

WELLNESS OF TRAIN DRIVERS IN A RAILWAY TRANSPORTATION INDUSTRY

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COMMENTS

- The reader must note that the publication and reference style used in this mini-dissertation is in accordance with the instructions for publication (5th ed.) of the American Psychological Association (APA). This is in accordance with the policy of the Programme in Industrial Psychology at the North-West University to use the APA style in all scientific documents since January 1999.
- In this mini-dissertation, the article option has been chosen.

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TABLE OF CONTENTS

	Page
Acknowledgements	ii
List of Tables	iv
Summary	v
Opsomming	vii
Chapter 1: Introduction	
1.1	1
1.2	6
1.2.1	6
1.2.2	6
1.3	7
1.3.1	7
1.3.2	7
1.3.2.1	7
1.3.2.2	7
1.3.2.3	8
1.3.2.4	9
1.4	9
1.5	10
References	11
Chapter 2: Research Article	
Chapter 3: Conclusions, Limitations and Recommendations	
3.1	44
3.2	45
3.3	45
References	47

LIST OF TABLES

Table	Description	Page
1	Characteristics of the participants ($N=332$)	24
2	Pattern Matrix of the <i>MBI-GS</i> and <i>CWS</i> for train drivers	30
3	Component Matrix of the <i>UWES</i> for train drivers	31
4	Goodness-of-Fit statistics for the Hypothesised Wellness Models	32
5	Descriptive statistics, Alpha Coefficient and Pearson Correlations of Scales	33
6	Standardised Regression Coefficients of Scales for Whites and Africans	35
7	AMOS: Standardised Regression Coefficients of Scales for Whites and Africans	35
8	Multivariate Tests	36
9	Descriptive Statistics of Age groups	37

SUMMARY

Topic: Wellness of train drivers in a Railway Transportation Industry

Key words: Burnout, work engagement, reliability, validity

In order to survive and to prosper in a continuously changing environment, organisations need energetic and motivated employees, i.e. employees who are psychologically well. Burnout and work engagement are important focus areas for research regarding the wellness of employees. In order to ensure work wellness (i.e. low burnout and high work engagement), it is necessary to assess the current level thereof. This assessment should be done on an individual level, and scores should also be aggregated to study patterns in specific occupations, sections, units, and organisations. However, before the levels of wellness can be assessed, a valid and reliable measuring instrument is needed. The objectives of the study were to investigate the construct validity and reliability of the Maslach Burnout Inventory – General Survey, and Utrecht Work Engagement Scale for train drivers, and to test assess the relationship between burnout and work engagement.

A cross-sectional survey design was used, whereby a sample ($N = 332$) was drawn from train drivers in SpoorNet. The measuring instruments utilised in this study were The Maslach Burnout Inventory – General Survey (MBI-GS) and the Utrecht Work Engagement Scale (UWES) and the Cognitive Weariness Scale (CWS). Principal components extraction was used prior to principal factor extraction to estimate the number of factors, presence of outliers and factorability of correlation matrices. Structural equation modelling was used to test the relationship between the constructs.

The results showed that burnout consisted of four factors, namely Exhaustion, Cognitive Weariness, Professional Efficacy and Cynicism. Work Engagement showed a one-factor structure. Structural equation modelling showed that work wellness consists of two factors, namely energy (including Exhaustion, Cognitive Weariness, and Cynicism), and motivation (Work Engagement and Professional Efficacy).

The results also showed that Exhaustion is practically significantly and positively related to Cynicism (large effect) and Cognitive Weariness (medium effect). Exhaustion is also practically significantly and negatively related to Work Engagement (large effect) and Professional Efficacy (medium effect). Cynicism is practically significantly and positively related to Cognitive Weariness (medium effect) and negatively related to Work Engagement (larger effect) and Professional Efficacy (medium effect). Work Engagement is practically significantly and positively related to Professional Efficacy (large effect).

The sten scores of the train drivers were low average on Exhaustion (4,02) and on Cynicism (4,38%). The sten scores were above average on Vigour (7,48%) and on Dedication (7,96%). About 52,1% of the train drivers reported low on Exhaustion and 42,5% reported low on Cynicism. As far as Vigour and Dedication are concerned, 57% showed high scores on Vigour and 63,9% of train drivers showed high scores on dedication. The structure of well-being was equivalent for Afrikaans and African language groups.

Recommendations for future research were made.

OPSOMMING

Onderwerp: Welstand van treinoperateurs in 'n Spoorwegvervoerbedryf

Sleutelwoorde: Uitbranding, werksbegeestering, betroubaarheid, geldigheid

Oorlewing en vooruitgang in 'n voortdurend-veranderende omgewing, vereis dat organisasies energieke en gemotiveerde werknemers het, met ander woorde werknemers met wie dit goed gaan. Ooreising en werksbegeestering is belangrike fokusareas vir navorsing aangaande die welstand van werknemers. Om welstand (m.a.w. lae vlakke van uitbranding en hoë werksbegeestering) te verseker, is dit nodig om die huidige vlakke daarvan te evalueer. Hierdie evaluasie moet op 'n individuele vlak gedoen word en uitslae moet in studiepatrone byeengebring word in spesifieke beroepe, seksies, eenhede en organisasies. Voordat die vlakke van welstand egter geëvalueer kan word, is 'n betroubare en geldige meetinstrument nodig. Die doelwitte van die studie is om die geldigheid en betroubaarheid van die konstruk van die "Maslach Burnout Inventory – General Survey" (Maslach se Uitbrandingsinventaris - Algemene Opname) en die "Utrecht Work Engagement Scale" (Utrecht Werksbegeesteringskaal) vir treinoperateurs te evalueer en om die verband tussen ooreising en werksverbintenis te evalueer.

Die ontwerp wat gebruik is tydens die studie, is 'n kruissnitopname, waarvolgens 'n monster ($N = 332$) van die operateurs in Spoornet geneem is. Die meetinstrumente wat in hierdie studie gebruik is, is die "Maslach Burnout Inventory – General Survey (MBI-GS)" (Maslach se Uitbrandingsinventaris - Algemene Opname) en die "Utrecht Work Engagement Scale (UWES)" (Utrecht Werksbegeesteringskaal) en die "Cognitive Weariness Scale (CWS)" (Kognitiewe Vermoeidheidskaal). Voordat die hoofte oonttrek is, is die hoofkomponente oonttrek, ten einde die aantal faktore, die aanwesigheid van uitskieters en die faktoriseerbaarheid van korrelasiefaktore te skat. Strukturele vergelykings is gemodelleer om die verhouding tussen die konstrakte te toets.

Die resultate het aangedui dat ooreising uit vier faktore spruit, naamlik Uitputting, Kognitiewe Vermoeidheid en Professionele Doeltreffendheid (sinisme). Werksbegeestering het 'n een-faktor struktuur vertoon. Modellerings van strukturele vergelykings het aangetoon dat werkswelsyn uit twee faktore bestaan, naamlik energie (insluitend Uitputting, Kognitiewe

Vermoeidheid en Sinisme) en motivering (Werksbegeestering en Professionele Doeltreffendheid). Die faktorstruktuur van welstand het nie verskil tussen Afrikaanse en Afrika-taalgroepe nie.

Aanbevelings vir toekomstige navorsing is aan die hand gedoen.

CHAPTER 1

INTRODUCTION

This mini-dissertation is about the wellness of train drivers in a railway transportation industry.

In this chapter the problem statement, aims of the research, the research methods and the division of chapters are outlined.

1.1 PROBLEM STATEMENT

In order to prosper and to survive in a continuously changing environment, organisations need energetic and motivated employees (Weinberg & Cooper, 2007), i.e. employees who are well. The experiences of individuals at work, be they physical, emotional, or social in nature, affect them while they are in the workplace. In addition, these experiences spill over into non-work domains. It is necessary to study work wellness for two reasons. Firstly, the wellness of employees has an impact on the productivity, job satisfaction, commitment, and turnover intention of employees. Secondly, the wellness of employees has an impact on customer satisfaction, return on assets, profits, and shareholder value.

Work wellness consists of two states, namely distress and eustress (Nelson & Simmons, 2003). Distress is defined as a negative psychological response to a stressor, as indicated by the presence of negative psychological states (e.g. exhaustion and cynicism). Eustress is defined as a positive psychological response to a stressor, as indicated by the presence of positive psychological states (Rothmann & Cooper, 2008). When assessing eustress, the indicators thereof should be positive psychological states, such as attitudes or emotions (e.g. vigour and dedication). Stable dispositional variables are not acceptable indicators of distress and eustress, which must be subject to change according to cognitive appraisals of stressors (Nelson & Simmons, 2003). Exhaustion and cynicism are dimensions of burnout, while vigour and dedication are dimensions of work engagement.

Schaufeli and Bakker (2001) distinguish between two dimensions that could be used to classify four types of well-being at work. The horizontal axis represents the extent of pleasure

at work (i.e. pleasure versus unpleasurable). The vertical dimension relates to the mobilisation of energy. This taxonomy makes it possible to distinguish between work engagement and burnout, but also workaholics and a type of work experience called “nine-to-five”. Burnout is a metaphor that is commonly used to describe a state or process of mental exhaustion (Schaufeli & Enzmann, 1998). Engagement is defined as an energetic state in which the employee is dedicated to excellent performance at work and is confident of his or her effectiveness (Schutte, Toppinen, Kalimo, & Schaufeli, 2000).

In a research project in South Africa, occupational stress, burnout and engagement were studied in samples of nurses (Van der Colff & Rothmann, 2004), educators (Jackson & Rothmann, 2004), engineers (Malan & Rothmann, in press), staff members of higher education institutions (Barkhuizen, Rothmann, & Tytherleigh, 2004), pharmacists (Malan, Rothmann & Rothmann, in press), and police officers (Storm & Rothmann, 2003). With regard to the measurement of burnout, South African studies confirmed the factor structure of various forms of the Maslach Burnout Inventory (MBI) and the Utrecht Work Engagement Scale (UWES), as well as the internal consistency of the subscales (e.g. Rothmann & Jansen van Vuuren, 2002; Rothmann & Malan, 2003; Rothmann, Jackson, & Kruger, 2003; Storm & Rothmann, 2003b).

Despite the fact that, from a psychometrical point of view, the MBI is a good tool for assessing burnout, a basic problem remains. Because of the predominance of the MBI, the concept of burnout has gradually been equated with the way it is measured. Hence, the concept is limited to the three dimensions that are included in the MBI: exhaustion, cynicism (or depersonalisation), and reduced professional efficacy (or personal accomplishment). Although this common standard has the advantage that findings across studies can be compared straightforwardly, for instance by using meta-analyses, the narrow focus remains an issue. This is all the more serious since the MBI is neither grounded in firm clinical observation nor based on sound theorising (Schaufeli, 2003).

From a theoretical point of view one could argue that (emotional and cognitive) exhaustion and mental distancing (cynicism or depersonalisation) constitute the two key aspects of burnout. Exhaustion refers to the fact that the employee is incapable of performing because all energy has been drained, whereas mental distancing indicates that the employee is no longer willing to perform, because of an increased intolerance to any effort. Mental

distancing – or psychological withdrawal from the task – can be seen as an adaptive mechanism to cope with excessive job demands and the resulting feelings of exhaustion. However, when this coping strategy becomes a habitual pattern – as in cynicism or depersonalisation – it becomes dysfunctional because it disrupts adequate task performance. In its turn, job demands and exhaustion are further increased so that the vicious circle is closed. This view on burnout agrees with the way (occupational) fatigue is conceptualised, namely as the incapacity and unwillingness to maintain a particular performance level (Meijman & Schaufeli, 1996).

Essentially, incapacity and unwillingness to perform are considered as both sides of the same coin. Indeed, some empirical findings point to the central role of exhaustion and mental distancing as opposed to the third component, lack of professional efficacy. Firstly, relatively low correlations of professional efficacy are observed with exhaustion and cynicism, whereas these two burnout dimensions are correlated relatively strongly (Lee & Ashforth, 1996). In a similar vein, both ‘core of burnout’ factors sometimes collapse into one factor (Green et al., 1991). Perhaps, however, this might reflect an artefact, because if all originally positively phrased MBI-professional efficacy items are rephrased negatively, correlations with exhaustion and depersonalisation increase substantially (Bouman, Te Brake, & Hoogstraten, 2002). Secondly, it seems that burnout develops in response to exhaustion, whereas professional efficacy seems to develop independently and in parallel (Leiter, 1993). Thirdly, professional efficacy is the weakest burnout dimension in terms of significant relationships with other variables (Lee & Ashforth, 1996). Moreover, several scholars have argued that professional efficacy reflects a personality characteristic rather than a genuine burnout-component (Cordes & Dougherty, 1993; Shirom, 1989).

Recently, it has been proposed to study the ‘opposite’ of burnout in order to cover the entire continuum of work-related experiences, ranging from negative (burnout) to positive (job engagement) (see Maslach, Schaufeli, & Leiter, 2001). The positive antipode of burnout is characterised by vigour (high energy) and dedication (strong identification). In addition, a third element is distinguished – absorption – which most likely plays a less central role in the engagement concept. The first psychometric results with a measure that assesses these three characteristics of engagement – the Utrecht Work Engagement Scale – are encouraging (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002; Schaufeli, Martinez, Marques-Pinto, Salanova, & Bakker, 2002). Hence, instead of exclusively focusing on negative work-related

experiences, future research should also include positive work experiences in order to arrive at a more balanced picture of employee (un)well-being.

Regarding the measurement of engagement, Schaufeli et al. (2002) disagree with Maslach and Leiter (1997), who stated that engagement is adequately measured by the opposite profile of MBI scores. Schaufeli et al. (2002) argue that, by using the MBI for measuring engagement, it is impossible to study its relationship with burnout empirically, since both concepts are considered to be opposite poles on a continuum that is covered by one single instrument (the MBI). Although they agree that engagement is the positive antithesis of burnout, they acknowledge that the measurement and the structures of both concepts differ. Rothmann and Storm (2003) and Naude (2003) studied the internal consistency, factorial validity, structural equivalence and bias of the UWES in South Africa. Although structural equation modelling supported a three-factor model of work engagement in both studies, the correlations between the three dimensions (i.e. vigour, dedication and absorption) were high, suggesting the possibility that work engagement (as measured by the UWES) is a one-dimensional construct > 0.70 (Nunnally, & Bernstein, 1994). Based on these results it was recommended that the items of the UWES be simplified and that the UWES be translated to the languages that are used in South Africa. Furthermore, it is unclear whether absorption should really be included as a dimension of work engagement.

Exhaustion (low energy) and mental distancing (poor identification) are the hallmarks of burnout that are assessed by the MBI. Vigour (high energy) and dedication (strong identification) as measured by the UWES seem to be opposites of exhaustion and mental distancing (as measured by the MBI). Therefore, a research problem is that no information exists regarding the possible combination of exhaustion-vigour on the one hand and mental distance-dedication on the other hand, in one taxonomy of wellness. For instance, it is possible that a person high on exhaustion and mental distance is burned out, while a person high on vigour and dedication is engaged. However, an individual could also measure low on exhaustion, but high on mental distance, or high on exhaustion and low on mental distance.

The train driver's work has special features compared with other professional drivers. The subjective workload of train drivers is relatively high (Ingre et al., 2000). While attention and information-processing requirements are increasing in many train driving tasks as a result of new technology, the driver's work is often subject to occasional periods of monotony.

Driving is focused on controlling speed and acceleration (Branton 1979; Foret 1987) but the driver also has to concentrate on the control of different dynamic forces, upcoming terrain, traffic signs and communication. The work includes intense periods of information-encoding and problem-solving.

Specific factors escalating burnout amongst train drivers, are human factor errors relating to train traffic rules, inevitable dependency on teams roles, long shifts and anxiety due to workload. The conflict between the demands of the job and the lack of family/social life due to long shifts causes an inability in the train driver to cope with these challenges, aggravated by absenteeism as his/her health collapses, and fatigue and hopelessness all contribute to an unhealthy employee and inevitable poor work performance.

In August 2002, the National Department of Transport introduced the National Railway Safety Regulator Act (Act 16, 2002) for the establishment and functioning of a National Railway Safety Regulator to oversee railway safety in South Africa and this will be applicable to all railway operators as defined in said legislation. The **result** of this external institution placed greater emphasises on train drivers, since their work is regarded as a safety-critical work in a railway transportation industry.

The shift work of train drivers has been studied (e.g. Luna, 1997). The shift schedules in railway transportation are often irregular and include early morning shifts and relatively short time off between the shifts (Harma et al., 2002). We are not aware of earlier empirical research undertaken to systematically investigate burnout among train drivers and when industrial accidents, absenteeism, loss of productivity, and increased insurance costs are considered, it becomes clear that companies can no longer afford to turn their backs on the issue of employee burnout (Hunsaker, 1986).

Collisions between trains are generally regarded as the most serious train accidents. Causes of train-on-train collisions are issues such as human fallibility, namely: “Signal passed at danger without authority”, “unauthorised movement of a train”, “movement of train not under control” and speed. “Signal passed at danger without authority” (SPAD’s) increased by 17.98% in comparison with other years (Spoornet Annual Railway Safety Performance Report, 2002/03). Human fallibility incidents include train drivers who are not observant and

misunderstood authority . In a study that was done by Ingre it was reported that about one-fourth of Swedish train drivers reported chronic fatigue at least once a week.

No studies regarding the burnout and work engagement of train drivers in South Africa have been found. It is not only important to obtain valid and reliable measurements of burnout and work engagement in South Africa from an empirical point of view, but also to enable the individual measurement of work wellness of train drivers in a valid and reliable manner in South Africa. According to Van de Vijver and Leung (1997), measurement equivalence should be computed for measuring instruments in any multicultural setting where groups from different cultural groups are compared in terms of a specific construct.

The following research questions are formulated, based on the above discussion of the problem statement:

- How is burnout conceptualised in the literature?
- How is work engagement conceptualised in the literature?
- Is the MBI-GS a valid and reliable instrument to assess the burnout of train drivers?
- Is the Utrecht Work Engagement a valid and reliable instrument to assess the work engagement of train drivers?
- Is it possible to combine burnout and work engagement in a wellness model for train drivers?
- Is the structure of the wellness model invariant for African and White train drivers?

1.2 AIMS OF THE RESEARCH

The research objectives will consist of a general aim and specific objectives.

1.2.1 General aim

The general aim of this research is to test a model of work wellness for train drivers and to investigate the relationship between burnout and work engagement of train drivers in a railway transportation industry.

1.2.2 Specific objectives

The specific objectives of this study are as follows:

- To conceptualise burnout from the literature.
- To conceptualise work engagement from the literature.
- To investigate the relationship between burnout and work engagement from the literature.
- To investigate the construct validity and reliability of MBI-GS for train drivers.
- To investigate the construct validity and reliability of the Utrecht Work Engagement Scale for train drivers.
- To test a model of burnout and work engagement for train drivers and to determine whether the structure of the model is invariant for African and White train drivers.

1.3 RESEARCH METHOD

The research method will consist of a literature review and empirical study.

1.3.1 Literature review

The literature review will consist of prior research on burnout, cognitive weariness and work engagement, and the measurements of these constructs. The literature review provides the conceptualisation of these constructs as well as some findings in respect of the measuring of burnout, cognitive weariness and work engagement.

1.3.2 Empirical study

1.3.2.1 Research design

A survey design will be used to reach the research objectives. The specific design was a cross-sectional design, whereby a sample was drawn from a population at one time (Shaughnessy & Zechmeister, 1997).

1.3.2.2 Participants

A stratified, random sample ($N = 2720$) was taken from the train driver personnel in all provinces.

1.3.2.3 Measuring instruments

Three questionnaires will be utilised in this study, namely: The Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli, 1996), the Utrecht Work Engagement Scale (Schaufeli & Bakker, 2003), and the Cognitive Weariness Scale (CWS).

- The *Maslach Burnout Inventory – General Survey* (MBI-GS) (Schaufeli, et al.1996) will be used to measure burnout. The MBI-GS consists of 16 items and is scored on a 7-point frequency rating scale, varying from 0 (*never*) to 6 (*always*). The MBI-GS consists of three sub-scales, namely Exhaustion, Cynicism, and Professional Efficacy. Internal consistencies (Cronbach alpha coefficient) reported by Schaufeli (1996) varied from 0,87 to 0,89 for Exhaustion, 0,73 to 0,84 for Cynicism and 0,76 to 0,84 for Professional Efficacy. Test-retest reliability after one year was 0,65 (Exhaustion) 0,60 (Cynicism) and 0,67 (Professional Efficacy) (Schaufeli, 1996). The MBI-GS was consistently related to other constructs, as expected (Schaufeli, 1996).
- The *Utrecht Work-Engagement Scale* (UWES) (Schaufeli & Bakker, 2003) will be used to measure the levels of engagement amongst train drivers. Work engagement is a concept that includes three dimensions: Vigour, Dedication and Absorption. High levels of vigour and dedication characterise engaged workers, and they are immersed in their jobs. The UWES consists of 17 items and is scored on a 7-point frequency rating scale, varying from 0 (*never*) to 6 (*always*). The alpha coefficients for the three sub-scales varied between 0,68 and 0,91 for the three sub-scales. The alpha coefficient could be improved by eliminating a few items without decreasing the scale's internal consistency substantially.
- The *Cognitive Weariness Scale* (CWS) was developed by Van Horn et al, (in press) to measure cognitive well-being. Initially this scale consisted of seven items, but they

recommended that, due to the high internal consistency of item 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, for instance, “I have trouble concentrating”. It is scored on a frequency scale varying from 0 (*a few times a year*) to 6 (*every day*). Van Horn et al. (in press) reported a Cronbach alpha coefficient of 0,92.

1.3.2.4 Statistical analysis

The statistical analysis was carried out with the help of the SAS-programme (SAS Institute, 2000). Principal factors with extraction rotation will be conducted through the SAS factor on the items of the measuring instruments. Principal components extraction will be used prior to principal factor extraction to estimate the number of factors, presence of outliers and factorability of the correlation matrices.

Cronbach alpha coefficients was used to assess the internal consistency of the measuring instruments (Clark & Watson, 1995). Descriptive statistics (for example means, standard deviations, skewness and kurtosis) will be used to analyse the data.

In order to test the factorial invariance of the wellness model for different language groups, structural equation modelling (SEM) methods will be used with the maximum likelihood method of the AMOS programme (Arbuckle, 1999). Hypothesised relationships will be tested empirically for goodness-of-fit with the sample data. The χ^2 and several other goodness-of-fit indices summarise the degree of correspondence between the implied and observed covariance matrices. However, because the χ^2 statistic equals $(N - 1) F_{min}$, this value tends to be substantial when the model does not hold and the sample size is large (Byrne, 2001). The following goodness-of-fit-indices will be used as adjuncts to the χ^2 statistics: a) The Goodness of fit Index (GFI); b) The Adjusted Goodness of Fit Index (AGFI); c) The Normed Fit Index (NFI); d) The Comparative Fit Index (CFI); e) The Tucker-Lewis Index (TLI), and f) The Root Mean Square Error of Approximation (RMSEA).

1.4 DIVISION OF CHAPTERS

The chapters are reported as follows in this mini-dissertation:

Chapter 1: Introduction

Chapter 2: Research article

Chapter 3: Conclusion, limitations and recommendations.

1.5 CHAPTER SUMMARY

This chapter set out the problem statement, the aims of the research, the research method utilised and the chapter division.

Chapter 2 focuses on the research article.

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CHAPTER 2

RESEARCH ARTICLE

WELLNESS OF TRAIN DRIVERS IN A RAILWAY TRANSPORTATION INDUSTRY

ABSTRACT

The objective of this study was to test a model of work wellness of train drivers in a railway transportation industry. A stratified random sample was taken of train drivers in Spoornet ($N = 332$). The Maslach Burnout Inventory-General Survey and the Utrecht Work Engagement Scale were administered. Exploratory factor analyses were used to assess the structure of the measuring instruments. Structural equation modelling was used to assess the model of work wellness. The results showed that burnout consists of four factors, namely Exhaustion, Cognitive Weariness, Cynicism, and Professional Efficacy. Work Engagement showed a one-factor structure. Structural equation modelling showed that work wellness consists of two factors, namely Energy (including Exhaustion, Cognitive Weariness, and Cynicism), and Motivation (Work Engagement and Professional Efficacy). The structure of work wellness was invariant for African and White train drivers.

OPSOMMING

Die doelwit van hierdie studie was om 'n model van werkswelstand van treinoperateurs in 'n spoorwegvervoerbedryf te toets. 'n Gestratifiseerde ewekansige steekproef is op treinoperateurs in Spoornet uitgevoer ($N = 332$). Die "Maslach Burnout Inventory-General Survey" (Maslach se Uitbrandingsinventaris - Algemene Opname) en die "Utrecht Work Engagement Scale" (Utrecht Werksbegeesteringskaal) is toegepas. Verkennende faktorontleding is gebruik om die struktuur van die meetinstrumente te evalueer. Die modellering van strukturele vergelykings is gebruik om die model van werkswelstand te evalueer. Die resultate het aangedui dat ooreising uit vier faktore spruit, naamlik Uitputting, Kognitiewe Vermoeidheid en Sinisme en Professionele Doeltreffendheid. Werksbegeestering het 'n een-faktor struktuur vertoon. Strukturele vergelykingsmodelle het getoon dat werkswelstand uit twee faktore bestaan, naamlik Energie, (insluitend Uitputting, Kognitiewe Vermoeidheid en Sinisme) en Motivering (Werksverbintenis en Professionele Doeltreffendheid). Die struktuur van welstand het nie verskil tussen Swart en Wit treinoperateurs nie.

In order to prosper and to survive in a continuously changing environment, organisations need energetic and motivated employees (Weinberg & Cooper, 2007), i.e. employees who are psychologically well. Individuals' experiences at work, whether physical, emotional, or social in nature, affect them while they are in the workplace. In addition, these experiences spill over into non-work domains. It is necessary to study work wellness for two reasons. Firstly, the wellness of employees has an impact on the productivity, job satisfaction, commitment, and turnover intention of employees. Secondly, the wellness of employees impacts on customer satisfaction, returns on assets, profits, and shareholder value.

Work wellness consists of two states, namely distress and eustress (Nelson & Simmons, 2003). Distress is defined as a negative psychological response to a stressor, as indicated by the presence of negative psychological states (e.g. exhaustion and cynicism). Eustress is defined as a positive psychological response to a stressor, as indicated by the presence of positive psychological states (Rothmann & Cooper, 2008). When assessing eustress, the indicators thereof should be positive psychological states, such as attitudes or emotions (e.g. vigour and dedication). Stable dispositional variables are not acceptable indicators of distress and eustress, which must be subject to change according to cognitive appraisals of stressors (Nelson & Simmons, 2003). Exhaustion and cynicism are dimensions of burnout, while vigour and dedication are dimensions of work engagement.

In order to ensure work wellness (i.e. low burnout and high work engagement), it is necessary to assess the current level thereof. This assessment should be done on an individual level, and scores should also be aggregated to study patterns in specific occupations, sections, units, and organisations (Rothmann, 2008). However, before the levels of wellness can be assessed, valid and reliable measuring instruments are needed.

Clinical practice suggests that employees suffering from severe burnout are characterised by cognitive impairment, and report symptoms such as the inability to concentrate, forgetfulness and difficulties with solving complex tasks (Hoogduin, Schaap, Methorst, Peters Van Neyenhof & Van de Griendt, 2001). Such cognitive symptoms typically occur when one feels exhausted. Recently, Van Horn, Taris, Schaufeli and Schreurs (in press) developed an alternative exhaustion scale that was labelled 'The Cognitive Weariness Scale' which includes items such as "*I have trouble concentrating*" and "*I'm absent-minded*". Their study among

teachers showed that this scale was reliable and that it was substantively correlated with all MBI burnout scales, but particularly with emotional exhaustion. Hence, based on clinical experience, the MBI burnout concept should be supplemented by cognitive exhaustion or weariness (Schaufeli, 2003).

The train driver's work has special features compared with other professional drivers. The subjective workload of train drivers is relatively high (Ingre, Söderström, Kecklund, Akerstedt, & Kecklund, 2000). While attention and information-processing requirements are increasing in many train driving tasks as a result of new technology, the driver's work is often subject to occasional periods of monotony. Driving is focused on controlling speed and acceleration (Branton 1979; Foret 1987), but the driver also has to concentrate on the control of different dynamic forces, upcoming terrain, traffic signs and communication. The work includes intense periods of information encoding and problem-solving.

Specific factors escalating burnout amongst train drivers are human factor errors relating to train traffic rules, inevitable dependency on team roles, long shifts, and anxiety due to workload. The conflict between the demands of the job and the lack of family/social life due to long shifts has the result that the train driver is unable to cope with these challenges, aggravated by absenteeism as the train driver's health collapses and fatigue and despair set in. All these issues result in an unhealthy employee and subsequently in poor work performance.

In August 2002, the National Department of Transport introduced the National Railway Safety Regulator Act (Act 16, 2002) for the establishment and functioning of a National Railway Safety Regulator to oversee railway safety in South Africa, which will be applicable to all railway operators as defined in the said legislation. The advent of this external institution placed greater emphasis on Train Drivers, since their work is regarded as a risky aspect of a railway transportation industry.

The effects of shift work on train drivers have been studied (e.g. Luna 1997). The shift schedules in railway transportation are often irregular and include early morning shifts and relatively short time off between the shifts (Harma et al., 2002). However, we are not aware of earlier empirical studies undertaken to systematically investigate burnout amongst train drivers. When industrial accidents, absenteeism, loss of productivity, and increased insurance

costs are considered, it becomes clear that companies can no longer afford to turn their backs on the issue of burnout (Hunsaker, 1986).

Collisions between trains are generally regarded as the most serious accidents. Causes of train-on-train collisions come down to the matter of human fallibility, namely: “Signal passed at danger without authority”, “unauthorised movement of a train”, “movement of train not under control” and speed. “Signal passed at danger without authority” increased by 17,98% in comparison with other years (Spoornet Annual Railway Safety Performance Report, 2002/03). Incidents involving human fallibility include train drivers who are not observant and misunderstanding of authority. In a study that was undertaken by Ingre, it was reported that about one-fourth of Swedish train drivers reported chronic fatigue at least once a week.

No studies have been found regarding the burnout and work engagement of train drivers in South Africa. It is not only important to obtain valid and reliable measurements of burnout and work engagement in South Africa from an empirical point of view, but also to enable the individual measurement of work wellness of train drivers in a valid and reliable manner in South Africa. According to Van de Vijver and Leung (1997), measurement equivalence should be computed for measuring instruments in any multicultural setting where groups from different cultural groups are compared in terms of a specific construct.

The objectives of this study were to assess the construct validity and reliability of measures of burnout and work engagement for train drivers and to investigate whether burnout and work engagement can be combined into a model of work wellness which will be invariant for Africans and Whites.

Burnout and work engagement

Schaufeli and Bakker (2001) distinguish between two dimensions that could be used to classify wellness at work. The horizontal axis represents the extent of pleasure at work (i.e. pleasure versus unpleasurableness). The vertical dimension relates to the mobilisation of energy. This taxonomy makes it possible to distinguish between work engagement and burnout. Burnout is a metaphor that is commonly used to describe a state or process of mental exhaustion (Schaufeli & Enzmann, 1998). Engagement is defined as an energetic state in

which the employee is dedicated to excellent performance at work and is confident of his or her effectiveness (Schutte, Toppinen, Kalimo, & Schaufeli, 2000).

Burnout

According to Schaufeli (2003), burnout consists of three interrelated, but conceptually distinct characteristics, namely exhaustion, mental distance (cynicism and/or depersonalisation) and low professional efficacy. Exhaustion refers to a reduction in the emotional resources of an individual (e.g. feeling drained, used up and physically fatigued). Cynicism refers to a negative or detached response to various aspects of the job. Low professional efficacy refers to a feeling of being unable to meet clients' needs and to satisfy essential elements of job performance.

From a theoretical point of view, one could argue that exhaustion and cynicism constitute two key aspects of burnout. Exhaustion, on the one hand, relates to the employee's incapacity to perform, due to the fact that his/her energy has been depleted. Cynicism, on the other hand, is relative to the employee's unwillingness to perform as a result of a negative attitude to work. The latter can further be viewed as a mechanism to cope with excessive job demands and feelings related to exhaustion. However, when this coping strategy becomes a habitual pattern – as in cynicism – it becomes dysfunctional because it disrupts adequate job performance.

Essentially, incapacity and unwillingness to perform are considered as both sides of the same coin, indeed, some empirical findings point to the central role of exhaustion and mental distancing as opposed to the third component, lack of professional efficacy. Firstly, relatively low correlations of professional efficacy are observed in exhaustion and cynicism, while the correlations between these two burnout dimensions are correlated relatively strongly (Lee & Ashforth, 1996). In a similar vein, both 'core of burnout' factors sometimes collapse into one factor (Green et al., 1991). Secondly, it seems that it develops in response to exhaustion, whereas professional efficacy seems to develop independently and in parallel (Leiter, 1993). Thirdly, professional efficacy is the weakest burnout dimension in terms of significant relationships with other variables (Lee & Ashforth, 1996).

Various studies were carried out regarding the construct validity and reliability of the MBI-GS in South Africa. Storm and Rothmann (2003a) confirmed the three-factor structure of the

MBI-GS in a sample of police officers. Jackson and Rothmann (2005) confirmed the three-factor structure of the MBI-GS for educators, although one of the dimensions, namely Mental Distance, also included items referring to depersonalisation (which was not included for the purposes of this study, mainly because train drivers are not primarily working with people). Malan (2006) confirmed the three-factor structure of the MBI-GS in a sample on engineers. Barkhuizen and Rothmann (2008) also found evidence for the three-factor structure of the MBI-GS in a sample of academics in higher education institutions. The internal consistencies in all the abovementioned studies were acceptable ($\alpha > 0,70$).

Cognitive weariness refers to the lack of capacity to take up new information and loss of concentration at work. Cognitive weariness was devised as an analogue to Maslach's (1993) emotional exhaustion concept. Whereas the latter concept taps feelings of work-related fatigue (thus reflecting the tiredness-vigour dimension of affect), cognitive weariness specifically reflects employee's cognitive functioning, especially the degree to which workers are able to take up new information and are able to concentrate on their work (Van Horn et al., in press). Empirical research has shown that (affective) well-being on the one hand and indicators of cognitive functioning (e.g. "the number of minor everyday errors people make", Broadbent, Cooper, FitzGerald & Parkes, 1982) and self-reports about one's ability to concentrate and decision-making skills (e.g. Goldberg, 1972; Wissing & Van Eeden, 2002) on the other, are correlated. As cognitive functioning is relevant for many of today's jobs (e.g. 56% of the European workers report that they must solve complex tasks (Merllié & Paoli, 2001), it was decided that this dimension deserved an additional place in the model of burnout (Schaufeli, 2003).

Despite the fact that, from a psychometrical point of view, the MBI is a good tool for assessing burnout, a basic problem remains. Because of the predominance of the MBI, the concept of burnout has gradually been equated with the way it is measured. Hence, the concept is narrowed to the three dimensions that are included in the MBI: exhaustion, cynicism, and reduced professional efficacy. Although this common standard has the advantage that findings across studies can be compared decisively, for instance by using meta-analyses, the narrow focus remains an issue. This is all the more serious since the MBI is neither grounded in firm clinical observation nor based on sound theorisation (Schaufeli, 2003).

Work engagement

There are various conceptualisations of work engagement, namely the conceptualisation of Maslach and Leiter (1997), Kahn (1990), and Schaufeli, Salanova, González-Romá, and Bakker (2002).

Maslach and Leiter (1997, p. 23) define burnout as "an erosion of engagement with the job". Therefore, they regard engagement as the opposite of burnout. In the view of these authors, work engagement is characterised by energy, involvement and efficacy, which are considered to be the direct opposites of the three burnout dimensions, namely exhaustion, cynicism, and lack of professional efficacy respectively.

Kahn (1990) defines work engagement as follows: "The attachment of organisation members' selves to their work roles [by which they] employ and express themselves physically, cognitively and emotionally during role performances."

Schaufeli, Salanova, et al. (2002) consider job burnout and work engagement to be opposite concepts that should be measured independently with different instruments. Schaufeli and Bakker (2003) define work engagement as a positive, fulfilling, work-related state of mind that is characterised by vigour, dedication, and absorption. Rather than a momentary and specific state, engagement refers to a more persistent and pervasive affective-cognitive state that is not focused on any particular object, event, individual or behaviour. According to Schaufeli and Bakker (2003), work engagement consists of three dimensions, namely vigour, dedication, and absorption. Vigour is characterised by high levels of energy and mental resilience while working, the willingness to invest effort in one's work, not being easily fatigued, and persistence even in the face of difficulties. Dedication is characterised by deriving a sense of significance from one's work, by feeling enthusiastic and proud about one's job, and by feeling inspired and challenged by it. Absorption is characterised by being totally and happily immersed in one's work and having difficulties detaching oneself from it. Time passes quickly and one forgets everything else that is around.

From the abovementioned discussion it is clear that work engagement has three dimensions, namely a physical dimension (being vigorous and physically involved in a task), a cognitive

dimension (being alert at work and absorbed), and an emotional dimension (being dedicated and connected to the job and others while working).

Regarding the measurement of engagement, Schaufeli, Salanova, et al. (2002) disagree with Maslach and Leiter (1997), who stated that engagement is adequately measured by the opposite profile of MBI scores. They argue that, by using the MBI for measuring engagement, it is impossible to study its relationship with burnout empirically, since both concepts are considered to be opposite poles on a continuum that is covered by one single instrument (the MBI). Although they agree that engagement is the positive antithesis of burnout, they concede that the measurement and the structures of both concepts differ.

The results of studies regarding the psychometric properties of the Utrecht Work Engagement Scale (UWES) are encouraging both internationally (Schaufeli, Salanova, et al., 2002; Schaufeli, Martinez, Marques-Pinto, Salanova, & Bakker, 2002) as well as in South Africa. Rothmann and Storm (2003) and Naudé and Rothmann (2004) studied the internal consistency, factorial validity, structural equivalence and bias of the UWES in South Africa. Although structural equation modelling supported a three-factor model of work engagement in both studies, the correlations between the three dimensions (i.e., vigour, dedication and absorption) were high, suggestive of the possibility that work engagement (as measured by the UWES) is a one-dimensional construct. Furthermore, it is unclear whether absorption should really be included as a dimension of work engagement.

The relationship between burnout and work engagement

Exhaustion (low energy) and mental distancing (poor identification) are the hallmarks of burnout that are assessed by the MBI. Vigour (high energy) and dedication (strong identification) as measured by the UWES seem to be opposites of exhaustion and mental distancing (as measured by the MBI).

Schaufeli, Salanova et al. (2002) showed that although burnout is related to work engagement, the latter is not the direct opposite of burnout. The results of a study by Schaufeli and Bakker (2004) showed that the engagement and burnout scales were moderately negatively correlated. Schaufeli and Bakker (2004) found that a core burnout

factor – consisting of exhaustion and cynicism and an extended engagement factor (including professional efficacy) in addition to the three engagement scales – fitted the data best.

Work wellness, race and age

Coetzee and Rothmann (2004) found that White employees (compared to Blacks) showed higher levels of exhaustion. This difference was explained in terms of demands faced by White employees because of organisational transformation. Campbell and Rothmann (2005) found no statistically significant differences between the burnout levels of different groups in a customer service environment.

Burnout seems to occur most frequently – at least in the USA – among young employees aged under 30 or 40, who have relatively little work experience (Maslach, Schaufeli, & Leiter, 2001). However, this finding must be interpreted with some caution because of selective dropout. It is quite likely that employees who are "burned out" have left their jobs and that the survivors, who consist of the older employees and the experienced, are relatively healthy – the so-called "healthy worker effect" (Karasek & Theorell, 1990). However, especially in European countries, like the Netherlands, burnout is more prevalent in older age groups (Schaufeli & Van Dierendonck, 2000).

STUDY AIM

The general aim of this research is to test a model of work wellness for train drivers and to investigate the relationship between burnout and work engagement as it pertains to train drivers in a railway transportation industry.

METHOD

Research design

A survey design was used to reach the research objectives. The specific design will be a cross-sectional design, whereby a sample will be drawn from a population at one time (Shaughnessy & Zechmeister, 1997).

Participants

A stratified, random sample ($N = 332$) was taken from the train driver personnel in all provinces. Descriptive information of the sample is given in Table 1.

Table 1

Characteristics of the Participants

Item	Category	Frequency	Percentage
Gender	Male	309	93,1
	Female	20	6,0
Age	23 - 29 years	47	14,1
	30,01 – 39 years	110	36,3
	40 - 49 years	109	32,7
	50 – 57 years	47	14,2
Race	Black	115	34,6
	White	177	53,3
	Coloured	22	6,6
	Indian	13	3,9
Language	Afrikaans	39	11,7
	English	206	62,0
	Other	79	23,9
Marital Status	Single	68	20,5
	Married	235	70,8
	Divorced	3	0,9
	Separated	16	4,8
	Remarried	2	0,6
	Widowed	4	1,2
Education	Grade 10 (Standard 8 to 9)	171	51,5
	Grade 12 (Matric)	21	6,3
	Matric + Diploma	111	33,4
	Matric + Higher Diploma or Degree	19	5,7
Years employed as Train Driver	0 – 10 years	170	51
	10,01 – 15 years	36	10,8
	15,01 – 20 years	48	14,4
	20,01 – 25 years	30	12,6
	25,01 – 30 years	23	6,9
	30,01 and longer	2	0,6

In summary, the train drivers can be described as follows: The mean age of the respondents was 39,66 ($SD = 8,41$) with 14,1% falling within the 23 to 29 age group, 36,3% falling within the 30 to 39 age group, 32,7% falling within the 40 to 49 age group and 14,7% falling within the 50 to 57 age group. The majority of this group consisted of males (93,1%), married and had a secondary school education, while the mean length of years employed as train drivers was 11,33 years ($SD = 9,31$).

Measuring instruments

Three questionnaires were utilised in this study, namely: The Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli, 1996), the Utrecht Work Engagement Scale (UWES) (Schaufeli & Bakker, 2003) and the Cognitive Weariness Scale (CWS) (Van Horn, Taris, Schaufeli, and Schreurs, 2004).

The Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli, et al. 1996) was used to measure burnout. The MBI-GS has three sub-scales: Exhaustion, Cynicism, and Professional Efficacy. Together the sub-scales of the MBI-GS provide a three-dimensional perspective on burnout. Internal consistencies (Cronbach alpha coefficients) reported by Schaufeli et al. (1996) varied from 0,87 to 0,89 for Exhaustion, 0,73 to 0,84 for Cynicism and 0,76 to 0,84 for Professional Efficacy. Test-Retest reliability after one year was 0,65 (Exhaustion) 0,60 (Cynicism) and 0,67 (Professional Efficacy) (Schaufeli, 1996). The MBI-GS was consistently related to other constructs, as expected (Schaufeli, 1996). High scores on Exhaustion and Cynicism and a low score on Professional Efficacy are indicative of burnout.

The *Utrecht Work-Engagement Scale* (Schaufeli & Bakker, 2003) was used to measure the levels of engagement amongst train drivers. Work engagement is a concept that includes three dimensions: Vigour, Dedication and Absorption. High levels of vigour and dedication characterise engaged workers, and they are immersed in their jobs, The UWES consists of seventeen items and is scored on a 7-point frequency rating scale, varying from 0 (*never*) to 6 (*always*). The alpha coefficients for the three sub-scales varied between 0,68 and 0,91 for the three sub-scales. The alpha coefficient could be improved by eliminating a few items without decreasing the scale's internal consistency substantially.

The *Cognitive Weariness Scale* (CWS) was developed by Van Horn et al. (2004) to measure cognitive well-being. Initially this scale consisted of seven items, but they recommended that, due to the high internal consistency of item 3 and 7, item 7 be dropped in the general six-item version. The scale refers to the capacity to absorb new information and loss of concentration at work, for instance, "I have trouble concentrating". It is scored on a frequency scale varying from 0 (*a few times a year*) to 6 (*every day*). Van Horn et al. (2004) reported a Cronbach alpha coefficient of 0,92.

Statistical analysis

The statistical analysis was carried out with the help of the SPSS-programme (SPSS Inc, 2003). Exploratory factor analyses were used to explore the factor structures of the MBI-GS, CWS and UWES. Firstly, a simple principal components analysis was conducted on the items of the PSI. The eigenvalues and scree plot were studied to determine the number of factors. Secondly, principal axis factoring with a direct oblimin rotation was conducted if factors were related ($r > 0,30$). Thirdly, a principal factor analysis with a varimax rotation was used if the obtained factors were not related.

Cronbach alpha coefficients were used to assess the internal consistency of the measuring instruments (Clark & Watson, 1995). Descriptive statistics (e.g. means, standard deviations, range, skewness and kurtosis) and inferential statistics were used to analyse the data. Pearson correlation coefficients were computed to determine the relationships between variables. A cut-off point of $p = 0,05$ was set for the statistical significance of the results. Effect sizes (Cohen, 1988) were used to decide on the practical significance of the findings. A cut-off of 0,30 (medium effect, Cohen, 1988) was set for the practical significance of correlation coefficients.

Structural equation modelling (SEM) methods as implemented by AMOS (Arbuckle, 1997) were used to test the factorial model for the MBI-GS and UWES, using the maximum likelihood method. SEM is a statistical methodology that takes a confirmatory (i.e. hypothesis) testing. Hypothesised relationships are tested empirically for goodness-of-fit with the sample data. The χ^2 and several other goodness-of-fit indices summarise the degree of correspondence between the implied and observed covariance matrices. However, because the χ^2 statistic equals $(N - 1) F_{min}$, this value tends to be substantial when the model does not hold and the sample size is large (Byrne, 2001). The following goodness-of-fit-indices were used as adjuncts to the χ^2 statistics: a) The Goodness of fit Index (GFI); b) The Adjusted Goodness of Fit Index (AGFI); c) The Normed Fit Index (NFI); d) The Comparative Fit Index (CFI); e) The Tucker-Lewis Index (TLI), and f) The Root Mean Square Error of Approximation (RMSEA).

In order to test the factorial invariance of the wellness model for different language groups, structural equation modelling (SEM) methods were used with the maximum likelihood method of the AMOS programme (Arbuckle, 1999). According to Jöreskog (1971), all tests of invariance across groups should begin with a global test of the equality of their covariance structures. In testing for these equivalencies, sets of parameters are tested in a logical order and by increasing restrictions in every step. The sets of parameters that are of most interest regarding group variances are: (a) factor loading paths, (b) factor variances/covariances, and (c) structural regression paths, while, according to Bentler (1995) – contradicting the view of Jöreskog – equality of error variances and covariances is generally the least important hypothesis to test, due to the restrictive nature of these tests.

The general procedure for the testing of hypotheses related to group invariance starts with scrutiny of the measurement model. The pattern of factor loadings for each observed measure should be tested first for its equivalence across the groups. Once the group invariances have been identified, these parameters are equally constrained, while subsequent tests of the structural parameters are conducted. While testing each new set of parameters, those known to be group-invariant are equally constrained, thus testing a series of increasingly restrictive hypotheses in an orderly sequence of analytical steps (Byrne, 2001).

Before the factorial invariance can be tested as described above, it is important to consider a baseline model for each group separately, which best fits the data from the perspectives of both parsimony and substantive meaningfulness. Baseline models need not be completely identical across groups. The number of factors also need not be equivalent across groups (Byrne, 2001). In testing for invariance, however, equality constraints are imposed on particular parameters. Therefore, the data for all groups must be analysed simultaneously to obtain efficient estimates (Bentler, 1995; Jöreskog & Sörbom, 1996).

RESULTS

Factor analyses

A principal component analysis was conducted on the 16 items of the MBI-GS and the six items of the CWS. The results showed that five components had eigenvalues larger than one, but an analysis of the scree plot showed that between two and four factors could be extracted. The five components explained 53,98% of the total variance.

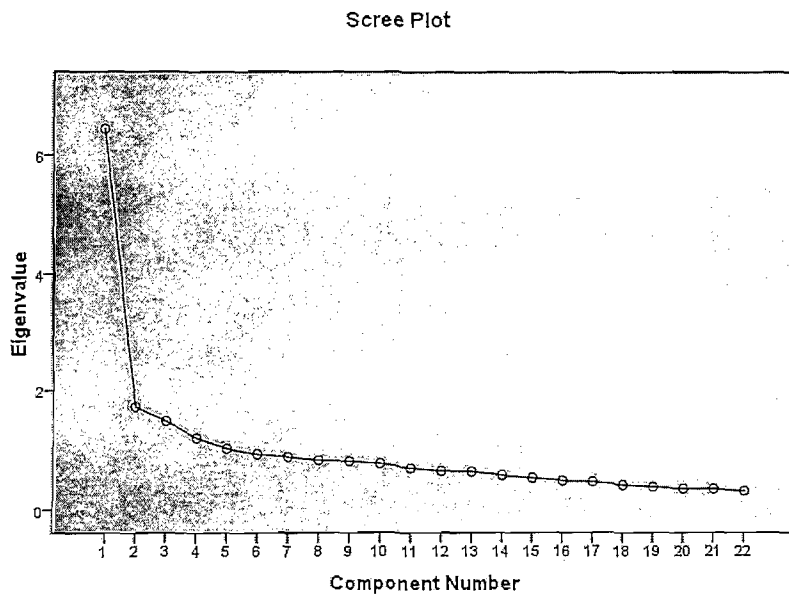


Figure 1. Scree plot for the items of the MBI-GS and the CWS

Subsequently, a principal axis factor analysis with a direct oblimin rotation was carried out on the items of the MBI-GS and the CWS. Table 2 shows the results of the principal axis factor analysis.

Table 2

Pattern Matrix of the MBI-GS and CWS for Train Drivers

Item	F1	F2	F3	F4	h^2	Anti-Image r
MBI3	0,78	0,00	0,00	0,00	0,67	0,94
MBI4	0,77	0,00	0,00	0,00	0,62	0,93
MBI1	0,75	0,00	0,00	0,00	0,61	0,90
MBI2	0,73	0,00	0,00	0,00	0,57	0,94
MBI6	0,63	0,00	0,00	0,00	0,62	0,94
CW4	0,00	0,69	0,00	0,00	0,58	0,85
CW5	0,00	0,68	0,00	0,00	0,58	0,87
CW2	0,00	0,64	0,00	0,00	0,44	0,84
CW6	0,00	0,55	0,00	0,00	0,57	0,91
CW3	0,00	0,47	0,00	0,00	0,50	0,93
MBI10	0,00	0,00	0,44	0,00	0,43	0,88
MBI16	0,00	0,00	0,70	0,00	0,62	0,86
MBI7	0,00	0,00	0,67	0,00	0,48	0,80
MBI11	0,00	0,00	0,57	0,00	0,42	0,87
MBI12	0,00	0,00	0,57	0,00	0,41	0,91
MBI8	0,00	0,00	0,00	0,80	0,62	0,87
MBI15	0,00	0,00	0,00	0,77	0,24	0,90
MBI9	0,00	0,00	0,00	0,56	0,56	0,90
Eigenvalue			6,43	1,73	1,49	1,20
Percentage of variance			29,25	7,85	6,75	5,47

Table 2 shows that the anti-image correlations were all higher than the cut-off value of 0,50. Furthermore, the communalities were acceptable. Four factors were extracted, using principal component analysis with a direct oblimin rotation. The first factor was labelled *Exhaustion*. This factor refers to the fact that the employee is incapable of performing because all energy has been drained. Items loading on this factor relate to tiredness in the morning, working all day is a strain, emotional drainage, feeling used up, and feeling burned out from work. The second factor was labelled *Cognitive Weariness*. Items loading on this factor relate to thoughts of being distracted, forgetful and absent-minded, making errors at work, problems with processing new information, and trouble in concentrating. The third factor was labelled *Professional Efficacy*. Items loading on this factor relate to feeling good at work, feeling confidence in getting things done, making an effective contribution, accomplishing

something at work and accomplishing worthwhile things. The fourth factor was labelled *Cynicism*. This factor refers to mental distance and indicates that the employee is no longer willing to perform, because of an increased intolerance to any effort.

Table 3

Component Matrix of the UWES for Train Drivers

No	Item	F1	h^2	Anti-image r
UWES1	I am bursting with energy in my work	0,66	0,41	0,94
UWES2	I find my work full of meaning and purpose	0,70	0,57	0,91
UWES3	Time flies when I'm working	0,45	0,15	0,86
UWES4	I feel strong and vigorous in my job	0,73	0,62	0,89
UWES5	I am enthusiastic about my job	0,67	0,48	0,92
UWES6	When I'm working I forget anything else around me	0,10	0,80	0,45
UWES7	My job inspires me	0,80	0,66	0,95
UWES8	When I get up in the morning, I feel like going to work	0,59	0,37	0,95
UWES9	I feel happy when I am engrossed in my work	0,72	0,52	0,94
UWES10	I am proud of the work that I do	0,72	0,55	0,92
UWES11	I am immersed in my work	0,59	0,54	0,91
UWES12	In my job, I can continue working for very long periods at a time	0,57	0,31	0,93
UWES13	To me, my work is challenging	0,64	0,40	0,90
UWES14	I get carried away by my work	0,36	0,55	0,85
UWES15	I am very resilient, mentally, in my job	0,47	0,49	0,90

Table 3 shows that the anti-image correlations were all higher than the cut-off value of 0,50. Furthermore, the communalities were acceptable, except for Item 3 of the UWES (“Time flies when I am working”). This indicates that the item might be problematic. Table 3 shows that Work Engagement consisted of one factor.

Structural equation modelling was used to assess the relationship between burnout and work engagement. Two competing models which depicted the relationship between burnout and work engagement were tested. In model 1, Exhaustion, Cynicism, Cognitive Weariness,

Professional Efficacy and Work Engagement were all modelled to be part of one overall construct, namely Work Wellness. In model 2, Exhaustion, Cynicism, and Cognitive Weariness were modelled to form part of one construct, namely Burnout, while Work Engagement and Professional Efficacy were modelled to form part of a second construct, namely Extended Work Engagement. A correlation was also modelled between Burnout and Extended Work Engagement to indicate that these constructs form part of a higher order construct, namely Work Wellness. The fit statistics for the two models are reported in Table 4.

Table 4

Goodness-of-Fit Statistics for the Hypothesised Wellness Models

Model	χ^2	χ^2/df	GFI	AGFI	NFI	TLI	CFI	RMSEA
Model 1	60,22	12,04	0,92	0,76	0,90	0,813	0,91	0,18
Model 2	7,93	1,93	0,99	0,97	0,99	0,98	0,99	0,05

The statistical significant χ^2 value of 60,22 ($df = 12,04$; $p = 0,00$) revealed a relatively poor overall fit of the originally hypothesised model. The hypothesised model (Model 1) was not that good from a practical perspective. The fact that the NFI, TLI, and CFI values are lower than 0,95 and that the RMSEA value is higher than 0,05 are indicative of failure to confirm the hypothesis model. It is therefore apparent that some modification in specification is needed, in order to determine a model that better represents the sample data.

The fit statistics for Model 2 indicate a good fit for the specified model. The fact that the NFI, TLI, and CFI values are higher than 0,95 and that the RMSEA value equals to 0,05 are indicative of good fit and therefore no further modifications of the model were deemed necessary. Model 2 depicts the relationships between burnout, cognitive weariness, and work engagement.

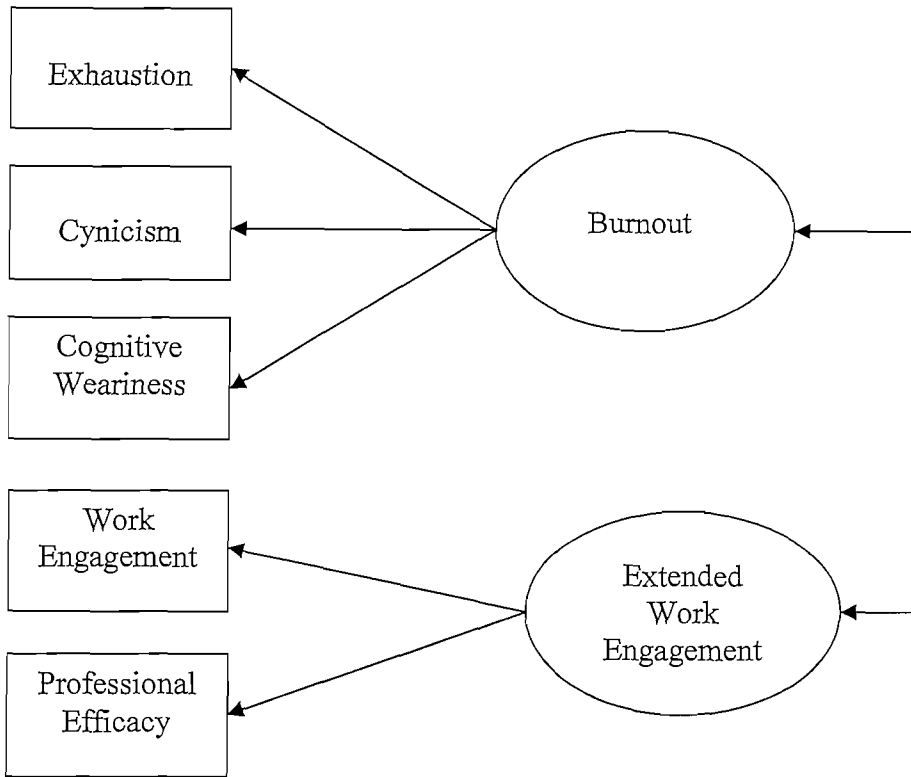


Figure 2. The relationship between the constructs

Descriptive statistics, alpha coefficients and correlations

The descriptive statistics, alpha coefficients of the factors of the MBI-GS, CWS, and UWES, as well as the Pearson correlations between the scales are reported in Table 5.

Table 5

Descriptive Statistics, Alpha Coefficients and Pearson Correlations of the Scales

Item	Mean	SD	Skewness	Kurtosis	α	1	2	3	4
1. Exhaustion	8,34	7,23	0,70	-0,428	0,85	-	-	-	-
2. Cynicism	3,03	4,29	1,49	1,44	0,70	0,51***	-	-	-
3. Cognitive Weariness	4,70	5,90	1,71	3,19	0,76	0,48**	0,47**	-	-
4. Professional Efficacy	27,45	3,94	-2,15	5,55	0,62	-0,45**	-0,39**	-0,29*	-
5. Work Engagement	69,46	13,79	-1,75	3,86	0,86	-0,57***	-0,51***	-0,39**	0,69**

* $p < 0,05$ – statistically significant

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

++ $r > 0,50$ – practically significant (large effect)

Table 5 indicates that the scores on the three factors of the MBI-GS are normally distributed. With regard to the internal consistency of the scales, Exhaustion, Cynicism, Cognitive Weariness and Work Engagement demonstrate acceptable coefficient alphas above the 0,70 guideline, provided by Nunnally and Bernstein (1994). Professional Efficacy showed an alpha coefficient which is lower than the recommended guideline. The scores of Work Engagement and Professional Efficacy are somewhat negatively skewed.

The Pearson correlations in Table 5 show that Exhaustion is practically significantly and positively related to Cynicism (large effect) and Cognitive Weariness (medium effect). Exhaustion is also practically significantly and negatively related to Work Engagement (large effect) and Professional Efficacy (medium effect). Cynicism is practically significantly and positively related to Cognitive Weariness (medium effect) and negatively related to Work Engagement (large effect) and Professional Efficacy (medium effect). Work Engagement is practically significantly and positively related to Professional Efficacy (large effect).

The sten scores of the train drivers were low average on Exhaustion (4,02) and on Cynicism (4,38). The sten scores were above average on Vigour (7,48) and on Dedication (7,96). About 52,1% of Train Drivers reported low on Exhaustion and 42,5% reported low on Cynicism. As far as Vigour and Dedication are concerned, 57% showed high scores on Vigour and 63,9% showed high scores on Dedication (Rothmann, 2005).

Invariance of the scales

Next, the invariance of the second-order factor structure was tested between Africans and Whites.

Table 6

Standardised Regression Coefficients of the Scales for Whites and Africans

Scale	β (Whites)	β (Africans)
Exhaustion	0,75	0,79
Cynicism	0,62	0,78
Cognitive Weariness	0,67	0,54
Professional Efficacy	0,78	0,63
Work Engagement	0,94	0,98

The correlations between the second-order factors (i.e. Burnout and Extended Work Engagement) were 0,74 and 0,70 for the White and African groups respectively.

The regression weights and correlations between the second-order factors were constrained equally. The model in which these parameters were constrained, was then compared with the unconstrained model using AMOS. Table 7 shows the χ^2 values and degrees of freedom for the two models.

Table 7

Standardised Regression Coefficients of the Scales for Whites and Africans

Model	χ^2	df
Parameters Unconstrained	19,72	8
Parameters Constrained	25,86	12
Change	6,14	4

The results in Table 7 show that the change in χ^2 (6,14) was not statistically significant compared to the change in the degrees of freedom ($\Delta df = 4$). Therefore, it can be concluded that the factor loadings and the correlations between the constructs for Africans and Whites were invariant.

Differences between groups

Next, Manova was carried out to determine whether there were statistically significant differences between the work wellness of different race and age groups (see Table 8).

Table 8

Multivariate Tests

Variable	Value	<i>F</i>	<i>df</i>	Error <i>df</i>	<i>p</i>	η^2
Race	0,94	1,35	15	881	0,16	-
Age	0,92	1,68	15	872	0,05	0,03

Table 8 shows that there was a significant effect of age on the combined dependent variable wellness (consisting of burnout and work engagement): ($F_{(15, 872)} = 1,68$, $p < 0,01$; Wilk's Lambda = 0,90; $\eta^2 = 0,03$). However, this effect was small (3% of the variance explained). Lastly, Table 6 shows that there was no significant effect of race on the combined dependent variable.

Next, the descriptive statistics of age groups are shown in Table 9.

Table 9

Descriptive Statistics of Age Groups

Item	Age Group	Mean	SD	N
Exhaustion	23 - 29 years	8,34	6,71	47
	30,01 – 39 years	8,52	6,86	121
	40 - 49 years	8,44	7,61	109
	50 – 57 years	7,52	7,17	47
Cynicism	23 - 29 years	1,76	3,16	47
	30,01 – 39 years	2,55	3,70	121
	40 - 49 years	3,49	4,62	109
	50 – 57 years	4,13	4,91	47
Engagement	23 - 29 years	68,96	12,67	47
	30,01 – 39 years	69,66	12,81	121
	40 - 49 years	69,16	15,22	109
	50 – 57 years	69,85	14,30	47
Cognitive Weariness	23 - 29 years	4,77	5,25	47
	30,01 – 39 years	4,83	4,65	121
	40 - 49 years	4,65	5,71	109
	50 – 57 years	3,62	4,44	47
Professional Efficacy	23 - 29 years	27,43	4,16	47
	30,01 – 39 years	27,66	3,56	121
	40 - 49 years	27,16	4,16	109
	50 – 57 years	27,51	4,34	47

The older group that is between 50 and 57 years of age, tends to be more cynical towards their work. The reason is related to employment equity promotional aspects, since the younger generation tends to be promoted quicker than their age group. However, they are engaged in their work, which is positive.

DISCUSSION

The objectives of this study were to assess the construct validity and reliability of measures of burnout and work engagement for train drivers and to investigate whether burnout and work engagement can be combined into a model work wellness. The other objective was to determine whether the structure of the model is invariant for African and White train drivers.

The results revealed that burnout consists of four factors, namely Exhaustion, Cognitive Weariness, Cynicism, and Professional Efficacy. Work Engagement showed a one-factor structure. This means that the *UWES* is a one-dimensional construct and not a two-factor or three-factor dimensional construct. The results of the study indicate that work engagement as measured by the *UWES* is indeed a one-dimensional construct. Structural equation modelling showed that work wellness consists of two factors, namely Energy (including Exhaustion, Cognitive Weariness, and Cynicism), and Motivation (Work Engagement and Professional Efficacy). A principal component analysis conducted on the 16 items of the MBI-GS and the six items of the CWS, showed that five components had eigenvalues larger than one, but an analysis of the scree plot showed that between two and four factors could be extracted. The five components explained 53,98% of the total variance.

The results obtained using principal component analysis, confirm the previous studies (Coetzer & Rothmann, 2006; Leiter & Schaufeli, 1996; Maslach, 1982; Maslach & Jackson, 1981; Maslach & Leiter, 1997; Schaufeli et al., 2002; Storm & Rothmann, 2003) that have been done across different samples, occupational groups and countries, and state that the MBI-GS is a four-dimensional construct. The constructs are Exhaustion, Cognitive Weariness, Cynicism and Professional Efficacy.

The validity analysis revealed that all the alpha score were acceptable. It can therefore be concluded that the MBI-GS and UWES, as developed in this research, are reliable and valid measuring instruments for train drivers.

The second objective of the study was to investigate whether burnout and work engagement can be combined into a model of work wellness. The results showed that Exhaustion was positively related to Cynicism. The train drivers who show low on exhaustion are therefore likely not to show a cynical attitude towards their job or fellow train drivers. Train drivers that show low on exhaustion are less likely to feel overloaded with work. Exhaustion showed a negative related to Work Engagement.

The relationship between Burnout, Cognitive Weariness and Work Engagement was also highlighted in this study. Large effects were found between Exhaustion and Cynicism, Exhaustion and Work Engagement, Cynicism and Work Engagement, and Work Engagement and Professional Efficacy. Thus the professional efficacy subscale of burnout was found to

be a constituting element of work engagement, which is in line with reports in literature (Maslash & Leiter, 1997).

The stens of the train drivers were low average on Exhaustion (4,02) and on Cynicism (4,38). The sten scores were above average on Vigour (7,48) and on Dedication (7,96). About 52,1% of Train Drivers reported low on Exhaustion and 42,5% reported low on Cynicism. As far as vigour and dedication is concerned 57% showed high on vigour and 63,9% of Train Drivers showed high on dedication, (Rothmann, 2005). Item 14 of the MBI-GS was not included as it loaded very low.

These results confirmed the empirical studies that have revealed that some individuals, regardless of high job demands and long working hours, do not develop burnout in comparison to others, but seem to find pleasure in hard work and dealing with job demands (Schaufeli & Bekker, 2001). Also, on the other hand, the results confirm that work engagement is identified as a positive, fulfilling, work-related state of mind that is characterised by vigour , dedication and absorption (Schaufeli, Salanoval et al. 2002).

Train drivers are responsible for driving passenger and goods trains safely, punctually and economically. Psychometric testing is utilised before a prospective candidate is employed. This is followed by three months of training in a classroom situation. After successful completion of the course, the candidate is employed as an assistant train driver for a period of 24 months before becoming eligible for promotion, which will be followed by a knowledge testing before finally being employed as a train driver.

Most qualified train drivers are positive in their work due to the fact that they drive goods trains that are worth more than a million rand, and especially those that are driving 200 wagon trains. This positive is as a result of the recruitment process that seeks to identify those individuals who have the qualities of becoming train drivers, as the training thereof would take up to twenty-four months.

RECOMMENDATIONS

According to the results obtained in this study, the use of the MBI-GS is recommended to determine wellness and the UWES to determine engagement to train drivers in a railway transportation industry. In the MBI-GS item 14 should be omitted from the questionnaire.

Wellness of train drivers should be promoted. Interventions to promote wellness can take place on tertiary, secondary or primary levels. Regarding tertiary interventions, the focus should be on counselling of disengaged train drivers. On secondary level, workshops could be used to reduce burnout and promote work engagement. On primary level interventions, job redesign, and improved human resource management practices might be considered.

This study showed that the burnout levels of train drivers are lower than the norm, while engagement levels were higher than the norm. Future studies should focus on the reasons for this finding. Lower burnout and higher work engagement could result from good person-environment fit (which might be caused by good recruitment and selection practices), or by the experience of low job demands and high job resources. Longitudinal research is necessary to study the role of these factors.

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CHAPTER 3

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

In this chapter conclusions are drawn regarding the specific objectives of this study. The limitations of the research are pointed out, followed by recommendations for future research.

3.1 CONCLUSIONS

The first research objective was to develop a theoretical model of work wellness which integrates burnout and work engagement. The second objective was to test a model of work wellness for train drivers in a railway industry and to determine whether the structure of the model is invariant for African and White train drivers.

The results of the factor analysis of the MBI-GS confirmed a four-factor by using principal component analysis with a direct oblimin rotation. The first factor labelled Exhaustion, included feeling tired, experiencing strain at work, being emotionally drained and feeling used up. The second factor labelled Cognitive Weariness, included burnout, distraction during work, forgetfulness and absent-mindedness, making errors, and problems with processing new information and trouble concentrating. The third factor, Professional Efficacy, included being good at work, feeling confident and feeling good when accomplishing a task. The fourth factor labelled Cynicism, included becoming less interested at work, doubting the significance of work, and becoming less enthusiastic about work.

The results obtained using principal component analysis confirm the previous studies (Coetzer & Rothmann, 2006; Leiter & Schaufeli, 1996; Maslach, 1982; Maslach & Jackson, 1981; Maslach & Leiter, 1997; Schaufeli et al., 2002; Storm & Rothmann, 2003) that have been done across different samples, occupational groups and countries, and state that the MBI-GS is a four-dimensional construct. The constructs are exhaustion, cognitive weariness, cynicism and professional efficacy.

The results of the factor analysis of the UWES showed a one-factor. The alpha coefficient of the MBI-GS factors was acceptable, indicating that the extracted factors were internally consistent. The scale of Work Engagement is somewhat negatively skewed, with regard to the internal consistency.

Structural equation modelling showed that work wellness consists of two factors, namely Energy (including Exhaustion, Cognitive Weariness, and Cynicism), and Motivation (Work Engagement and Professional Efficacy). The structure of work wellness was invariant for African and White train drivers.

3.2 LIMITATIONS

The following limitations have been identified regarding this research:

The response rate of the questionnaire was a concern. This could be attributed to some influence from the shop stewards who had a perception that the study results would be used by management against the employees, since at the time management had a great concern about the high accident rate of “speed past at danger”.

The questionnaire was in English, and this could have led to some train drivers not understanding the items. Language could have been a barrier.

Most of the train drivers had to complete the questionnaire before or after their shift, which means that time constraints could have contributed immensely towards the results on their part.

3.3 RECOMMENDATIONS

Recommendations are made in this section in respect of train drivers under study, as well as recommendations for future research.

From the results of this study, it is recommended that the subscales of the MBI-GS, as used in the four-factor model and the Work Wellness, be used to test the burnout and work engagement of train drivers and other occupational groups. Future studies should therefore consider using the four-factor model, namely Exhaustion, Cynicism, Professional Efficacy and Cognitive Weariness and the Work Wellness model.

The relationship between the MBI-GS, UWES and CW subscales and the various

demographics variables using larger samples should be considered in future studies, since some of the respondents experienced difficulties in understanding some of the items. It is suggested that future studies consider translating the measuring instrument into other languages of choice, and substituting the confusing items with more familiar ones.

The information reported from this study can be compared with information from other occupational groups in South Africa, to learn more as to why these train drivers are more engaged as compared to other occupational groups.

It is therefore recommended that the number of items be reduced to a more manageable number. Principal component analysis was used in this study and a strong correlation was found between burnout and work engagement. It provides the structure of wellness at work. Therefore it would be important for the management of train drivers to focus on these two dimensions (burnout and engagement) when addressing issues related to work wellness.

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