can lead to burnout and fatigue (Djebarni, 1996; Lingard, 2003; Lingard & Francis, 2005; Lingard & Sublet, 2002; Smallwood, 1997). It is therefore in the interest of organisations to improve their employees' work-life balance and to pay attention to stressful job characteristics that could cause employees to become burned out.

A paradigm shift has occurred and organisations are starting to focus on the positive aspects of wellness, including positive WHI (Geurts, Taris, Kompier, Dijkers, Van Hooff, & Kinnunen, 2005; Grzywacz & Marks, 2000) and work engagement (Schaufeli, Salanova, Gonzáles-Romá &

Bakker, 2002; Schaufeli & Bakker, 2004). Positive WHI means that the interaction between work and home can be beneficial for workers and that the positive effects built up at work (in terms of the creation of mood and transfer of skills) could spill over in a positive way to the home (Geurts et al., 2005; Hochschild, 1997; Kirchmeyer, 1993). Engagement is an important concept because workers who are engaged with their work illustrate distinctive characteristics such as being vigorous; being enthusiastic about their jobs; having a positive attitude and high levels of organisational commitment; show low turnover intention; and having the ability to deal better with the demands of their jobs (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2001, 2004; Schaufeli et al., 2002).

Several studies have shown that job demands have an impact on negative WHI (Bakker & Geurts, 2004; Janssen, Peeters, De Jonge, Houkes, & Tummers, 2004; Montgomery et al., 2003) and burnout (Demerouti et al., 2001; Janssen et al., 2004; Peeters et al., 2005). Demands such as work pressure result in negative load reactions building up in the work domain, creating a negative spillover into the home domain that can lead to higher levels of burnout (Geurts & Demerouti, 2003; Geurts et al., 2003; Janssen et al., 2004; Lee & Ashforth, 1996). It also seems that job resources have a relationship with positive WHI (Montgomery et al., 2003; Mostert, 2006; Mostert et al., 2006) and engagement (Geurts & Demerouti, 2003; Montgomery et al., 2003; Mostert, 2006; Mostert, Cronje & Pienaar, 2006; Schaufeli & Bakker, 2004). Adequate job resources help individuals to balance work and home demands, leading to positive reactions that build up at work and spillover to the home domain. This could lead to higher levels of engagement. On the other hand, a lack of resources could hinder employees to balance the demands of work and home, which could lead to negative interference from work to home and consequently to burnout (Geurts et al., 2003; Janssen et al., 2004; Peeters et al., 2005).

The objectives of this research were to determine the relationships between job characteristics (consisting of job demands and job resources), negative and positive WHI, and wellbeing (consisting of burnout and engagement); and to test a structural model that include all the hypothesised relationships between these variables.

Job characteristics

With regard to job characteristics, various theoretical models were used by researchers to investigate work stress and the various outcomes thereof (e.g., Bakker, Demerouti, De Boer, & Schaufeli, 2003; Demerouti et al., 2001; Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964; Karasek, 1979; Karasek & Theorell, 1990). The Job Demands-Resources (JD-R) model (Bakker et al., 2003; Demerouti et al., 2001) is a useful model that can be used to investigate the influence of job characteristics on work-related outcomes. Job characteristics consist of two variables that are eminent in a job. Firstly, job demands refer to physical, psychological and organisational dimensions of the job which require mental and psychical effort that is associated with physiological and/or psychological costs (Demerouti et al., 2001). The second dimension (namely, job resources) refers to those physical, psychological, social or organisational aspects of the job that may be functional in meeting task requirements and may thus reduce the associated physiological and/or psychological costs, and at the same time stimulate personal growth and development. Job resources can be located in the tasks itself (e.g., performance feedback, autonomy and skill variety), in the context (e.g., organisational resources such as career opportunities and job insecurity) and in the social resources (e.g., supervisor support) (Demerouti et al., 2001).

Burnout

Schaufeli and Enzmann (1998, p. 36) define burnout as "a persistent, negative, work-related state of mind in 'normal' individuals that is primarily characterised by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work". According to (Kristensen, Borritz, Villadsen, & Christensen, 2005), burnout refers to feelings of mentally exhaustion that can be measured with regard to work aspects.

Burnout was originally measured in the human services sector by focussing on occupations that dealt with people (Schaufeli & Enzmann, 1998). However, burnout also exists outside the realm of the human services (Maslach & Leiter, 1997). In order to overcome this limitation, the

Maslach Burnout Inventory – General Survey (MBI-GS) was developed (Schaufeli, Leiter, Maslach & Jackson, 1996) and consists of three subscales, namely exhaustion (referring to fatigue and individual stress that result from the depletion of emotional and psychical resources), cynicism (reflecting an indifferent or negative attitude towards one's work due to the inability to deal with job demands) and professional efficacy (which covers the self-evaluation dimension and refer to feelings of incompetence and the lack of achievements both socially and non-socially).

Recent developments have taken place in burnout research. First of all, various studies do not include professional efficacy when measuring burnout (Green, Walkey, & Taylor, 1991; Montgomery, et al., 2003; Peeters et al., 2005), mainly because researchers see it as a personality characteristic that is independent from exhaustion and cynicism (Shirom, 1989; Cordes & Dougherty, 1993; Green et al., 1991) which form part of an extended engagement construct (Salanova, Schaufeli, Llorens, Peiro, & Grau, 2001; Schaufeli & Bakker, 2004; Schaufeli et al., 2002). Secondly, researchers acknowledged that employees who suffer from severe burnout have negative effects such as cognitive impairment. Consequently, cognitive weariness became part of the burnout concept and is associated with lack of concentration, forgetfulness and an inability to solve problems (Hoogduin, Schaap, Methorst, Peters, Van Neyenhof & Van de Griendt, 2001).

Engagement

Organisations are paying more attention to the new shift in "positive psychology" that focuses on optimal functioning (Seligman & Csikszentmihalyi, 2000), including work engagement. Engagement is considered to be the opposite of burnout and is defined as a positive, rewarding, work-related state of mind that is characterised by three dimensions (namely, vigour, dedication and absorption). Vigour is characterised by mental toughness and high levels of energy, and is associated with an individual who is engrossed in his/her work. Dedication is characterised by feelings of pride, enthusiasm and finding the work challenging. Absorption is characterised by being engrossed in one's work and being unaware of time and not easily separated from one's work (Schaufeli et al., 2002). However, after 30 in-depth interviews, Schaufeli and Bakker (2001) found that absorption is only a relevant aspect of engagement and that vigour and

dedication are the core components of work engagement. Currently, professional efficacy is also seen as part of an enlarged engagement concept (Salanova et al., 2001; Schaufeli & Bakker, 2004; Schaufeli et al., 2002).

Work-home interference

According to Greenhaus and Beutell (1985, p. 77), work-family conflict can be defined as a “form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible in some respect. That is, participation in the work (family) role is made more difficult by virtue of participation in the family (work) role”. Geurts et al. (2005) base their definition on the Effort-Recovery (E-R) model (Meijman & Mulder, 1998) and define the work-home interface as “an interactive process in which a worker’s functioning in one domain (e.g., home) is influenced by (negative or positive) load reactions that have built up in the other domain (e.g., work)”.

Research on the work-home interaction of employees has been characterised by several limitations. Firstly, the majority of research focused almost solely on the negative impact from work to home (Carlson, Dacmar & Williams, 2000; Netemeyer, Boles & McMurrin, 1996; Stephens & Sommer, 1996), while very few studies addressed the possibility that the interaction between work and home could also be *positive* (Geurts & Demerouti, 2003; Grzywacz & Marks, 2000). Secondly, researchers have not based their hypotheses on strong theoretical frameworks (Bakker & Geurts, 2004; Geurts et al., 2005; Grandey & Cropanzano, 1999).

In order to overcome this limitation, negative and positive WHI were included in the structural model and the E-R model was, in addition to the JD-R model, used as a theoretical framework. The E-R model describes the interaction that can occur between work and private life whereby mechanisms’ wellbeing can be affected (Geurts, et al., 2003). It proposes that effort expenditure is associated with specific load reactions that developed within the individual. These load reactions can include physiological, behavioural and subjective responses and are, in principle, reversible. When the exposure to load is reduced, recovery can begin and the respective psychological systems begin to stabilise at a specific baseline level within a certain period of

time (Drenth, Thierry, & De Wolff, 1998). The recovery process results in a reduction of fatigue and other stressful situations. However, recovery cannot occur unless the demands cease, or the originally adaptive responses will develop into negative load reactions (e.g., strain, short-term psychosomatic health complaints and sustained activation) that can spill over to the home environment.

The presuppositions put forward by the E-R model may enhance our understanding of positive work-home interaction, since effort expenditure may also be accompanied by positive load reactions. When individuals are able to keep their effort investments within acceptable limits by utilising opportunities for control and support (e.g., by alternating high-effort and low-effort, or unpleasant and pleasant, tasks; by taking “time out” when necessary; and by asking for support from significant others such as a supervisor, colleagues or a spouse), energy resources can be recharged rather than exhausted. Furthermore, in order to stabilise energy generation, it is necessary to consume energy (Marks, 1977) and people tend to find energy for the things they like doing. People will produce rather than consume energy, which will result in tasks being completed with excellence.

A structural model of job characteristics, work-home interference and wellbeing

In line with the JD-R model, employees are exposed to job demands and job resources. Various studies have indicated that job demands are related to burnout (Demerouti et al, 2001; Lee & Ashforth, 1996; Janssen et al., 2004; Peeters et al., 2005; Schaufeli & Bakker, 2004). According to Bakker et al. (2003), the demanding aspects of a job may lead to burnout, fatigue and health problems. In a similar vein, Peeters et al. (2005) indicate that job demands are related to burnout. Based on these findings, it can be hypothesised that job demands are related to burnout (*hypothesis 1a*) (see figure 1).

It was found that job demands are related to negative WHI (Bakker & Geurts, 2004; Janssen et al., 2004; Montgomery et al., 2003). According to Janssen et al. (2004), negative work-home interference was associated with job demands, including psychological and emotional demands. In a similar vein, the dual-process model of Bakker and Geurts (2004) indicated that WHI acts as

a mediator in the relationship between job demands and negative work-home interaction. It can therefore be expected that job demands will also be related to negative WHI (*hypothesis 1b*). Furthermore, several studies have indicated that burnout is one of the psychological consequences of negative interference between work and home (Burke, 1988; Kinnunen & Mauno, 1998; Netemeyer et al., 1996). In a similar vein, Allen, Herst, Bruck and Sutton (2000) found that negative WHI was related to burnout. Based on these results, it could be hypothesised that negative WHI is related to burnout (*hypothesis 1c*).

A number of studies have indicated that a lack of resources is associated with exhaustion and mental distance (Demerouti et al., 2001; Janssen et al., 2004; Peeters et al., 2005). In line with the previous research, it is therefore expected that job resources are related to burnout (*hypothesis 2a*). Several studies have indicated that job resources can have a facilitating effect on the negative interference that can occur between work and home when job resources at the workplace is negatively associated with work-family conflict or negative work-home interaction (Carlson & Perrewé, 1999; Grzywacz & Marks, 2000; Kinnunen & Mauno, 1998; Kirchmeyer & Cohen, 1999; Moen & Yu, 2000). Janssen et al. (2004) reported that if an individual has less opportunity or resources (e.g., insufficient support from his/her supervisor, or no clear job instructions or targets) to manage work activities, it will result in a negative spillover from work to home. It can therefore be hypothesised that job resources will also be related to negative WHI (*hypothesis 2b*).

Several studies have found that job resources are more strongly related to work engagement (Barkhuizen & Rothmann, 2006; Coetzer, 2004; Demerouti et al., 2001; Jackson & Rothmann, 2005; Montgomery et al., 2003; Schaufeli & Bakker, 2004). This relates to the second process of the JD-R model which suggests that individuals who receive sufficient resources achieve their work goals, deal better with demanding aspects in their work, and are more motivated and stimulated for learning and development in their jobs (Bakker et al., 2003). Therefore, one can expect that job resources are related to engagement (*hypothesis 3a*).

It also seems that there is a relationship between job resources and positive WHI (Geurts & Demerouti, 2003; Mostert, 2006; Mostert et al., 2006). In their research Demerouti, Geurts and

Kompier (2004) found that two job resources (namely job control and job support) were related to positive WHI. Furthermore, Grzywacz and Marks (2000) found a relationship between job control, job support and positive WHI, but indicated that job control was stronger related to positive WHI than to negative spillover. Based on these results, it can be hypothesised that the availability of job resources are related to positive WHI (*hypothesis 3b*).

With regard to the relationship between positive WHI and engagement, Montgomery et al. (2003) found that positive interference was correlated with feelings of dedication. Bakker and Geurts (2004) also indicated that two separate pathways exist which lead to negative and positive WHI. Employees that are exposed to a high workload and demanding interactions within the organisations experience negative spillover from work to family. These findings suggest that feelings of exhaustion are due to high demands, creating a spillover into the home domain. In contrast, job resources such as possibilities for growth, participative management and a variety of skills lead to more positive experiences. Employees who were engrossed in their work activities and were motivated also experienced engagement as a positive influence as a result of the positive spillover from work into the home domain (Bakker et al., 2003; Demerouti et al., 2001, 2004). Based on these findings, it can be hypothesised that positive WHI is related to engagement (*hypothesis 3c*).

Several studies have indicated that negative WHI can act as mediator between job characteristics and burnout (Frone, Russell & Cooper, 1992; Janssen et al., 2004; Montgomery et al., 2003; Koekemoer & Mostert, 2006). A mediator indicates why a certain effect will occur (Baron & Kenny, 1986). In other words, the mediator explains the relationship between the independent variable and the dependent variable, and the mediating effect consists of the independent variable, the mediator and the outcome. This effect can be a full mediating effect or a partial mediating effect. Therefore, if job demands and job resources are related to negative work-home interaction (and consequently to burnout), it is a full mediating effect. However, when job demands and job resources have a direct relationship with burnout in addition to the relationship of negative WHI, it will be a partial mediating effect. Most studies have found that WHI was a partial mediator between job characteristics and burnout (Janssen et al., 2004; Koekemoer & Mostert, 2006; Montgomery et al., 2003; Peeters et al., 2005). It was also reported that positive

WHI acts as a partial mediator between job resources and engagement (Montgomery et al, 2003; Mostert, 2006; Mostert et al., 2006). These studies found that job resources contributed to higher levels of engagement. Positive WHI, in addition to the effects of job resources, also contributed to employees feeling more engaged.

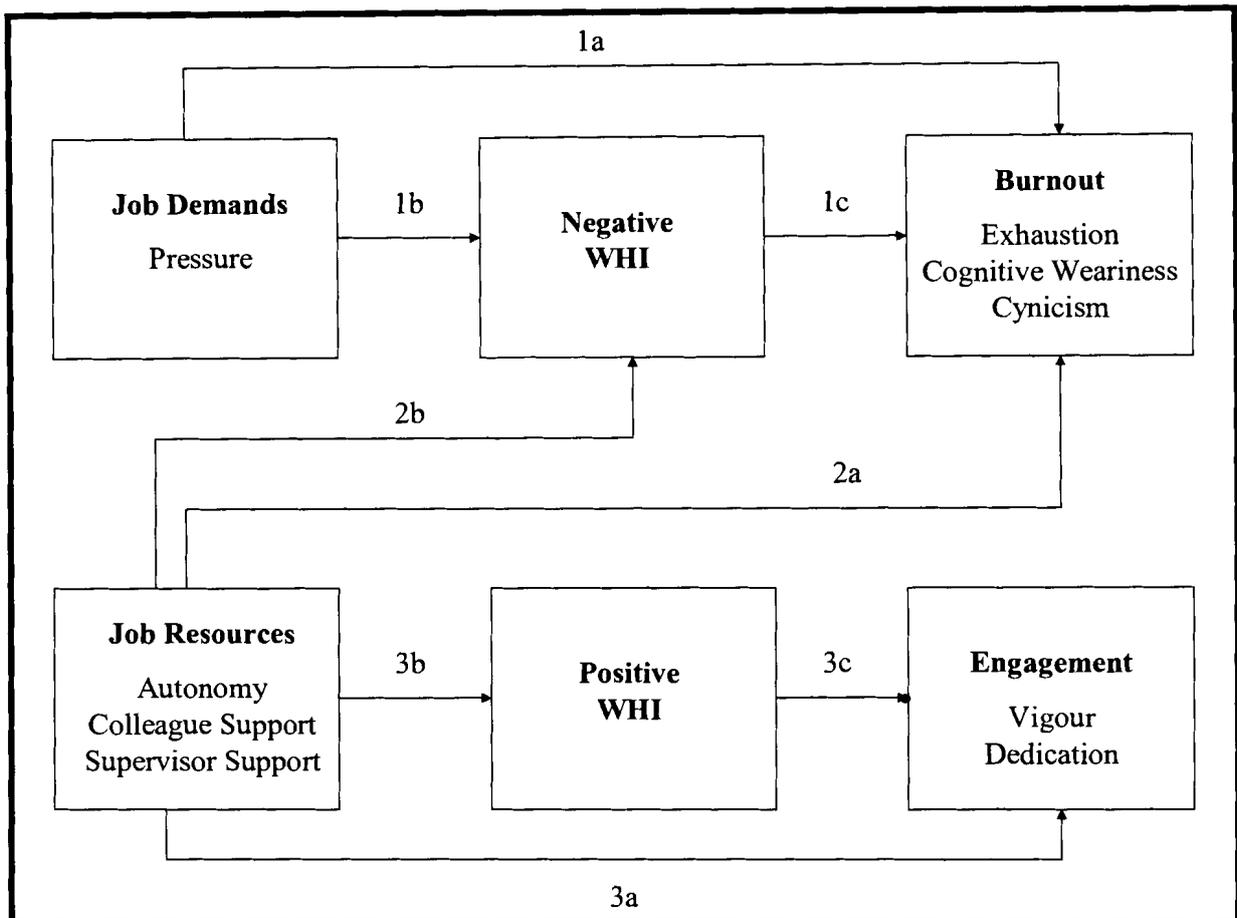


Figure 1: Theoretical model (numbers correspond with the hypotheses)

METHOD

Participants and procedure

A cross-sectional survey was conducted among employees working in the earthmoving equipment industry ($n = 528$) in Gauteng, the Limpopo Province, Mpumalanga, the Northern

Cape, the Western Cape, the Eastern Cape, Kwa-Zulu Natal and the North West Province of South Africa (response rate = 53%). After permission was obtained from executive management, all the managers, human resources departments and employee/employer committees were informed of the study during management meetings. Thereafter, all employees received paper-and-pencil questionnaires and return envelopes at their work that could be returned to the researchers involved. A letter explaining the purpose of the research accompanied the questionnaire. The employees were kindly requested to fill in the questionnaire in private and to send it to the Human Resources Department, where the researchers involved collected all the completed questionnaires. Participation was voluntary, and the confidentiality and anonymity of the answers were emphasised. Table 1 gives an indication of the characteristics of the participants who were included in the study.

Table 1

Characteristics of Participants

Item	Category	Frequency	Percentage
Gender	Male	380	72,0
	Female	141	26,7
Race	White	329	62,3
	African	109	20,6
	Coloured	60	11,4
	Indian	16	3,0
	Other	2	0,4
Age	1940-1949	44	8,3
	1950-1959	108	20,5
	1960-1969	137	25,9
	1970-1979	158	29,0
	1980-1989	63	11,9
Language	Afrikaans	233	44,1
	Zulu	18	3,4
	Tsonga	6	1,1
	Other languages	1	0,2
	English	192	36,4
	Sepedi	30	5,7
	Sesotho	12	2,3
	Setswana	8	1,5
	Venda	5	0,9
	Ndebele	7	1,3
Xhosa	11	2,1	
Household situation	Single without children	81	15,3
	Single with children	44	8,3
	Married without children	77	14,6
	Married with children	266	50,4
	Living with parents	35	6,6
	Other	18	3,4
Education level	Grade 10	77	14,6
	Grade 12	217	41,1
	Technikon diploma	44	8,3
	Postgraduate	11	2,1
	Grade 11	16	3,0
	Technical/College diploma	128	24,2
	Other	1	0,2
Employment status	Full time	412	78,0
	Part time	93	17,6

The participants were predominantly male (72,0%), 62,3% were White and 20,6% were African. The majority of the participants worked in the construction unit (40,2%) and in the mining unit (24,2%). The majority of the participants spoke Afrikaans (44,1%) and English (36,4%). A total of 41% of the participants possessed a Grade 12 certificate, while 24,2% of the participants possessed a technical college diploma. Most of the participants were married (65,0%) with children (58,7%).

Measuring instruments

The following questionnaires were used in the empirical study:

Job characteristics included job pressure, job control and job support. These characteristics were selected because of their central position in various leading job stress theories and the crucial role they play in effort expenditure and recovery in the job setting (Kompier, 2003). *Job pressure* was measured by six items that were adapted from the Job Content Questionnaire (JCQ, Karasek, 1985). The original statements were rephrased as questions (e.g., "Are you asked to do an excessive amount of work?", 1 = *almost never*, 4 = *always*), with higher scores indicating higher job pressure. *Job control* was measured by six items from the validated questionnaire on experience and evaluation of work (Van Veldhoven, Meijman, Broersen, & Fortuin, 1997) (e.g., "Can you decide for yourself how to carry out your work?", 1 = *almost never*, 4 = *always*). Higher scores signified a higher level of job control. Seven items from the JCQ measured job support. Four items addressed supervisor support (e.g., "My supervisor is helpful in getting the job done", 1 = *totally disagree*, 5 = *totally agree*), while three items addressed support from colleagues (e.g., "My colleagues are helpful in getting the job done", 1 = *totally disagree*, 5 = *totally agree*), with higher scores denoting higher social support.

Burnout. The Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli et al., 1996) was used to measure burnout. Two subscales of the MBI-GS were used in this study, namely Exhaustion (five items, e.g., "I feel used up at the end of the workday") and Cynicism (five items, e.g., "I have become less enthusiastic about my work"). All items were scored on a seven-point frequency-rating scale that ranged from 0 (*never*) to 6 (*daily*). High scores on Exhaustion

and Cynicism are indicative of burnout. Internal consistencies found by Leiter and Schaufeli (1996) and Schaufeli, Van Diederendonck and Van Gorp (1996) ranged from 0,73 (Cynicism) to 0,91 (Exhaustion). Test-retest reliabilities after one year were 0,65 for Exhaustion and 0,60 for Cynicism (Schaufeli et al., 1996). Test-retest reliability from three months to one year ranged from 0,50 – 0,82 (Leiter & Durup, 1996). The following Cronbach alpha coefficients were obtained for the two scales of the MBI-GS in a South African police sample: Exhaustion: 0,88; Cynicism: 0,79 (Storm & Rothmann, 2003a). In addition, the Cognitive Weariness Scale (CWS) was used. The CWS was developed by Van Horn, Taris, Schaufeli, and Shreurs (2004) to measure cognitive wellbeing. Initially this scale consisted of seven items but the authors recommended that, due to the high internal consistency of items 3 and 7, item 7 be dropped in the general six-item version. The scale refers to the capacity to take up new information and loss of concentration at work (e.g., "I have trouble concentrating"). It is scored on a seven-point frequency scale with 0 (*never*) to 6 (*daily*). Van Horn et al. (2004) reported a Cronbach alpha coefficient of 0,92; while Coetzee and Rothmann (2004) reported a Cronbach alpha coefficient of 0,76.

Engagement. The Utrecht Work Engagement Scale (UWES) (Schaufeli et al., 2002) was used to measure work engagement and consists of three scales (namely Vigour, Dedication and Absorption). In this study, the “core dimensions” of work engagement were used, namely Vigour and Dedication (see Schaufeli & Bakker 2001, 2004). Five items were used to measure Vigour (e.g., “I am bursting with energy every day in my work”) and five items to measure Dedication (“I am enthusiastic about my job”). The UWES is scored on a seven-point frequency rating scale, varying from 0 (*never*) to 6 (*always*). Alpha coefficients range between 0,78 and 0,89 (Schaufeli et al. 2002). Storm and Rothmann (2003b) obtained the following alpha coefficients for the core engagement dimensions in a sample of 2 396 members of the SAPS: Vigour: 0,78; Dedication: 0,89.

Work-home interference. The *Survey Work-Home Interaction – Nijmegen* (SWING) (Geurts et al., 2005) was used to measure negative WHI (eight items, e.g., “How often does it happen that you do not have the energy to engage in leisure activities with your spouse/family/friends because of your job?”) and positive WHI (five items, e.g., “How often does it happen that you

fulfil your domestic obligations better because of the things you have learned on the job?"). All items are scored on a four-point frequency rating scale, ranging from "0" (never) to "3" (always). Geurts et al. (2005) report Cronbach alpha coefficients of 0,84 for negative WHI and 0,75 for positive WHI. In a South African sample, Pieterse and Mostert (2005) obtained the following Cronbach alpha coefficients for the SWING: Negative WHI: 0,87 and Positive WHI: 0,79.

Statistical analysis

A statistical analysis was carried out with the SPSS program (SPSS, 2005) and the Amos program (Arbuckle, 2003). Cronbach alpha coefficients were used to assess the reliability of the constructs that were measured in this study. Descriptive statistics (e.g., means and standard deviations) and inferential statistics were used to analyse the data. Pearson product-moment correlation coefficients were used to specify the relationship between the variables. In terms of statistical significance, it was decided to set the value at a 95% confidence interval level ($p \leq 0,05$). Structural equation modelling (SEM) methods, as implemented by AMOS (Arbuckle, 2003), were used to test the construct validity of the job characteristics questionnaire and to test the structural model. The construct validity of work-home interference, burnout and engagement had already been tested in separate studies (see Rost, 2006). Maximum likelihood estimation methods were used with the covariance matrix of the scales as input for the analysis. The goodness-of-fit of the model was evaluated by using absolute and relative indices. The χ^2 goodness-of-fit statistic and the Root Mean Square Error of Approximation (RMSEA) were used as absolute goodness-of-fit indices. Acceptable fit of the model is indicated by non-significant χ^2 values and RMSEA values smaller than or equal to 0,08 (Cudeck & Browne, 1993). The following goodness-of-fit-indices were used as adjuncts to the χ^2 statistics: a) χ^2/df ratio; b) the Goodness-of-Fit Index (GFI); c) the Incremental Fit Index (IFI); d) the Tucker-Lewis Index (TLI); and e) the Comparative Fit Index (CFI).

RESULTS

Confirmatory factor analyses

The construct validity of the job characteristics questionnaire was tested by means of structural equation modelling. A four-factor model was tested, including Pressure, Autonomy, Colleague Support and Supervisor Support. The results are reported in Table 2.

Table 2

Construct Validity of the Job Characteristics Questionnaire

	Model	χ^2	χ^2/df	GFI	IFI	TLI	CFI	RMSEA
M1	Four-factor model	633,22	4,17	0,89	0,85	0,83	0,85	0,08
M2	Final model	381,45	2,56	0,93	0,93	0,92	0,93	0,05

Regarding the factor structure for job characteristics, the results from Table 2 indicate a relatively poor fit for the hypothesised four-factor model. Inspection of the modification indices indicated that the highest degree of misfit lay in the error covariance matrix and represents correlated errors between Colleague Support and Supervisor Support (MI = 156,00), between Autonomy and Colleague Support (MI = 51,05), and between Autonomy and Supervisor Support (MI = 43,06). After these errors were allowed to correlate, all the fit indices indicated good fit of the measurement model to the data ($\Delta \chi^2 = 251,77$ ($N = 528$), $df = 3,00$, $p < 0,05$; GFI, IFI, TLI and $CFI \geq 0,90$; $RMSEA \leq 0,08$).

Table 3 shows the means, standard deviations, Cronbach alpha coefficients and product-moment correlations between the variables.

Table 3

Descriptive Statistics, Reliability and Product-Moment Correlations

	M	SD	α	1	2	3	4	5	6	7	8	9	10
1 Pressure	2,18	0,57	0,78	1,00									
2 Autonomy	2,30	0,64	0,78	-0,13**	1,00								
3 Colleague Support	2,12	0,69	0,72	-0,04	0,29**	1,00							
4 Supervisor Support	2,19	0,80	0,86	0,11*	0,28**	0,54**	1,00						
5 Negative WHI	1,00	0,57	0,86	0,22**	-0,21**	-0,23**	-0,24**	1,00					
6 Positive WHI	1,55	0,66	0,77	0,01	0,23**	0,21**	0,26**	-0,17**	1,00				
7 Exhaustion	2,50	1,40	0,82	0,20**	-0,28**	-0,25**	-0,31**	0,47**	-0,29**	1,00			
8 Cognitive Weariness	1,94	1,18	0,73	-0,01	-0,24**	-0,17**	-0,17**	0,35**	-0,19**	0,47**	1,00		
9 Cynicism	1,74	1,44	0,73	0,04	-0,23**	-0,32**	-0,31**	0,41**	-0,21**	0,47**	0,52**	1,00	
10 Vigour	4,59	1,13	0,73	0,13**	0,31**	0,33**	0,35**	-0,26**	0,35**	-0,37**	-0,31**	-0,53**	1,00
11 Dedication	4,96	1,19	0,85	0,08	0,35**	0,35**	0,39**	-0,24**	0,40**	-0,43**	-0,31**	-0,57**	0,74**

** Correlation is significant at the 0,01 level

* Correlation is significant at the 0,05 level

Table 3 provides the means, standard deviations, Cronbach alpha coefficients and correlation coefficients of the study variables. As expected, negative WHI was moderately correlated with Exhaustion ($r = 0,47, p < 0,01$), Cognitive Weariness ($r = 0,35, p < 0,01$) and Cynicism ($r = 0,41, p < 0,01$); and weakly with Vigour ($r = -0,26, p < 0,01$) and Dedication ($r = -0,24, p < 0,01$). Positive WHI was moderately correlated with Vigour ($r = 0,35, p < 0,01$) and Dedication ($r = 0,40, p < 0,01$), but was weakly correlated with Exhaustion ($r = -0,29, p < 0,01$), Cognitive Weariness ($r = -0,19, p < 0,01$) and Cynicism ($r = -0,21, p < 0,01$). Of the four job characteristics, Supervisor Support appeared to correlate the strongest with negative WHI ($r = -0,24, p < 0,01$), positive WHI, ($r = 0,26, p < 0,01$), Exhaustion ($r = -0,31, p < 0,01$), Vigour ($r = 0,35, p < 0,01$) and Dedication ($r = 0,39, p < 0,01$); while Autonomy correlated the strongest with Cognitive Weariness ($r = -0,24, p < 0,01$) and Colleague Support correlated the strongest with Cynicism ($r = -0,32, p < 0,01$).

Next, structural equation modelling methods were used to test the hypothesised model. All the latent factors were operationalised by exogenously observed variables. For job demands, negative WHI and positive WHI, there were only one indicator – meaning that in these cases there was a one-to-one correspondence between the manifested variables (scales) and the underlying latent dimensions. Usually no distinction is made in these cases between random error variance and true score variance, so that the correlations among these one-indicator latent variables and other latent variables may be biased (Little, Cunningham, Shahar, & Widaman, 2002). A procedure suggested by Bagozzi and Heatherton (1994) was used to overcome this problem. First, a one-factor model was fitted for all the items that belonged to the three scales. Second, separate indicators for each scale were formed by selecting items on the basis of their loadings, alternating items with high and low loadings. As a result, three item parcels were created for job demands and negative WHI; and two item parcels for positive WHI. The manifest indicators of the latent exogenous factor job resources were autonomy, colleague support and supervisor support. The latent burnout factor was assessed by three observed variables, namely exhaustion, cognitive weariness and cynicism. The latent engagement factor was assessed by two observed variables, namely vigour and dedication.

In line with the proposed hypotheses, the model was tested with direct relationships specified between (1) job demands and burnout (hypothesis 1a); (2) job demands and negative WHI (hypothesis 1b); negative WHI and burnout (hypothesis 1c); job resources and burnout (hypothesis 2a); job resources and negative WHI (hypothesis 2b); job resources and engagement (hypothesis 3a); job resources and positive WHI (hypothesis 3b) and positive WHI and engagement (hypothesis 3c). In order to test these hypotheses, a series of structural equation modelling (SEM) analyses were performed. The results are presented in Table 3.

Table 3

Goodness-of-Fit Indices for the Hypothesised Model

Model	χ^2	X^2/df	GFI	IFI	TLI	CFI	RMSEA
M1 Research	370,56	3,86	0,92	0,92	0,90	0,92	0,07
M2 Modified	314,99	3,28	0,93	0,93	0,92	0,93	0,07

The results of the SEM analyses show that the hypothesised or proposed model (M1) fit adequately to the data ($\chi^2 = 370,56$; GFI, IFI, TLI and CFI $\geq 0,90$; RMSEA $\leq 0,08$). However, inspection of the regression weights showed that the path between job demands (pressure) and burnout is statically insignificant ($p = 0,07$). Amos modification indices also suggested correlated errors between the burnout and engagement factors. After these factors were allowed to co-vary and the path between job demands and burnout was removed, model fit improved ($\Delta \chi^2 = 55,57$, $\Delta df = 1,00$, $p = 0,00$). Finally, an examination of the modification indices revealed that the overall fit of model 2 could not be substantially improved by freeing any of the remaining paths that were constrained to equal zero. Since this model fit was satisfactory and the results agreed with the theoretical assumptions, no further modifications of the model were deemed necessary. Parameter estimates for the final model (model 2) are shown in figure 2. All relationships in the model were significant and in the expected direction.

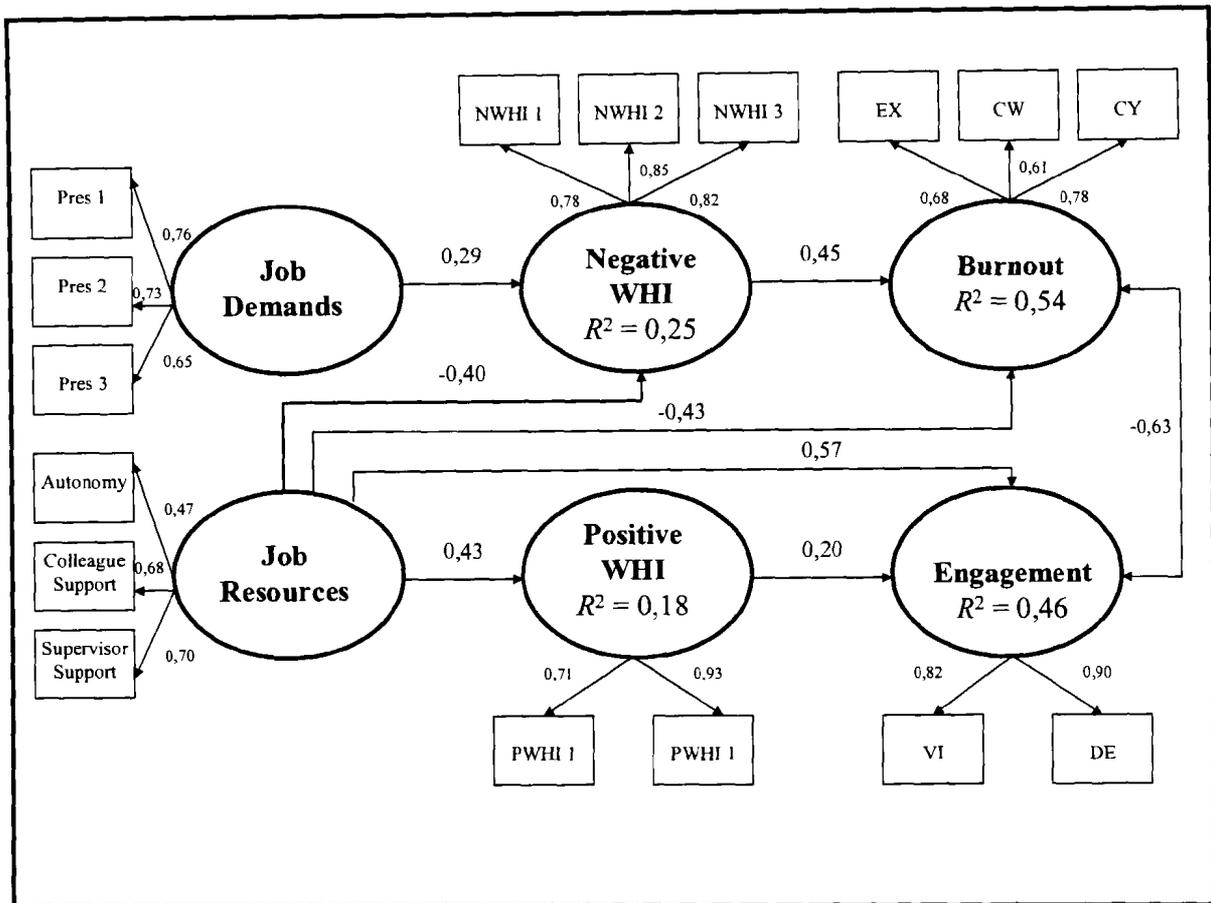


Figure 2. Standardised path coefficients for Model 2

As can be seen in Figure 2, the path between job demands (pressure) and burnout was not statistically significant. Therefore *hypothesis 1a* is rejected. However, the path from job demands to negative WHI were statistically significant, providing support for *hypothesis 1b*. The model also shows that negative WHI has a strong influence on burnout (consisting of exhaustion, cynicism and cognitive weariness), which provides support for *hypothesis 1c*. Furthermore, job resources (consisting of job control, colleague support and supervisor support) were related to burnout and negative WHI, providing support for *hypothesis 2a* and *hypothesis 2b*. Therefore, negative WHI fully mediates between job demands and burnout, but only partially mediates between job resources and burnout.

The path from job resources to engagement was statistically significant. Therefore *hypothesis 3a* is accepted. Furthermore, this model indicated that job resources have a strong influence on positive WHI (which provides support for *hypothesis 3b*). In addition, positive WHI has a relationship with engagement. These findings confirm *hypothesis 3c*. Therefore, positive WHI partially mediates the relationship between job resources and engagement. Finally, it can be seen that 54% of the variance in burnout can be explained by job demands, job resources and negative WHI. Job resources and positive WHI explained 46% of the variance in work engagement.

DISCUSSION

The objective of this study was to test a structural model that included job characteristics, negative and positive WHI, and wellbeing (burnout and engagement) of employees in the earthmoving equipment industry. It was also important to determine the mediating role of negative and positive WHI in the relationship between job characteristics and burnout and between job characteristics and engagement. In order to ensure that the hypothesised model was based on a sound theoretical and conceptual framework, the hypotheses were based on the Job Demands-Resources model and the Effort-Recovery model. Mediation was tested with SEM to determine the relationships between the variables.

With regard to the JD-R model, it was argued that the job characteristics consisted of two variables, namely job demands and job resources (Bakker et al., 2003; Demerouti et al., 2001). The results showed that job demands have a relationship with negative WHI. This is in line with previous research which confirmed that job characteristics were related to work-home interaction (Bakker & Geurts, 2004; Demerouti et al., 2001; Janssen et al., 2004; Montgomery et al., 2003). In addition, support was found for the hypotheses that negative WHI is related to burnout. This is also supported by previous research (Allen et al., 2000; Burke, 1988; Kinnunen & Mauno, 1998; Netemeyer et al., 1996). With regard to the mediating role of negative WHI, the results revealed that negative WHI plays a full mediating role between job demands and burnout. Therefore, job demands will negatively interfere with home and this will lead to burnout. Job resources were also related to negative WHI and burnout, showing evidence for a partial mediating effect. This

may suggest that, in addition to the indirect effect through negative WHI, job resources have a direct relationship with burnout.

Based on the principles of the JD-R model and E-R model, these results suggest that when an employee experience high levels of work pressure (demands) and insufficient resources (e.g., the employee does not receive adequate support from his/her supervisor or his/her colleague; or the employee does not have complete ownership of his/her work), it will result in the build up of negative load reaction within the individual. The individual will experience interference between work and home, causing a negative spillover into the home domain and creating a hindrance for him/her to fulfil his/her domestic obligations. When this process of negative experiences become accumulative and no recovery occurs within an acceptable time limit, the wellbeing of the employee is affected and may lead to burnout (e.g., Janssen et al., 2004; Montgomery et al., 2003; Peeters et al., 2005; Sluiter, 1999).

Furthermore, the results showed that job resources are related to positive WHI and engagement. This is congruent with previous research (Bakker & Geurts, 2004; Barkhuizen & Rothmann, 2006; Coetzer, 2004; Demerouti et al., 2004; Frone et al., (1992) Geurts & Demerouti, 2004; Geurts et al., 2005; Demerouti et al., 2001; Jackson & Rothmann, 2005; Montgomery et al., 2003; Schaufeli & Bakker, 2004). Positive WHI plays a partial mediating role between job resources and work engagement. Therefore, job resources have a direct relationship with engagement in addition to the indirect effect through positive WHI. This is in line with the framework of the E-R model. When an organisation offers valuable resources (e.g., training facilities and participative management), the employee will be able to invest more time and energy (vigour) that will lead to his/her learning and development, increased organisational commitment (dedication) and individuals who feel more efficacy in their work. Therefore, positive load reaction will build up, spilling over in the home domain. These positive load reactions can influence energy levels (vigour) and dedication. According to Marks (1977), finding energy will be produced rather than depleted. It is important that energy is kept within acceptable limits. If the load reaction is reduced (Drenth, Thierry & De Wolff, 1998), recovery will occur and individuals will rest and have more energy for the next day of work. This is also

in line with previous research (Geurts & Demerouti, 2003; Montgomery et al., 2003; Schaufeli & Bakker, 2004).

This emphasises the important role of available resources in the assistance of recovery at work. Based on this, sufficient and available resources are not only important for engagement but also for assisting in recovery at work. It will result in reduced recovery at home and will influence the motivation and engagement of employees. These job resources will help employees in the earthmoving equipment industry to deal with their work demands and will increase growth, development, dedication and energy levels while reducing burnout.

This study had various limitations. Firstly, the results were obtained solely by self-report questionnaires. This can create problems because it can contaminate the reported relationships commonly referred to as “method-variance” or “nuisance”, resulting in participants not understanding specific words or meaning of words. However, according to Semmer, Zapf and Grief (1996) and Spector (1992), self-report questionnaires are not as immense a limitation as various researchers think. The homogeneity of the sample and the size of the sample are further limitations of this study. The sample only included employees from the earthmoving equipment industry and the majority of the participants were White males. These limitations make it difficult to generalise the results to other occupations and groups. The use of cross-sectional design might be a further limitation because this design limits the casual relationship and consequences of job characteristics, work-home interaction and wellbeing over a period of time. Also, only a few job demands and resources were included in this study. Furthermore, variables such as demographic variables and personality characteristics were not included in this study and this could have been related to the variables. It therefore seems necessary to investigate these variables, demands and resources.

RECOMMENDATIONS

The results obtained from this study have important implications for organisations and future research. The findings suggest that employees in the earthmoving equipment industry benefit from a work environment that offers them complete ownership of their work, sufficient support

from their supervisors and colleagues, and resources that are available to assist them with work pressure. However, it seems that they may suffer from work pressures that influence their work and home life; and this can result in symptoms such as fatigue, burnout and difficulty to concentrate. Insufficient resources such as supervisor support and no control over the job may lead to negative spillover from work to family or lower levels of engagement. Since employees in the earthmoving equipment industry are constantly under pressure, organisations should put strategies in place to address work pressures and provide sufficient resources to prevent burnout, lower levels of engagement and work-family conflict. Geurts and Demerouti (2003) and Duxbury and Higgins (2001) recommend that policies should be implemented in organisations to address work-family conflict and, most importantly, promote work-life balance. In addition, companies should create a culture for employees to use these preventative policies when they experience work-family conflict (Duxbury & Higgins, 2001; Duxbury, 2004).

Future research that uses longitudinal studies will enhance assumptions regarding the relationships and consequences of job characteristics, work-home interaction and wellbeing over time. By studying the relationship between job characteristics and work-home interaction, it will ensure best application of the different and specific influences and outcomes in the earthmoving equipment industry. Finally, future research on other job demands and resources (e.g., decision making and training facilities) that might be relevant to the earthmoving equipment industry should be undertaken. It will enhance existing knowledge on the relationship between job characteristics, work-home interference and wellbeing. It can assist in developing and designing organisational policies to create a better integration of family and work roles that lead to higher levels of engagement and lower levels of burnout within the earthmoving equipment industry.

Author's note

The material described in this article is based upon work that was supported by the National Research Foundation under reference number 20050801000025.

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CHAPTER 5

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

In this chapter, conclusions are drawn with regard to the specific objectives of this study. The literature review, empirical study and the limitations of the research are discussed, followed by recommendations to the organisation regarding the specific research problem. Lastly, suggestions are made for further studies.

5.1 CONCLUSIONS

The first objective of this study was to investigate the construct validity, construct equivalence and reliability of the SWING for the earthmoving equipment industry. The results that were obtained by using the structural equation modelling approach confirmed a four-dimensional construct which consisted of negative and positive interference from work to home (WHI) as well as negative and positive interference from home to work (HWI). However, because of empirical and conceptual considerations, it was decided to allow correlations between positive and negative factors; thereby indicating that the factors are in some way related to each other. Furthermore, items 3 and 9 showed a high overlap, which indicated highly correlated errors. In terms of the construct equivalence, the SWING was equivalent for the six relevant subgroups (language, ethnicity, gender, education, marital status and parental status). Reliability analyses revealed acceptable Cronbach alpha coefficients for all four scales, which provided support for the reliability of the SWING.

The prevalence of the WHI/HWI in this research revealed that interference originated more often from work than from home and that positive HWI is more prevalent than positive WHI. These results may suggest a proneness to arrange work over family matters (which results in reduced efforts at home) and that home activities are more favourable than work activities. It could also be that the time to recover and relax is more obtainable in the home domain because efforts are recharged rather than depleted at home.

Another objective was to determine whether important demographic groups differ with regard to work-home interaction. No statistically significant differences were found with regard to education, marital status and parental status. The results showed that statistically significant differences were found for age, gender, language, ethnicity, a partner's contribution to household income and the different business units. Differences between work-home interaction and the age groups showed that younger employees (between 26 and 35 years of age) experienced statistically significant lower levels of positive WHI than older employees (between 46 and 65 years of age). With regard to differences that were based on gender, it seems that males experienced statistically significant higher levels of negative WHI than females. Differences that were based on ethnicity indicated that White and African participants experienced higher levels of negative WHI compared to Coloured and Indian participants. These findings may suggest that White and African participants find their work environment more stressful, resulting in fewer opportunities to recover at home. The different cultural differences and backgrounds may influence the way in which the work environment is perceived. Significant differences exist for negative and positive WHI levels that were based on a partners' contribution to household income. The results obtained from this study revealed that employees with partners who contributed more than 50% of a household's income experienced more positive WHI than employees with partners who contributed approximately 50%. Finally, it appears that the mining business unit experienced statistically significant higher levels of negative WHI than employees in the construction, shared services and handling business units. With regard to positive WHI, employees in the construction business unit experienced higher levels of positive WHI compared to employees in the rental business unit.

The next objective was to determine the psychometric properties of the MBI-GS and the UWES. The results obtained with SEM supported a four-dimensional factor structure for the MBI-GS that distinguished between four dimensions, namely exhaustion, cognitive weariness, cynicism and professional efficacy. One professional efficacy item was problematic and was therefore omitted. The reason for the problem might have been the misinterpretation of the meaning of the word. With regard to the construct validity of the UWES, a two-factor structure consisting of vigour and dedication supported the hypothesis.

The MBI-GS showed construct equivalence for the two relevant subgroups (language and education) for employees in the earthmoving equipment industry. In addition, the two-factor structure of the UWES was equivalent for the language and education groups. It therefore seems acceptable to use the MBI-GS and UWES in order to compare the wellbeing levels for different language and education groups. Furthermore, internal consistencies revealed that all the scales were acceptable, providing support for the reliability for the MBI-GS and UWES.

It was important to determine the construct validity of the total wellness construct. A post-hoc confirmatory analysis with SEM was conducted to exclude the possibility that the items that belonged to the burnout and engagement dimensions actually tapped the same underlying dimension. Two models were tested. The first model assumed that all the factors loaded on one latent factor, whereas the second model differentiated between *burnout* (exhaustion, cognitive weariness and cynicism) and *engagement* (engagement and professional efficacy). The structure in this study was equivalent for the two-factor wellness structure across language and education.

It was also important to determine whether important demographical groups differ with regard to wellbeing. The results indicated no significant differences that were based on gender, education and marital status with regard to work wellness. With regard to age, it appears that the younger participants (between 26 and 35 and between 36 and 45) experienced higher levels of exhaustion than the older participants (46 to 55). It also seems that the older participants experienced statistically significant lower levels of cynicism compared to the younger individuals. Furthermore, employees between 36 and 45 years experienced higher levels of professional efficacy, vigour and dedication than younger employees. Regarding language, Afrikaans-speaking employees experienced higher levels of cynicism and lower levels of vigour compared to English-speaking employees. These results may suggest that Afrikaans-speaking employees are less engaged in their work than English-speaking employees. Certain changes and transformation may have influenced their perception with regard to the work environment, leading to increased levels of cynicism. Overall, the rental business unit experienced the highest levels of exhaustion, cynicism and cognitive weariness. The construction unit had the lowest level of cynicism and the shared services unit had the lowest levels with regard to exhaustion and cognitive weariness. The construction unit experienced the highest levels of dedication, vigour

and professional efficacy, while the rental business unit experienced the lowest levels of dedication, vigour and professional efficacy.

The last objective of the study was to test a structural model that included the job characteristics, negative and positive WHI, and wellbeing (burnout and engagement) of employees in the earthmoving equipment industry. It was important to determine the mediating role of negative and positive WHI in the relationship between job characteristics and burnout and also between job characteristics and engagement. In order to ensure that the hypothesised model was based on a sound theoretical and conceptual framework, the hypotheses were based on the Job Demands-Resources (JD-R) model and the Effort-Recovery (E-R) model. Mediation was tested with SEM in order to determine the relationships between the variables.

With regard to the JD-R model, it was argued that job characteristics consist of two variables (namely job demands and job resources) (Bakker et al., 2001; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). The results showed that job demands have a relationship with negative WHI. This is in line with previous research and confirms that job characteristics are related to work-home interaction (Bakker & Geurts, 2004; Demerouti et al., 2001; Janssen, Peeters, De Jonge, Houkes, & Tummers, 2004; Montgomery, Peeters, Schaufeli & Den Ouden, 2003). In addition, support was found for the hypothesis that negative WHI is related to burnout. This is also supported by previous research (Allen, Herst, Bruck, & Sutton, 2000; Burke, 1988; Kinnunen & Mauno, 1998; Netemeyer, Boles, & McMurrian, 1996). With regard to the mediating role of negative WHI, the results revealed that negative WHI plays a full mediating role between job demands and burnout. Therefore, job demands will negatively interfere with the home, leading to burnout. Job resources were related to negative WHI and burnout, showing evidence for a partial mediating effect. This may suggest that, in addition to the indirect effect through negative WHI, job resources have a direct relationship with burnout.

Based on the principles of the JD-R model and E-R model, these results suggest that when an employee experiences high levels of work pressure (demands) and insufficient resources (e.g., the employee does not receive adequate support from his/her supervisor or colleagues, or the employee does not have complete ownership of his/her work), it will result in the build up of

negative load reaction within the individual. The individual will experience interference between work and home, causing a negative spillover into the home domain and creating a hindrance for the individual to fulfil his/her domestic obligations. When this process of negative experiences become accumulative and no recovery occurs within an acceptable time limit, the wellbeing of the employee is affected and this may lead to burnout (Janssen et al., 2004; Montgomery et al., 2003; Peeters et al., 2004; Sluiter, 1999).

Furthermore, the results showed that job resources are related to positive WHI and engagement. Positive WHI plays a partial mediating role between job resources and work engagement. Therefore, in addition to the indirect effect through positive WHI, job resources have a direct relationship with engagement. This is in line with the framework of the E-R model. When an organisation offers valuable resources (e.g., training facilities and participative management), its employees will be able to invest more time and energy (vigour) in their work. This will lead to the learning and development of the employees, increased organisation commitment (dedication) and individuals who feel more efficacy in their work. Therefore, positive load reaction will build up, spilling over in the home domain. These positive load reactions can influence energy levels (vigour) and dedication. According to Marks (1977), energy will be produced rather than depleted. It is important that energy is kept within acceptable limits. If the load reaction is reduced (Drenth, Thierry, & De Wolff, 1998), recovery will occur and individuals will rest out and have more energy for the next day of work. This is also in line with previous research (Geurts & Demerouti, 2003; Montgomery et al., 2003; Schaufeli & Bakker, 2004).

5.2. LIMITATIONS

This study had various limitations. Firstly, the results were obtained solely by means of self-report questionnaires. This can create problems because participants may not understand the questions or the meaning of specific words (referred to as “method-variance” or “nuisance”). In addition, several studies recommend the use of more objective measures for wellbeing, such as the use of other information or sources (Demerouti, Geurts, & Kompier, 2004; Geurts, Kompier, Roxburgh, & Houtman, 2003; Jones & Fletcher, 1996; Morrison & Clements, 1997). However, Frese and Zapf (1999) maintain that the participant himself/herself is the most critical source of

information when personal issues are investigated. Several researchers argue that self-report questionnaires cannot be seen as an immense limitation (Boumans & Landeweerd, 1993; Semmer, Zapf, & Grief, 1996; Spector, 1992), especially if interaction is found between variables (Dollard & Whinefield, 1998; Schonfield, 1996).

A further limitation was the size and homogeneity of the sample. Not only was the sample taken from the earthmoving equipment industry, but most of the respondents were White males. Furthermore unique characteristics such as the organisational culture and climate could have influenced the participants' responses. It is therefore difficult to generalise the results to other occupational groups and subgroups. A larger and more representative sample would have revealed more accurate results. It is therefore important to investigate findings of other occupational groups and heterogeneous samples.

The use of a cross-sectional design could be a further limitation because this design limits the casual relationship and consequences of work-home interaction, job characteristics and wellbeing over a period of time -- resulting in the relationship being interpreted and not necessarily confirmed. A possible solution may be the use of longitudinal studies and quasi-experimental research that may enhance assumptions regarding the relationships and consequences of job characteristics, work-home interaction and wellbeing, thereby providing further validation of the hypothesised relationships and best application (Peeters, Montgomery, Bakker, & Schaufeli, 2005). It should however be noted that cross-sectional design plays an important role in testing for casual relationship (Montgomery et al., 2003).

Only a few job demands and resources were included in this study. Variables such as demographic variables and personality characteristics (e.g. overtime and participative management) were not included in this study. It therefore seems necessary to investigate and assess these variables and also other demands and resources (Le Blanc et al., 2001). Confidentiality was an important aspect of the study and could have influenced the results, especially if the employees were not comfortable with the confidentially statement which explained the purpose of the study.

5.3. RECOMMENDATIONS

The following recommendations are made for the organisation and for future research.

5.3.1. Recommendations for the organisation

One of the major challenges for organisations is to maintain and promote a work-life balance within organisations. Several studies revealed that work-home interaction affects the company's competitiveness, economic viability and bottom-line profits (Burke, 1988; Barnett, 1996; Duxbury, 2004; Duxbury & Higgins, 2001; Hall & Mirvis, 1995; Kotze, 2005; Parasuraman & Greenhaus, 1999). The application of valid, equivalent and reliable instruments will be a valuable tool to assist managers and employees in obtaining a clear and accurate understanding of the concepts of wellbeing and work-home interaction. In addition, it will determine the success of their implementation in organisations. Correct application and clear understanding will result in higher levels of organisational commitment, low intention to leave the organisation, higher levels of performance and the development of skills (Duxbury, 2004; Duxbury & Higgins, 2001; Kotze, 2005). Overall, organisations are continuously changing and adapting to legislation such as employment equity laws. These transformation developments emphasise the significance of construct equivalence because organisations can use it to obtain important results when comparing wellbeing (burnout and engagement) and work-home interference across different cultures within the organisation.

Furthermore, these instruments will identify problem areas and will contribute to the development of wellness programmes for organisations. Information with regard to the prevalence of the WHI/HWI (where it is clear that negative interference originated more often from work than from home and that positive interference originated more often from home than from work) will have various implications for organisations. Firstly, managers and employees will become aware of the causes and negative effects of work-home interaction. Secondly, it will create awareness that employees are experiencing difficulty with these domains and that recovery is essential.

It is important for organisations to realise that work wellness has several organisational and individual consequences. Work-related stressors such as long working hours, excessive job demands and the working environment can lead to burnout (Frone, Russell, & Cooper, 1997; Montgomery et al, 2003) and lower levels of engagement (Montgomery et al., 2003). Physical effects such as headaches, sleeping disorders, dizziness (Geurts, Rutte, & Peeters, 1999) and substance abuse (Lingard & Francis, 2005) lead to overall poor health (Burke, 1998). Valid and reliable instruments that measure work wellness will help to identify the root causes and symptoms of burnout. Furthermore, awareness can be promoted in order to prevent the extent in which burnout affect the rest of the workforce. Organisations can develop intervention programmes that are aimed at reducing burnout and increasing engagement.

Sufficient job resources (such as working in an environment that offers ownership of work, and support from supervisor and colleagues) will assist employees in dealing with work demands. It seems that employees in the earthmoving equipment industry are subjected to work demands that influence their work and home life, resulting in fatigue, lack of concentration, forgetfulness and burnout. Sufficient job resources will assist individuals to recover at home and will lead to higher levels of engagement. Strategies should be put in place to increase job resources because this will lead to positive work-home interaction and consequently to higher levels of engagement.

Organisation should provide work-family facilities to help employees to balance their work and home domains (e.g., flexible working hours) (Geurts & Demerouti, 2003). Companies should create a culture in which work-family interference can be addressed by providing adequate resources such as more managers, supervisor support, a supportive environment and leadership (Duxbury, 2004). According to Cohen (1997), organisational commitment will increase if organisations show equal interest in the home domain and work domain (e.g., flexible attitude towards working schedules and taking the home domain in consideration before making decisions regarding employees' careers that impact on their personal lives). Geurts et al. (2003) report that the attitude, behaviour and expectations of employees play an important role in this regard. In addition, the results of Cohen (1997) indicate that it is important to recognise the significance of the quality of their employees' lives and to respect their interests outside the work domain.

Information regarding the differences between important demographic groups and work-home interaction (as well as work wellness levels) will assist organisations in identifying risks groups. Organisations can focus on intervention programmes such as career developing, support for continued learning and development, and sufficient support from managers and colleagues. Programmes should focus on promoting engaged employees, reducing burnout and balancing work-family life.

5.3.2. Recommendations for future research

The findings of this study may have important implications for future studies. The SWING, MBI-GS and UWES are recommended as reliable and useful measuring instruments to measure the work-home interaction and wellness of employees in the earthmoving equipment industry. However, it is highly recommended that these instruments be translated into other official languages in order to prevent participants from misunderstanding the items. Although English is regarded as the business language in organisations, English is the second language of a number of employees. It could be difficult for these employees to understand the content of the questions. By translating the measuring instruments, a comprehensive investigation of work-home interaction and wellbeing across cultures will be promoted that will produce valid and reliable conclusions.

One of the limitations of this study was the size and homogeneity of the sample. The sample only included employees from the earthmoving equipment industry and the majority of them were White males. Specific characteristics (such as organisational climate and culture) that are described as unique characteristics may have influenced the participants' responses. These limitations make it difficult to generalise the results to other occupational groups and industries. Therefore, the application of these constructs in other professions and heterogeneous samples requires further investigation.

A further investigation with regard to the problematic items of the measuring instruments should be conducted and should focus on positive response sets, difficult wording of items and the

meaning of specific words. Further research with regard to construct equivalence and demographic groups should take place because transformation developments within organisations make it impossible to assume that the results obtained for one culture or language group can be generalise to other cultures or groups.

The findings of this study suggest that employees in the earthmoving equipment industry benefit from a work environment that offers complete ownership of their work, sufficient support from their supervisor and colleagues, and provide resources that are available to assist them with work pressure. However, it seems that they may suffer from work pressures that influence their work and home life, resulting in symptoms such as fatigue, burnout and difficulty to concentrate. Insufficient resources such as supervisor support and no control over the job may lead to negative spillover from work to family or lower levels of engagement. Since employees in the earthmoving equipment industry are constantly under pressure, organisations should put strategies in place to address work pressures and should provide sufficient resources to prevent burnout, lower levels of engagement and work-family conflict. Geurts and Demerouti (2003) and Duxbury and Higgins (2001) recommend that policies should be implemented within organisations to address work-family conflict and, most importantly, promote work-life balance. In addition, companies should create a culture for employees to use preventative policies when work-family conflict is experienced. Factors such as manager and supervisor support and leadership have a major influence on work-home interaction and the work wellness of employees, and should be investigated and form part of the policies (Duxbury & Higgins, 2001; Duxbury, 2004; Janssen et al., 2004). Future research should address the effectiveness of these policies and should examine whether the organisational culture is supportive of such policies and practices (Geurts & Demerouti, 2003).

This study also has various limitations with regard to the structural model. The mediating role of positive WHI and negative WHI was confirmed, even though various sources query whether WHI should be seen as an outcome, a strain or a stressor (Bakker & Geurts, 2004; Burke, 1988; Frone, Rusell, & Cooper, 1992; Kinnuen & Mauno, 1998). Bakker and Geurts (2004) argue that WHI can fulfil all of these roles. It is recommended that a longitudinal study be conducted in order to determine whether WHI is an outcome or a mediator, and to determine the position of

WHI in the stressor-strain relationship. It can be argued that positive or negative WHI will change over a period of time as a result of job resources or job demands, or that negative or positive WHI will be predicted as a result of burnout and fatigue or feelings of vigour and dedication. Furthermore, Demerouti, Geurts and Kompier (2004) emphasise that longitudinal studies will give a true reflection of the consequences and outcomes of WHI. Peeters et al. (2005) note that longitudinal studies can prevent subjective measurements.

Only a few job demands and resources were included in this study. Variables such as demographics and personality characteristics were not included in this study and could have been related to the variables. It therefore seems necessary to investigate these variables together with additional demands and resources. Future research should also focus on the enhancement of existing knowledge and new methodologies and designs (Janssen et al., 2004) that will enhance the processes between the home and the work environments as well as work wellness levels. A study of the processes of positive and negative work-home interference, job characteristics and wellbeing will ensure best application for the different and specific influences and outcomes found in the earthmoving equipment industry. This will, in turn, ensure a productive, motivated and engaged workforce.