

**OCCUPATIONAL STRESS, COPING, BURNOUT AND
WORK ENGAGEMENT OF EMERGENCY WORKERS
IN GAUTENG**

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REMARKS

The reader is reminded of the following:

- 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 is in line with the policy of the Programme in Industrial Psychology of the PU for CHE, to use APA-style in all scientific documents as from January 1999.
- The thesis is submitted in the form of five research articles.

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“We are like dwarfs on the shoulders of giants, so that we can see more than they, and things at a greater distance, not by virtue of any sharpness of sight on our part, or any physical distinction, but because we are carried high and raised up by their giant size” (Bernard of Chartres, 12th Century).

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SUMMARY

Topic: Occupational stress, coping, burnout and work engagement of emergency workers in Gauteng

Key terms: Burnout, work engagement, positive psychology, emergency worker, job demands, job resources, strain, stress, coping, affect, reliability, construct validity, bias, equivalence, moderator effects

Emergency work is considered to be one of the most demanding occupations with significant social, physical and psychological consequences for the well-being of the emergency worker. Burnout, as well as its antithesis, work engagement, are two possible transactional outcomes impacting on the well-being of the emergency worker. Measurement of burnout and work engagement requires valid, reliable and culturally fair measuring instruments. However, research on burnout and work engagement in South Africa are characterised by poorly designed studies, a lack of sophisticated statistical analyses and poorly controlled studies. Furthermore, research paucity in terms of burnout and work engagement seems to prevail in the multicultural South African emergency worker context.

A lack of norms for the Maslach Burnout Inventory – Human Services Survey (MBI-HSS), as well as the Utrecht Work Engagement Scale (UWES) makes the identification of burnout and engagement in the emergency services difficult. Consequently, investigating the reliability, validity, equivalence and bias would result in the standardisation of the MBI-HSS and the UWES, suitable for use in the multicultural emergency work setting. Amongst the factors that could play a role in the prevalence of burnout and work engagement are stress because of the demands of a job, a lack of job resources, as well as dispositional variables such as affect and situational variables, such as coping strategies. The operationalisation of occupational stress for emergency workers as well as information in terms of the standardisation of measurement of coping strategies for emergency workers in the South African context are lacking in the literature.

The objectives of this research were to standardise the MBI-HSS, UWES and Coping Orientation to Problems Experienced (COPE) and to develop a valid and reliable occupational stress measure for emergency workers in South Africa. Another objective of the current study was to develop and test a causal model of burnout and work engagement of

emergency workers, including occupational stress, coping strategies and affect. Finally, moderating effects of coping strategies and affect with regards to burnout and work engagement were tested for.

The research method was by means of five separate articles, each consisting of a brief literature overview and an empirical study. A cross-sectional survey design was used. An accidental sample of emergency workers in Gauteng ($N = 405$) was used. The MBI-HSS, UWES, Emergency Worker Stress Inventory (EWSI), COPE, Affectometer 2 (AFM) and a biographical questionnaire were administered. Descriptive statistics, analysis of variance, correlations, principal component factor extraction, exploratory factor analysis with target rotations, canonical analysis, multiple regression analysis and structural equation modelling were used.

Structural equation modelling confirmed 3-factor models of burnout (Emotional Exhaustion, Depersonalisation and Personal Accomplishment) as well as work engagement (Vigour, Dedication and Absorption). Internal consistency for the MBI-HSS and UWES was confirmed. Construct inequivalence was found for the Nguni group but not for the Afrikaans, English and Sotho groups. Item bias analysis revealed evidence of both uniform and non-uniform bias for some items of the MBI-HSS, while nonuniform bias was found for the UWES. In terms of the EWSI, a 3-factor structure was obtained by means of principal factor extraction with varimax rotation, namely lack of resources, job demands and inherent emergency work stressors. Principal factor extraction on the COPE revealed four factors, namely problem-focused coping, seeking social support, passive coping and turning to religion. Both the EWSI and COPE were found to be internally consistent. Construct equivalence was obtained for the Afrikaans, English and Sotho groups, but not for the Nguni group. Evidence of uniform bias was found for the EWSI, whereas nonuniform bias was found for the COPE.

Structural equation analysis showed that the lack of resources predicted the core of burnout, namely emotional exhaustion and depersonalisation. Problem-focused coping predicted personal accomplishment, while positive affect predicted emotional exhaustion. Work engagement was related to low burnout scores. Depersonalisation was associated with work engagement.

Recommendations for the organisation and future research were made.

OPSOMMING

Onderwerp: Beroepstres, coping, uitbranding en werksbegeestering van nooddienerswerkers in Gauteng

Sleuteltermes: Uitbranding, werksbegeestering, positiewe sielkunde, nooddienerswerker, werkseise, werks hulpsbronne, spanning, stressore, coping, affek, betroubaarheid, konstruktiewe, sydigheid, ekwivalensie, modereringseffekte

Nooddienerswerk word beskou as een van die mees veeleisende beroepe in die wêreld wat beduidende sosiale, fisiese en psigologiese gevolge vir die welstand van nooddienerswerkers inhou. Werksuitbranding, asook sy teenpool, werksbegeestering, is twee moontlike transaksionele uitkomstes wat die welstand van die nooddienerswerker beïnvloed. Die meting van uitbranding en werksbegeestering vereis geldige, betroubare en kultuurbillike meetinstrumente. Uitbrandingsnavorsing in Suid-Afrika word egter gekenmerk deur gebrekkige navorsingsontwerpe, 'n tekort aan gesofistikeerde statistiese metodes en swak gekontroleerde studies. Bowendien is daar 'n tekort aan navorsing wat betref uitbranding en werksbegeestering in die multikulturele Suid-Afrikaanse nooddienerswerker-konteks.

'n Tekort aan norme vir die Maslach Uitbrandingsvraelys – Menslike Dienste-opname (MBI-HSS) en die Utrecht-werksbegeesteringskaal (UWES) veroorsaak dat die bepaling van uitbranding en begeestering in die nooddieners moelik gemaak kan word. Gevolglik sal ondersoeke in verband met die betroubaarheid, geldigheid, ekwivalensie en sydigheid tot die standaardisering van die MBI-HSS en UWES lei wat geskik is vir gebruik in die multikulturele nooddienersopset. Faktore wat 'n rol kan speel in uitbranding en werksbegeestering sluit onder andere die volgende in: stres as gevolg van die eise van 'n pos en 'n tekort aan hulpsbronne, disposisionele veranderlikes soos byvoorbeeld affek, asook situasionele veranderlikes, soos byvoorbeeld coping-strategieë. Inligting rakende die operasionalisering van beroepstres vir nooddienerswerkers, asook inligting aangaande die standaardisering van die meting van coping-strategieë vir nooddienerswerkers in die Suid-Afrikaanse konteks is beperk.

Dit was die doel van hierdie navorsing om die MBI-HSS, UWES en COPE te standaardiseer, maar ook om 'n geldige en betroubare beroepstres-meetinstrument te ontwikkel vir nooddienerswerkers in Suid-Afrika. 'n Verdere doelwit was om 'n kousale model van uitbranding en werksbegeestering vir nooddienerswerkers te ontwikkel en te toets wat poseise,

werkshulpbronne, coping-strategieë en affek insluit. Laastens is die modereringseffek van coping-strategieë en affek in terme van uitbranding en werksbegeestering getoets.

Die navorsingsmetode het bestaan uit vyf aparte artikels wat 'n kort literatuuroorsig en empiriese ondersoek by elke artikel insluit. 'n Beskikbaarheidsteekproef bestaande uit nooddiensterkers in Gauteng ($N = 405$) is gebruik met die hulp van 'n dwarsnee opname-ontwerp. Die MBI-HSS, UWES, Nooddiensterker Stresvraelys (NWSV), COPE, Affektometer 2 (AFM) en 'n biografiese vraelys is afgeneem. Beskrywende statistiek, korrelasies, variansie-analise, hoofkomponente faktorontleding, eksploratiewe faktorontleding met teikenrotasies, kanoniese analise, meervoudige regressie-ontleding en strukturele vergelykingsmodellering is gebruik.

Strukturele vergelykingsmodellering het 3-faktor oplossings vir beide die MBI-HSS (Emosionele Uitputting, Depersonalisasie en Persoonlike Bereiking) en UWES (Energie, Toewyding en Absorpsie) opgelewer. Interne konsekwentheid is gevind vir die MBI-HSS en UWES. Konstrukekwivalensie is gevind vir die Afrikaans, Engelse en Sotho groep, maar nie vir die Nguni groep nie. Beide uniforme en nie-uniforme sydigheid is gevind vir sommige items van die MBI-HSS, terwyl nie-uniforme sydigheid vir die UWES gevind is. 'n 3-Faktor struktuur is by wyse van hoofkomponente-faktorontleding met 'n varimax-rotasie vir die NWSV bepaal, bestaande uit tekort aan hulpbronne, poseise en inherente nooddienststressore. Hoofkomponente-faktorontleding vir die COPE het vier faktore opgelewer, naamlik probleemgefokusde coping, soeke na sosiale ondersteuning, passiewe coping en keer-na-religie. Beide die NWSV en COPE het bevredigende interne konsekwentheid getoon. Konstrukekwivalensie is gevind vir die Afrikaans, Engelse en Sotho groepe, maar nie vir die Nguni groep nie. Bewyse van uniforme sydigheid is vir die NWSV gevind, terwyl nie-uniforme sydigheid vir die COPE gevind is.

Strukturele vergelykingsmodellering het aangetoon dat stres as gevolg van 'n tekort aan hulpbronne die kern van uitbranding (emosionele uitputting en depersonalisasie) voorspel. Probleemgefokusde coping het persoonlike bereiking voorspel, terwyl positiewe affek emosionele uitputting voorspel het. Werksbegeestering het met lae uitbrandingsvlakke verband gehou.

Aanbevelings vir die organisasie en toekomstige navorsing is aan die hand gedoen.

CHAPTER 1

INTRODUCTION

This thesis is about burnout and work engagement of emergency workers in Gauteng.

In this chapter, the problem statement is discussed. Research objectives are set out, including general and specific objectives. The research method is explained and a division of chapters is given.

1.1 PROBLEM STATEMENT

Emergency workers are often confronted with extremely stressful and demanding situations that they have to deal with, such as violent, disagreeable, demanding or manipulative patients or patients with severe trauma and also cardiac arrest. According to Vettor and Kosinski (2000), emergency workers are faced with chronic stressors, such as dealing with injury, mutilation and even death. Even though Frank and Ovens (2002) points to the fact that emergency work is both rewarding and demanding, it is often characterised by little control over patient mix and the fact that life or death decisions have to be dealt with at a rapid pace. Many of these situations are stressful and difficult to manage, often resulting in psychological distress for the individual who functions in a chronic stress environment where stress may be perceived as part of the job (Phipps, 1988; Whitley, Gallery, Allison & Revicki, 1989; Young & Cooper, 1995).

The impact of highly stressful environments on the emergency workers is tremendous, rendering emergency workers particularly vulnerable to increased risk of injury and stress-related illnesses (Payne & Firth-Corzens, 1987), such as cardiovascular disease and other health problems, psychological health disorders and burnout (Kowalski & Vaught, 2001). According to Cherniss (1995), stress is believed to be one of the main contributors in the development of burnout. According to Marmar, Weiss, Metzler, Ronfeldt and Foreman (1996) and Mitchell and Dyregrov (1993) emergency workers such as paramedics demonstrate higher levels of psychological stress which are already elevated above the general population. Not only does an accumulation of stress lead to burnout, it also results in a deterioration of the

quality of care provided by emergency workers (Boudreaux, Jones, Mandry & Brantley, 1996). As such, burnout has been associated with various negative outcomes for the organisation including employee turnover, low morale, poor quality of care, lowered productivity, absenteeism and interpersonal problems. Also, burnout has been associated with insomnia, perceptions of physical exhaustion and increased substance abuse (Jackson & Maslach, 1982; Levert, Lucas & Ortlepp, 2000; Maslach, 1979, 1981, 1982; Maslach & Pines, 1977; Muchinsky, 1987; Pines & Aronson, 1981; Pines & Maslach, 1978; Rosse, Boss, Johnson & Crown, 1991; Turnipseed, 1988). Therefore, it is necessary to investigate the role that stress-related phenomena, such as burnout, play in the lives of emergency workers in South Africa.

Burnout was first detected as a social problem and was used to describe symptoms of emotional depletion and a loss of motivation and commitment amongst volunteers in an alternative care setting (Freudenberger, 1974). According to Maslach and Jackson (1986), burnout can be described as a syndrome of emotional exhaustion, depersonalisation and reduced personal accomplishment occurring in individuals doing “people work” of some kind. Originally only associated with the helping professions, burnout has since been extended to include all other professional and occupational groups when researchers realised that employees can develop burnout in almost any job (Schaufeli & Enzmann, 1998). There seems to be a consensus that burnout can be viewed as a particular, multidimensional, chronic stress situation that goes beyond the experience of mere exhaustion (Malan, Rothmann & Rothmann, in press). More specifically, burnout can be defined as a persistent, negative, work-related state of mind in “normal” individuals, primarily characterised by exhaustion and accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work (Schaufeli & Enzmann, 1998). Research has also demonstrated that burnout is related to depression, a sense of failure, fatigue, loss of motivation, and poor job-related self-esteem (Levert et al., 2000; Rosse et al., 1991).

The Maslach Burnout Inventory (MBI) describes burnout as a syndrome that consists of three interrelated, but conceptually distinct characteristics, namely emotional exhaustion, depersonalisation and low personal accomplishment (Maslach, 1979, 1982; Maslach & Jackson, 1986, 1996). *Emotional exhaustion* refers to the depletion or draining of the emotional resources caused by interpersonal demands. *Depersonalisation* points to the

development of negative, callous, and cynical attitudes towards colleagues, clients and/or patients. These two dimensions represent the core symptoms of burnout (Schaufeli, Salanova, Gonzáles-Romá & Bakker, 2002). Lastly, low *personal accomplishment* represents the tendency to evaluate one's own work with recipients negatively, which includes the belief that objectives are not reached, beliefs of insufficiency and poor professional self-esteem.

Traditionally, research in the behavioural sciences focused on the *pathos* (disease, pathology, and ill-health). Recently, a significant shift in perspective has been recognised by various researchers towards the study of the *fortis* (strengths, capabilities and health). Many names have been given to this prevailing paradigm, namely “salutogenesis” (Antonovsky, 1979); “fortigenesis” (Strümpfer, 1995); “positive” psychology (Seligman & Csikszentimihalyi, 2000), or “psychofortology” which has been proposed as a subdiscipline for the field of psychology (Wissing & Van Eeden, 1997). Recently, a special edition of the American Psychologist called “Positive Psychology” was published where an international attempt was made to stimulate research into the origins of health or strengths (Seligman & Csikszentimihalyi, 2000). In line with the emergence of this new field of study, the study of engagement, a construct postulated as the opposite of burnout, has been added to the voluminous body of burnout research. According to Maslach, Schaufeli and Leiter (2001), the conception of burnout has been expanded and enlarged in recent years by the positive antithesis of job engagement which allowed the study of the full spectrum of workers' well-being, ranging from the negative (burnout) to the positive (engagement) states.

Engagement is defined as a positive, fulfilling, work-related state of mind that is characterised by vigour, dedication, and absorption (Schaufeli, Salanova, Gonzáles-Romá & Bakker, 2002). *Vigour*, the opposite of mental exhaustion, relates to high levels of energy and mental resilience while working, the willingness to put effort into one's work and to persist even in the face of adversity. *Dedication*, the opposite pole of cynicism or depersonalisation, is characterised by a sense of significance, enthusiasm, inspiration, pride and challenge. Finally *absorption* refers to a state where the individual is fully concentrated and deeply engrossed in his/her work, a state where time passes quickly and where the individual has difficulty detaching him- or herself from work. Engagement in this context is a persistent, pervasive affective-cognitive state which is not focused on a specific object, event, individual, or behaviour (Schaufeli et al., 2002).

In terms of measurement, the UWES (Utrecht Work Engagement Scale) (Schaufeli, et al., 2002) and the MBI-HSS (Maslach Burnout Inventory – Human Sciences Survey) (Maslach & Jackson, 1986, 1996) have been developed to measure the constructs of engagement and burnout respectively. Even though it is estimated that the MBI has been used in over 90% of burnout studies from the mid-eighties to the turn of the century, little information seems to be available in the South African context with regards to the psychometric properties of the scale. Similarly, there is a lack of research into the newly developed UWES in the South African context. A review of the literature yielded no information regarding the reliability and validity of the MBI-HSS and the UWES for emergency workers in South Africa. Consequently, the first research problem is that MBI-HSS and the UWES is not validated and standardised for emergency workers in South Africa. The fact that no norms are available in terms of the measurement of burnout and engagement of emergency workers in South Africa makes it difficult to assess the levels of burnout and engagement of emergency workers and to compare these levels for different demographic groups. Standardisation of these questionnaires in the present study would solve these problems.

South Africa is a multi-cultural society. According to Van de Vijver and Leung (1997), equivalence and bias should be computed in a multicultural setting such as South Africa to enable valid and fair comparison of constructs between different cultural groupings. Whereas measurement equivalence is concerned with measurement and the comparability of scores, bias is concerned with factors that influence the validity of cross-cultural comparisons. To date, very little information exists with regards to the equivalence and bias of the MBI and the UWES, especially for emergency workers in South Africa, a factor highlighted by Rothmann (2002) in a recent review of burnout research in South Africa. Consequently, a second research problem is that little information exists regarding the item bias and construct equivalence of the MBI-HSS and the UWES for emergency workers in South Africa.

According to Schaufeli and Bakker (2002) and Jones and Fletcher (1996) any occupation can be analysed in terms of a stress-interaction process in two elements, namely job demands and job resources. *Job demands* are those physical, psychological, social or organisational aspects of the job which require sustained physical and/or psychological strain (i.e. cognitive or emotional effort), the consequences of which are associated with physiological or psychological costs, e.g. work overload, personal conflicts and emotional demands, such as demanding clients. Although these demands are not necessarily negative, they can turn into

job stressors when meeting these high demands requires sustained effort, consequently being associated with negative responses in the long run, such as depression, anxiety, or burnout. *Job resources* on the other hand, refer to those physical, psychological, social or organisational aspects of the job that (1) reduce the job demands and therefore the associated physiological and psychological costs, or (2) are functional in achievement of work goals, or (3) stimulate personal growth, learning and development, e.g. social support, autonomy, feedback and job security.

Recently, renewed interest was sparked in those aspects that buffer or exacerbate job demands in the occupational setting (Cooper, Dewe & O'Driscoll, 2001). According to Dewe, Cox and Ferguson (1993), this process can be best understood in a transactional framework where an ongoing transaction between individuals and their environment occurs; where individuals make appraisals of the environment and attempt to manage the consequences of this interaction. These so-called moderator or mediating constructs can be categorised as dispositional, situational or social variables (Cooper et al., 2001). Many possible moderators or mediating variables have been identified in the literature, such as Type A Behaviour Pattern, Affect, Hardiness, Self-Esteem, Self-Efficacy, Dispositional Optimism, Locus of Control, Social Support and Coping Strategies to name but a few. In the current research, Affect and Coping Strategies are included as moderators of the interaction between emergency workers and their occupational environment. Identification of these variables could have significant implications for a better understanding of how emergency workers interact with their environment and could aid in the prevention of negative outcomes often associated with high stress occupations such as emergency work.

In the present study, potential moderators include:

- *General Well-being (Affect)* or sense of well-being can be seen as the balance of positive and negative feelings (affect) in recent experience (Kamman & Flett, 1983). Research indicates that high levels of Negative Affect increase susceptibility to the experience of psychological strain and other negative outcomes of stress such as negative emotions and adversarial social relationships, whereas Positive Affect is associated with high generalised self-efficacy, subjective well-being and positive social relationships (Church, 1994; Spielberger, Gorsuch & Lushene, 1970).

- *Coping* can be defined as the efforts that we make to manage situations appraised as potentially harmful or stressful (Kleinke, 1991). Coping refers to the perceptual, cognitive or behavioural responses used to manage, avoid or control situations that could be regarded as difficult (Folkman & Lazarus, 1984, Moos, 1994; Zeidner & Endler, 1996). Coping could either refer to strategies or results (Fleishman, 1984). As a strategy, coping refers to the different methods that individuals apply to manage their specific circumstances, while coping as a result refers to the eventual outcomes of the chosen strategy for the individual. The former is the focus in the current study. Non-coping is defined by Callan (1993) as failed efforts to cope, accompanied by various physical and psycho-social disturbances, eventually resulting in higher stress levels. Non-copers experience things as not making sense and they lose perspective on issues. According to Carver, Scheier and Weintraub (1989), non-coping results in higher levels of depression and anxiety. The deciding factor in the coping process is the selection of an appropriate coping strategy. The selection of an appropriate coping strategy would result in an increase in professional efficacy due to goals, the achievement of goals and consequently the strengthening of coping resources (Schaufeli & Enzmann, 1998).

In terms of burnout, research suggests that the development of burnout could be described as a progression of unsuccessful attempts to cope with a variety of negative stress conditions (Schaufeli & Enzmann, 1998). The process is self-perpetuating, affecting the attainment of professional goals and depleting the resources of the individual to cope with the symptoms and process of burnout (Schaufeli & Enzmann, 1998). Likewise, the adoption of either a positive or negative attitudinal disposition in evaluating recent experience seems to have significant implications for the experience of strain, and possibly the development of negative attitudes and behaviours at work.

In terms of work engagement, research indicates that a lack of job resources (i.e. feedback, control, participation in decision-making and supervisory support) could be related to mental disengagement from work, its content and work in general (Schaufeli & Bakker, 2002). Furthermore, in their study in the South African Police Services, Storm and Rothmann (in press, c) found that low job demands, active coping strategies, a tendency not to cope through avoidance, coping by seeking emotional support and by turning to religion correlated with work engagement ($r_c = 0,44$). Schaufeli and Bakker (2002) reported that job resources

exclusively predicted work engagement, while both job demands and lack of job resources predicted burnout.

Regarding the experience of job demands in stressful environments, little information is available with regards to stressors and coping strategies specific to the emergency worker occupation in South Africa. A review of the literature revealed no studies standardising these constructs in terms of the measurement of job stress and coping strategies for the emergency worker in South Africa. Furthermore, no standardised measurement for job stress could be found for emergency workers in South Africa that are suitable for use in the multi-cultural context. Consequently, the third research problem is that no valid and reliable measuring instrument for job stress, as well as information with regards to the reliability and validity of the measurement of coping strategies in a multi-cultural setting, could be found for emergency workers in South Africa.

It is clear from the above-mentioned discussion that the experience of stressful situations, coping strategies and affect might be related to burnout and engagement of emergency workers. However, no studies including these factors in a causal model of burnout and engagement of emergency workers in South Africa were found in the literature. Furthermore, studies with regard to the possible moderating effects of dispositional and situation variables in the South African Emergency Services are lacking. Therefore, the fourth research problem is that a causal model of burnout and engagement of emergency workers in South Africa does not exist. The fifth research problem is that studies in terms of the possible moderating effects of dispositional and situational variables for emergency workers in South Africa are lacking.

Consequently, in the present study, the following research problems will make contributions to industrial psychology as a science:

- Standardised measuring instruments for burnout and work engagement of emergency workers in Gauteng will exist, which have been proven both reliable and valid;
- Equivalent and unbiased measuring instruments of burnout and work engagement of emergency workers in Gauteng will exist;

- Standardised measuring instruments for stress and coping strategies of emergency workers in Gauteng will exist, which have been proven reliable, valid, equivalent and unbiased;
- A causal model of burnout and work engagement will exist, which could be used to predict burnout and work engagement of emergency workers in Gauteng;
- Information will exist regarding the moderating effects of coping strategies and affect on burnout and work engagement of emergency workers in Gauteng.

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 standardise the Maslach Burnout Inventory – Human Services Survey (MBI-HSS) and the Utrecht Work Engagement Scale (UWES) and to test a causal model of burnout and engagement for emergency workers in Gauteng.

1.2.2 Specific objectives

The specific research objectives are as follows:

- To determine the reliability and validity of the MBI-HSS for emergency workers in Gauteng;
- To determine the construct equivalence and item bias of the MBI-HSS for emergency workers in Gauteng;
- To determine the reliability and validity of the UWES for emergency workers in Gauteng;
- To determine the construct equivalence and item bias of the UWES for emergency workers in Gauteng;
- To develop a reliable and valid measuring instrument of job stress for the emergency worker in Gauteng which is equivalent and unbiased;

- To determine the reliability, validity, construct equivalence and item bias of the COPE for emergency workers in Gauteng;
- To develop and test a causal model of burnout of emergency workers in Gauteng which includes occupational stress, coping strategies and affect;
- To develop and test a causal model of work engagement of emergency workers in Gauteng which includes occupational stress, coping strategies and affect;
- To make recommendations with regards to the possible moderating effects of coping strategies and affect on burnout and work engagement of emergency workers in Gauteng.

1.3 RESEARCH METHOD

The research method for each of the five articles which are submitted for the purposes of this thesis consists of a brief literature review and an empirical study. In the following paragraph, relevant aspects of the empirical studies conducted in this thesis are discussed.

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 and is appropriate for studying various groups at different stages of development (Burns & Grove, 1993). This design can also be used to assess interrelationships among variables within a population. According to Shaughnessy and Zechmeister (1997) this design is ideally suited to the descriptive and predictive functions associated with correctional research.

Structural equation modelling is used to address the problems associated with this design (Byrne, 2001). Structural equation modelling is used to test causal models of burnout and work engagement, inclusive of occupational stressors, coping strategies and affect. As such, structural equation modelling is a statistical methodology that takes a confirmatory (i.e. hypothesis-testing) approach to the analysis of a structural theory bearing on some phenomenon (Byrne, 2001). The term "structural equation modelling" (SEM) or covariance analysis, conveys two important aspects of the procedure:

- the causal processes under study are represented by a series of structural (i.e. regression) equations, and
- these structural relations can be pictorially represented or modelled to enable a clear conceptualisation of the theory under study.

1.3.2 Study population

The study population could be defined as a non-probability (accidental) sample of emergency workers in the different regions of Gauteng, namely West Rand, Ekurhuleni, Sedibeng, Johannesburg Metropolitan, Tshwane, Kungwini and Nokeng Tsa Taemane. The total population of about 2100 emergency workers in Gauteng was targeted. A response rate of 21,6% was achieved due to the nature of the job e.g. call-outs, rotating working schedules and leave, of which 405 responses (19,3%) could be utilised.

1.3.3 Measuring battery

Six questionnaires are used in the empirical study, namely the Maslach Burnout Inventory – Human Services Survey (MBI-HSS) (Maslach & Jackson, 1986; Maslach, Jackson & Leiter, 1996), the Utrecht Work Engagement Scale (UWES) (Schaufeli et al., 2002), the Emergency Worker Stress Inventory (Naudé & Rothmann, in press, c), the COPE Questionnaire (COPE) (Carver et al., 1989), the Affectometer 2 (AFM) (Kammann & Flett, 1983) and a biographical questionnaire.

The *Maslach Burnout Inventory – Human Services Survey (MBI-HSS)* (Maslach & Jackson, 1986) measures respondents' perceived experience of burnout in relation to the recipients of their service, care or treatment. The MBI-HSS consists of 22 items phrased as statements about personal feelings and attitudes, which is self-scored on a seven-point frequency scale, ranging from 0 “never” to 6 “every day”. Three subscales can be identified, namely Emotional Exhaustion (EE) (nine items; e.g. “I feel emotionally drained from my work”), Depersonalisation (Dep) (five items; e.g. “I feel I treat some recipients as if they were impersonal objects”), and Personal Accomplishment (PA) (eight items; e.g. “I have accomplished many worthwhile things in this job”). High scores on Emotional Exhaustion and Depersonalisation and low scores on Personal Accomplishment are indicative of burnout.

The subscales represent a related (Emotional Exhaustion and Depersonalisation) and independent (Personal Accomplishment), but separate, multidimensional concept of the burnout construct. As such, the psychometric soundness of the MBI-HSS is well-documented in the literature with internal consistencies usually well above the 0,70 Cronbach alpha level, except for the Depersonalisation scale in some samples (Schaufeli, Bakker, Hoogduin, Schaap & Kladler, 2001). Test-retest reliability ranging from three months to one year has been reported in the range of 0,50 to 0,82 (Leiter & Durup, 1996).

The *Utrecht Work Engagement Scale (UWES)* (Schaufeli et al., 2002) measures levels of engagement. Initially, engagement was viewed as the positive antithesis of burnout, but according to the scale developers, it can be operationalised in its own right. The UWES is scored on a seven point frequency scale, ranging from 0 “never” to 6 “every day”. Three dimensions of engagement can be distinguished, namely Vigour (6 items; e.g. “I am bursting with energy in my work”), Dedication (5 items; e.g. “I find my work full of meaning and purpose”) and Absorption (6 items; e.g. “When I am working, I forget everything else around me”). Engaged individuals are characterised by high levels of Vigour and Dedication and also elevated levels of Absorption. Empirically, certainty needs to be obtained whether burnout and engagement are indeed opposites of the same continuum, while theoretically there seems to be a dichotomous relationship. Burnout and Engagement can be described as related but distinct concepts (Schaufeli et al., 2002). In terms of internal consistency, reliability coefficients for the three subscales have been determined between 0,68 and 0,91. Improvement of the alpha coefficient (ranging from 0,78 to 0,89) seems possible without adversely affecting the internal consistency of the scale (Storm & Rothmann, in press, b).

The *Emergency Worker Stress Inventory (EWSI)* is used to measure job stress and was developed by Naudé and Rothmann (in press, c) for the emergency worker in Gauteng, based on several literature findings regarding stressors specific to the emergency work environment. The EWSI consists of 78 items scored on a frequency and intensity scale. In the first part of the questionnaire, participants rate each of the 39 statements in terms of perceived intensity of the particular stressor on a 9-point scale, ranging from “1” (Low) to “9” (High). In the second part of the questionnaire, the participants are requested to respond in terms of perceived frequency in experiencing these stressors over a period of the past six months on a 10 point scale ranging from “0” (No days) to “9+” (more than 9 days). In each instance, respondents are given the option to indicate whether a given stressor is relevant in terms of

their experience or not. Factor analysis with a varimax rotation identified three underlying factors, namely Lack of Resources, Job Demands and Inherent Emergency Work Stressors.

The *Coping Orientation for Problem Experiences Questionnaire (COPE)* (Carver et al., 1989) is used to measure the participant's general coping strategies. The COPE is a multi-dimensional 53-item questionnaire indicating the different ways in which individuals cope in different circumstances. Respondents rate themselves on a 4-point frequency scale, ranging from "1" (usually not doing it at all) to "4" (usually doing it a lot). In total, 13 different coping strategies are measured. Five subscales (4 items each) measure different aspects of problem focused coping, namely Active Coping, Planning, Suppressing of Competing Activities, Restraint Coping and Seeking Social Support for Instrumental Reasons. Five subscales (4 items each) measure aspects of emotion-focused coping, namely Seeking Social Support for Emotional Reasons, Positive Reinterpretation and Growth, Acceptance, Denial, and Turning to Religion. Lastly, four subscales measure coping strategies which are used less, namely Focus on and Venting of Emotions, Behavioural Disengagement, Mental Disengagement and Alcohol-drug Disengagement (Carver et al., 1989). The COPE has been proven both reliable and valid in different cultural groups (Clark, Bornman, Cropanzano & James, 1995; Van der Wateren, 1997). Carver et al. (1989) also reported Cronbach alpha coefficients for the COPE ranging from 0,45 to 0,92. With the exception of Mental Disengagement which measures less than 0,60, all the sub-scales demonstrate good levels of reliability. Test-retest reliability varies from 0,46 to 0,86 and 0,42 to 0,89 after 2 weeks (Carver et al, 1989). Acceptable reliability and validity levels have been determined for the COPE in the South African context, rendering it suitable for usage in the South African context (Van der Wateren, 1997; Wissing & Du Toit, 1994).

The *Affectometer 2 (AFM)* (Kammann & Flett, 1983) is used to measure the general well-being or sense of well-being in recent experience. The AFM (shortened version) is a 20-item scale that gives a bottom-line indication of quality of life as experienced on an affective and emotional level. The overall level of well-being or happiness is conceptualised as the extent to which positive feelings dominate over negative feelings. The subscales of the AFM measures Positive Affect, Negative Affect and Positive-Negative Affect-Balance. Respondents evaluate themselves on a 5-point frequency scale, ranging from "1" (not at all) to "5" (all the time). Kamman and Flett (1983) reported alpha reliabilities of 0,88 to 0,93 as well as indications of validity. Wissing and Van Eeden (1994) reported alpha coefficients for

Positive Affect between 0,81 and 0,86, and between 0,83 and 0,90 for Negative Affect in South African studies. Wissing et al. (1999) indicated the validity of this scale for use in an African group and reported reliability coefficients of 0,68 (Positive Affect) and 0,77 (Negative Affect).

A questionnaire was also developed to gather information about the demographic characteristics of the sample. Participants were given the option of providing their names and contact details in the case of feedback. Other information gathered included position, area, education, gender, marital status and language.

1.3.4 Statistical analysis

The statistical analysis is conducted with the aid of the SAS program (SAS Institute, 2000). Cronbach alpha coefficients and inter-item correlations are used to determine the internal consistency, homogeneity and unidimensionality of the measuring instruments (Clark & Watson, 1995). Coefficient alpha contains important information regarding the proportion of variance of the items of a scale in terms of the total variance explained by that particular scale. According to Clark and Watson (1995), the mean inter-item correlation (which is a straightforward measure of internal consistency) provides useful information in conjunction with the alpha coefficient of a scale (which is an indication of homogeneity of a scale), but as such cannot ensure unidimensionality of a scale. The range of inter-item correlations around the mean inter-item correlation should also be inspected in this regard. Sufficient clustering of correlations around the mean should provide sufficient support for the unidimensionality of a scale. Descriptive statistics (means, standard deviations, skewness and kurtosis) are computed to describe the data.

In terms of statistical significance, a 95% confidence interval level ($p \leq 0,05$) is taken. Effect sizes are used to decide on the practical significance of the findings. Pearson product-moment correlations coefficients are used to specify the relationship between the variables. A cut-off point of 0,30 (medium effect, Cohen, 1988) is set for the practical significance of correlation coefficients. In terms of the differences between sub-groups in the sample, t-tests and one-way analysis of variance (ANOVA) are used. The following formula, as provided by Steyn (1999), is used to determine the practical significance of differences (d):

$$d = \frac{Mean_A - Mean_B}{\text{Root MSE}}$$

where

$Mean_A$ = Mean of the first group

$Mean_B$ = Mean of the second group

Root MSE = Root Mean Square Error

According to Cohen (1988), $0,10 \leq d \leq 0,50$ = small; $0,50 \leq d \leq 0,80$ = medium and $d \geq 0,80$ = large. In terms of the current research, a cut-off point of 0,50 (medium effect) is set for the practical significance of the differences between group means.

Canonical correlations (r_c) are used to determine the relationships of the dimensions (scales) of burnout and work engagement with occupational stress, coping strategies and affect. The goal of canonical correlations is to analyse the relationships between sets of variables (Tabachnick & Fidell, 2001) and as such it is a descriptive rather than a hypothesis-testing technique.

Principal factor extraction with varimax rotation is performed by means of SAS FACTOR on the items of the MBI-HSS, UWES, EWESI, COPE and AFM prior to testing for the structural equivalence and bias of the different instruments. Prior to principal factor extraction, principal component extraction is done to estimate the number of factors, the presence of outliers and the factorability of the correlation matrices. Furthermore, the oblique method with a promax rotation is used to determine the interfactor correlations of each measuring instrument. Correlations higher than 0,30 are deemed sufficient to accept the factor solution provided by this method of principal factor extraction.

Construct (structural) equivalence is determined to compare the different language groups included in this study. Exploratory factor analysis with a Procrustean target rotation is used to determine the construct equivalence of the MBI-HSS, UWES, EWESI and the COPE for the different language groups in the sample (Van de Vijver & Leung, 1997). According to Van de Vijver and Leung (1997), the comparison between similarities of the factor structure of two cultural groups could be underestimated due to the arbitrary spatial allocation of factors

during factor analysis. Rather, it is suggested that target rotation be conducted prior to comparing the factor solutions of cultural groups by rotating the factor loading matrices with regard to each other in order to maximise the agreement between the factors. During this process, one group is arbitrarily assigned the target group and the factor loadings of the other group rotated towards the target group to form a common factor loading matrix, also known as the centroid. Factorial agreement between the two groups is then estimated with Tucker's coefficient of agreement, also known as Tucker's phi. Because this index is insensitive to multiplications of factor loadings, but sensitive to a constant added to factor loadings, sufficient agreement between the factor-solutions of the respective cultural groups would be a reflection of the extent to which a perfect multiplicative agreement is achieved between the factor loadings of the respective factor solutions of both groups in the centroid. The formula for Tucker's phi is as follows:

$$p_{xy} = \frac{\sum x_i y_i}{\sqrt{\sum x_i^2 y_i^2}}$$

Because this index does not have a known sampling distribution, it is impossible to establish confidence intervals. Values higher than 0,95 are deemed to be evident of factorial similarity or equivalence across different cultural groups (Van de Vijver & Leung, 1997), whereas values lower than 0,90 (Van de Vijver & Poortinga, 1994) or even 0,85 (Ten Berge, 1986) should be viewed as an indication of sufficient existing differences. This index is deemed sufficiently adequate to evaluate global factorial agreement, but if construct equivalence is not acceptable, bias analysis should be conducted to detect possible inappropriate items in the questionnaire. Furthermore, bias analysis is necessary because construct equivalence does not presuppose the absence of bias. An instrument could therefore demonstrate acceptable construct equivalence and still be biased (Van de Vijver & Leung, 1997).

In order to determine item bias, an extension of Cleary and Hilton's (1968) use of analysis of variance is used to identify possible item bias (Van de Vijver & Leung, 1997). Bias is determined for each individual item. In the analysis, the individual item is specified as the dependent variable with cultural (language) groups and score groups as the independent variables in the variance analysis. Score groups are compiled, based on the total scores on the MBI-HSS, UWES, EWSI and the COPE. Two effects are tested for significance in the subsequent variance analysis, namely the main effects of culture (uniform bias) and

interaction effects of culture and score level (nonuniform bias). If both the main effect of culture and the interaction of culture and score level is found to be non-significant, the item is taken to be unbiased, in which case it was considered appropriate to be included in the subsequent analyses.

Covariance analysis or structural equation modelling (SEM) methods, as implemented by AMOS (Arbuckle, 1997) are used to test the factorial models of the MBI-HSS and UWES, as well as constructing and evaluating causal models of burnout and engagement. SEM is a statistical methodology that takes a confirmatory (i.e. hypothesis-testing) approach to the analysis of a structural theory bearing on some phenomenon (Byrne, 2001, p. 3). The structural approach offered by SEM methodology allows for the stipulation of a model prior to being examined in relation to the dataset under study. Testing of the model with the dataset then proceeds in terms of goodness-of-fit in relation to the covariance matrix presented by the data. Using a number of testing procedures, the fit between the specified model and the covariance matrix are compared, but competing models may also be tested, making decisions in terms of suitability of model-dataset fit possible (Deary et al., 1996).

Hypothesised relationships in the theoretically based model are empirically tested for goodness-of-fit with the sample data. In terms of the degree of correspondence between the implied (hypothesised model) and the observed covariance matrices, the χ^2 statistic and several goodness-of-fit indices were utilised. Jöreskog and Sörbom (1993) aptly describe the χ^2 statistic as a badness-of-fit statistic, because smaller values indicate better fit. The χ^2 statistic however, if used in isolation, can offer certain limitations. The statistic can be equated to the $(N-1)F_{min}$ statistic where N is the sample size and F_{min} the minimum fit function. This value tends to become substantial in the case where the model does not hold and the sample size is large, in which the likelihood of rejecting the null-hypothesis is increased (Byrne, 2001). In addressing this problem, one of the first alternative statistics to be included in the model was the $\chi^2/\text{degrees of freedom}$ or $CMIN/DF$ statistic, which is the minimum discrepancy per degrees of freedom (Wheaton, Muthén, Alwin & Summers, 1977). These criteria, often referred to as “subjective” or “practical” indices of fit, are typically used as adjuncts of the χ^2 statistic.

The Goodness-of-Fit Index (GFI) indicates the relative amount of variance and co-variance in the sample predicted by estimates of the population. Its value usually varies between 0 and 1 with values higher than 0,90 indicating good model fit with the data. The Adjusted Goodness-of-Fit Index (AGFI) indicates the relative amount of variance accounted for by the model, corrected for the number of parameters that needed to be estimated (degrees of freedom) in the model. Both these values are classified as absolute values, because they compare the hypothesised model with no model at all (Hu & Bentler, 1995). Even though both indexes vary between 0 and 1, the distribution of AGFI is not known, and consequently no critical value can be obtained (Jöreskog & Sörbom, 1986). The Parsimony Goodness-of-Fit Index (PGFI) adds to a more realistic interpretation of the model; it combines the issue of parsimony and goodness-of-fit by taking the number of variables needed to be determined into account (Mulaik et al., 1989). Although this index generally demonstrates lower levels in comparison to the other fit indices at the 0,50 level in comparison to values higher than 0,90, values > 0,80 are considered to be more appropriate (Byrne, 2001).

The Normed Fit Index (NFI) is used to measure global model fit, giving an indication of the extent to which the hypothesised model compares with the most restricted model where relationships between variables are zero, in other words a perfectly independent model. This index also varies between 0 and 1 and tends to overestimate fit in smaller samples. The Comparative Fit Index (CFI) also compares the hypothesised and independent models, but takes sample size into account. The Tucker-Lewis Index (TLI) is a relative measure of covariation explained by the hypothesised model which has been specifically designed for the assessment of factor models (Tucker & Lewis, 1973). Critical values for good model fit have been recommended for the NFI, CFI and TLI to be acceptable above the 0,90 level (Bentler, 1992), although recently Hu and Bentler (1999) recommended a cut-off value of 0,95.

Browne and Cudeck (1993) suggested the use of the Root Mean Square Error of Approximation (RMSEA), as well as the 90% confidence interval of the RMSEA to address the problems associated with sample size. The RMSEA provides an indication of the overall amount of error in the hypothesised model-data fit, relative to the number of estimated parameters (complexity) in the model. The recommended acceptable levels of the RMSEA should be 0,05 or less and should not exceed 0,08. Hu and Bentler (1999) suggested a value of 0,06 to indicate acceptable fit, whereas MacCallum, Browne and Sugawara (1996)

suggested that values between 0,08 and 0,10 indicate mediocre fit and values above 0,10 poor fit.

Standard multiple regression analysis is carried out to assess the contribution of the independent variables (occupational stress, coping strategies and affect) to burnout. According to Tabachnick and Fidell (2001), the correlation between an independent variable and a dependent variable reflects variance shared with the dependent variable, but some of the variance may be predictable from other independent variables. The unique contribution of an independent variable to predicting a dependent variable can be assessed by semipartial correlation. Squared semipartial correlation (sr_i^2) expresses the unique contribution of the independent variable to the total variance of the dependent variable. In standard multiple regression sr_i^2 for an independent variable is the amount by which R^2 is reduced if that independent variable is deleted from the regression equation. The difference between R^2 and the sum of sr_i^2 for all independent variables represent shared variance; variance that is contributed to R^2 by two or more independent variables. Effect sizes are calculated with the following formula (Steyn, 1999):

$$f^2 = \frac{R^2}{1 - R^2}$$

Steyn (1999) suggested the following guidelines in terms of effect size, namely $f^2 = 0,01$ (small effect), $f^2 = 0,15$ (medium effect) and $f^2 = 0,35$ (large effect). In the present study a cut-off point of 0,15 (medium effect) was set for the practical significance of f^2 .

1.4 OVERVIEW OF CHAPTERS

In Chapter 2 the construct validity, internal consistency and homogeneity of the MBI-HSS, as well as the construct equivalence and bias for the different language groups in the Gauteng Emergency Services, are dealt with. In Chapter 3, the work engagement of emergency workers is focused on, more specifically in terms of the construct validity, internal consistency and homogeneity of the UWES, as well as the construct equivalence and bias for the different language groups in the Gauteng Emergency Services. In Chapter 4, the occupational stress is investigated, while Chapter 5 deals with the coping strategies that

emergency workers in Gauteng are using. In Chapter 6 a causal model of burnout and engagement is developed and tested for the emergency worker in Gauteng, inclusive of occupational stress, coping strategies and affect. Chapter 7 presents conclusions, shortcomings and recommendations.

1.5 CHAPTER SUMMARY

This chapter discussed the problem statement and research objectives. The measuring instruments and research method that are used in this research were also explained, followed by a brief discussion on the subsequent chapter outline in this thesis.

THE VALIDATION OF THE MASLACH BURNOUT INVENTORY – HUMAN SERVICES SURVEY FOR EMERGENCY WORKERS IN GAUTENG*

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ABSTRACT

The objectives of this research were to validate the Maslach Burnout Inventory – Human Services Survey (MBI-HSS) for emergency workers in the Gauteng Province of South Africa and to determine its construct equivalence and bias for different language groups. A cross-sectional survey design with an accidental sample ($N = 405$) was used. The MBI-HSS and a biographical questionnaire were administered. Structural equation modelling confirmed a 3-factor model of burnout, consisting of Emotional Exhaustion, Depersonalisation and Personal Accomplishment. The scales showed acceptable internal consistencies. Exploratory factor analysis with target rotations confirmed construct equivalence of scales for the Afrikaans, English and Sotho groups, but not the Nguni group. Evidence of uniform bias was found for Item 14 and non-uniform bias for Items 4 and 7 of the MBI-HSS for the Afrikaans, English and Sotho groups.

OPSOMMING

Die doelstellings van hierdie navorsing was om die Maslach Uitbrandingsvraelys – Menslike Dienste-Opname (MBI-HSS) te valideer vir die Gautengse Nooddienste en om die konstrukekwivalensie en sydigheid daarvan vir die verskillende taalgroepe te bepaal. 'n Dwarssnee opname-ontwerp met 'n beskikbaarheidsteekproef ($N = 405$) is gebruik. Die MBI-HSS en 'n biografiese vraelys is afgeneem. Strukturele vergelykingsmodellering het 'n 3-faktormodel van uitbranding bestaande uit Emosionele Uitputting, Depersonalisasie en Persoonlike Bereiking bevestig. Die skale het aanvaarbare interne konsekwentheid getoon. Eksploratiewe faktoranalise met teikenrotasies het die konstrukekwivalensie vir die drie faktore bevestig vir die Afrikaanse, Engelse en Sotho groepe, maar nie vir die Nguni groep nie. Uniforme sydigheid is gevind vir Item 14, terwyl nie-uniforme sydigheid gevind is vir Items 4 en 7 van die MBI-HSS vir die Afrikaanse, Engelse en Sotho groepe.

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Emergency workers are often confronted with extremely stressful and demanding situations that they have to deal with. According to Vettor and Kosinski (2000), emergency workers are constantly faced with chronic stressors, such as dealing with injury, mutilation and even death. Frank and Ovens (2002) point to the fact that emergency work is both rewarding and demanding in that little control over patient-mix exists, compounded by the fact that life or death decisions have to be dealt with at a rapid pace. Many of these situations are difficult to manage, often resulting in psychological distress for the emergency worker who functions in a chronic stress environment where stress may be perceived as part of the job (Phipps, 1988; Whitley, Gallery, Allison & Revicki, 1989; Young & Cooper, 1995). The impact of highly stressful environments on the emergency workers is tremendous, often resulting in an increased risk of injury, cardiovascular disease and other health problems, psychological health disorders and burnout (Kowalski & Vaught, 2001).

Burnout can be described as a specific type of job stress which influences job-related affective well-being (Schaufeli & Buunk, in press). Although mainly psychological in nature, the prevalence of physical symptoms is not uncommon. More specifically, burnout affects the individual on a cognitive, affective (motivational), physical and behavioural level as a result of a general breakdown in defences against prolonged job-stress (Brill, 1984). This breakdown occurs gradually and often remains unnoticed for a long time, perpetuated by ineffective coping strategies and frustrated intentions brought about by the subjective experience of work-reality. The gradual depletion of emotional resources results in a sense of reduced effectiveness, decreased motivation and the development of dysfunctional behaviours and attitudes at work (Schaufeli & Enzmann, 1998). According to these authors, burnout can be defined as a persistent, negative work-related state of mind in “normal” individuals, primarily characterised by emotional exhaustion and accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work.

Originally restricted to the helping professions, burnout is now recognised as a phenomenon found in a variety of occupational groups (Cordes & Dougherty, 1993). Research over the last three decades has shown that the consequences of burnout are not just limited to the individual’s subjective experience, but also to various organisational outcomes. Burnout has been associated with reduced organisational efficiency and work-related problems such as

employee turnover, low morale, poor quality of care, lowered productivity, absenteeism and interpersonal problems (Levert, Lucas & Ortlepp, 2000; Rosse, Boss, Johnson & Crown, 1991). Also, burnout has been associated with insomnia, perceptions of physical exhaustion and increased substance abuse (Jackson & Maslach, 1982; Maslach, 1979, 1981, 1982; Maslach & Pines, 1977; Muchinsky, 1987; Pines & Aronson, 1981; Pines & Maslach, 1978; Turnipseed, 1988). The study of burnout, therefore, certainly seems to be beneficial to the general welfare of companies and their workers in various organisational contexts.

Probably the most influential development in terms of scientific exploration of the burnout construct was the development of the Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1986). Three versions of the MBI were developed, namely the MBI-GS (General Survey), MBI-ED (Educators) and MBI-HSS (Human Services Survey). Whereas the MBI-GS measures Exhaustion, Cynicism and Professional Efficacy, the latter two measures Emotional Exhaustion, Depersonalisation and Personal Accomplishment. The General Survey measures burnout in a broad range of professions, whereas the HSS and ED-versions of the MBI measures burnout in the human services and education contexts respectively. Recently, Schaufeli, Martinez, Pinto, Salanova and Bakker (2002) developed a student version of the MBI. In the current study, however, the MBI-HSS is used, but to date, no validation studies on the MBI – HSS on the South African emergency worker context could be found, which means that burnout norms for the emergency worker still need to be developed in South Africa.

The importance of establishing a reliable and valid instrument to assess burnout in the emergency worker setting is not only important for empirical research purposes, but also for the pragmatic, standardised application in the individual assessment setting. As such, a considerable amount of research seems to support of the psychometrical soundness of the MBI-HSS in various occupational settings (Byrne, 1991, 1994; Enzmann, Schaufeli & Girault, 1994; Green & Walkey, 1988; Maslach & Jackson, 1981).

In terms of the validity of the MBI-HSS, there seems to be sufficient evidence for the convergent validity of the scale, but some difference of opinion exists regarding the discriminant validity of the MBI-HSS (Schaufeli & Van Dierendonck, 1995). The convergent validity, established by gathering data in different ways to demonstrate convergence on the

same construct (Kerlinger & Lee, 2000), was established by the expected relationships of correlations of MBI-HSS scores with independent behavioural ratings of significant others, job characteristics expected to contribute to burnout and measures of various outcomes hypothesised to be related to burnout (Maslach, Jackson & Leiter, 1997). In order to differentiate the MBI-HSS from other constructs and explain why they are/are not related to the construct of burnout (Kerlinger & Lee, 2000), relationships between burnout and concepts such as job satisfaction, depression and social desirability were investigated. Small but significant positive relationships were found between different measures of satisfaction and the MBI-HSS scales (Maslach et al., 1997).

In terms of South African studies, there seems to be an apparent paucity of research regarding the validity, reliability and the establishment of norms for various occupational settings of the MBI-HSS. Although many related studies were conducted in the United States and Europe in the early stages of scale development, a lack of research in this area within the South African context necessitates the current research. Rothmann (2002) stressed the need for burnout research in South Africa in stating that serious limitations of burnout research in South Africa include poorly designed studies (i.e. small sample size), a lack of sophisticated statistical analyses (i.e. confirmatory factor-analytical analysis by means of structural equation modelling) and poorly controlled studies.

South Africa is a multicultural society. According to Van de Vijver and Leung (1997), measurement equivalence and bias should be computed for measuring instruments in any multicultural setting where individuals from different cultural groups are compared in terms of a specific construct. This is particularly relevant where no norms exist for the different cultural groups, which is often the case in cross-cultural research. In line with recommendations of Poortinga (1989) and Van de Vijver and Leung (1997) measurement equivalence and bias should be tested for in a multi-cultural context where differences in scores could be attributed to cultural influences in terms of item meaning and understanding, rather than differences resulting from the measuring of the constructs by the measuring instruments. If cultural influences are not accounted for, invalid conclusions regarding the constructs under study could be made with serious implications for culturally diverse settings such as South Africa. Where measurement equivalence is concerned with measurement and

the comparability of scores, bias is concerned with factors that influence the validity of cross-cultural comparisons.

The objectives of this study were to determine the construct equivalence, item bias, factorial validity and internal consistency of the Maslach Burnout Inventory – Human Services Survey (MBI-HSS) for emergency workers in Gauteng.

The Maslach Burnout Inventory – Human Services Survey (MBI – HSS)

A major development in the stimulation of scientific interest in burnout was the introduction of the easy to administer self-report questionnaires in the beginning of the eighties, the Maslach Burnout Inventory (MBI) in particular being the most popular (Maslach & Jackson, 1981; Maslach, Jackson & Leiter, 1996). It is estimated that the MBI was used in over 90% of the empirical publications on burnout since the mid eighties (Schaufeli & Enzmann, 1998). Koeske and Koeske (1993) state that the MBI has taken a central point in shaping the theoretical debate over the nature of burnout.

The MBI-HSS (Human Services Survey) was designed to measure burnout of people working in the human services and health care occupations by means of three subscales, namely Emotional Exhaustion, Depersonalisation and Personal Accomplishment. Emotional Exhaustion refers to a lack of energy and a feeling that emotional resources are depleted, whereas Depersonalisation refers to the treatment of recipients of services in a negative, cynical, detached and emotionally callous manner. Reduced Personal Accomplishment refers to negative self-evaluation, the belief that objectives are not reached, poor professional self-esteem and beliefs of insufficiency on the part of the service provider.

Initial interest in the first phase of development of the construct was limited to pragmatic and descriptive concerns and a lack of empirical study. It was only during the so-called empirical phase that the construct of burnout was operationally defined and researched by means of scientific study. Although the reliability and validity of the MBI-HSS are well established, there seems to be disagreement in the literature with regards to the factorial structure of the MBI-HSS (Cordes & Dougherty, 1993; Maslach & Jackson, 1986). Findings have indicated two-factor solutions (Brookings, Bolton, Brown & McEvoy, 1985), four-factor solutions

(Firth, McIntee, McKeown & Britton, 1985; Iwanicki & Schwab, 1981) and unitary conceptions of the factor structure of the MBI-HSS, adding the three factors together towards an overall measure of burnout (Golembiewski & Munzenrider, 1981; Meier, 1984).

In their sample of female human services professionals, Brookings et al. (1985) found a combined factor consisting of Emotional Exhaustion and Depersonalisation which they called the core of burnout, and a Personal Accomplishment factor. According to Firth et al. (1985), Emotional Exhaustion could be subdivided into two factors, namely Frustration and Discouragement about work and Emotional Draining in a nursing sample, whereas Iwanicki and Schwab (1981) argued for the separation of Depersonalisation into a job-related and student-related factor in their teacher sample. However, the most common solution in terms of the factorial structure of the MBI seems to be the existence of three conceptually distinct components of burnout (Golembiewski & Munzenrider, 1981; Green & Walkey, 1988; Maslach & Jackson, 1981, 1986).

In terms of reliability, the MBI-HSS seems to be an internally consistent scale with Cronbach alphas in various samples (e.g. graduate students, administrators in a health agency, teachers, social service and mental health workers, police officers, nurses, public service employees, etc.) constantly exceeding the proposed criterion of 0,70 proposed by Nunnally and Bernstein (1994) with the exception of the Depersonalisation scale in some samples (Schaufeli, Bakker, Hoogduin, Schaap & Kladler, 2001; Schaufeli, Enzmann & Girault, 1993). Initial research on the MBI-HSS ($N = 1\ 316$) yielded reliability coefficients of 0,90 for Emotional Exhaustion, 0,79 for Depersonalisation and 0,71 for Personal Accomplishment (Maslach et al., 1997). In a study of educators and business owners in the United States of America, Boles, Dean, Ricks, Short and Wang (2000) found Cronbach alpha coefficients of 0,89 and 0,90 (Emotional Exhaustion), 0,70 and 0,80 (Depersonalisation) and 0,76 and 0,78 (Personal Accomplishment) for the educators and small business owners respectively.

In the South African context, research evidence seems to confirm these findings. Basson and Rothmann (2002) found internal consistencies of 0,67 (Depersonalisation); 0,73 (Personal Accomplishment) and 0,89 for Emotional Exhaustion in a pharmacist sample. In their sample of psychiatric nurses, Levert, Lucas and Ortlepp (2000) reported alpha coefficients of 0,74 (Depersonalisation); 0,75 (Personal Accomplishment) and 0,78 (Emotional Exhaustion).

Studies on the test-retest reliability of the MBI-HSS seem to confirm the stability of the MBI-HSS scales over time. Coefficients of 0,82 for Emotional Exhaustion, 0,60 for Depersonalisation and 0,80 for Personal Accomplishment was found after 2 to 4 weeks for a sample of social welfare graduate students and health agency administrators. Although the findings were low to moderately high, they were found statistically significant at the 0,001 level (Maslach et al., 1997). Another study amongst teachers ($n = 248$) revealed coefficients of 0,60 for Emotional Exhaustion, 0,54 for Depersonalisation and 0,57 for Personal Accomplishment after 1 year (Jackson, Schwab & Schuler, 1986). Other studies confirmed stability of the scales of the MBI-HSS over time with correlations of 0,50 to 0,82 for time spans of three months to one year (Leiter & Durup, 1996). Schaufeli and Enzmann (1998) analysed 15 longitudinal studies with different versions of the MBI and found that the differences in variance between the first and second measurement, which can be explained by the first measurement ranged between 24% and 67% for Emotional Exhaustion, 12% and 61% for Depersonalisation and 20% and 62% for Personal Accomplishment.

The lowered internal consistency findings in terms of the Depersonalisation scale seem to be in line with reports in the literature regarding the high correlations between Emotional Exhaustion and Depersonalisation (Koeske & Koeske, 1989; Lee & Ashforth, 1990). Meta-correlations in a study by Lee and Ashforth (1996) provided support for this finding by establishing the intercorrelation between the Emotional Exhaustion scale and the Depersonalisation scale at 0,64. The relationship between Emotional Exhaustion and Personal Accomplishment was determined at -0,22, while Depersonalisation and Personal Accomplishment yielded a correlation of -0,34. Notwithstanding this fact, differential patterns of correlations between the dimensions of burnout and other study variables such as age, workload, autonomy, job challenge, satisfaction with status and recognition, role ambiguity, job satisfaction, turnover intention, role conflict and organisational commitment, to name but a few, seem to suggest the existence of the three distinct components of burnout (Friesen, Prokop & Sarros, 1988; Jackson, Schwab & Schuler, 1986; Maslach & Jackson, 1984; Lee & Ashforth, 1996; Schwab & Iwanicki, 1982). This argument was also posited by Maslach in arguing against the existence of a single unitary conception of burnout (Iwanicki & Schwab, 1981; Maslach & Jackson, 1981).

Three types or levels of equivalence can be identified, namely construct equivalence, measurement unit equivalence and scalar equivalence. *Construct equivalence* (also known as structural equivalence), the first level of equivalence, indicates the extent to which the same construct is measured across the cultural groups under study, in other words the comparison of cultural groups, because their scores are related to the same construct. On the other hand, in the case of structural inequivalence, no comparison can be made because scores obtained are not related to the same construct. In the second type (level) of equivalence, the measuring unit for the cultures under study is the same but the origins not. This is called *measurement unit equivalence* and normally reflects the characteristics of interval scale measurement where differences between groups can be obtained, but the amount of difference cannot be quantified unless a point of origin can be determined or assumed (as is the case with ratio scales). This is often problematic in cross-cultural research because the real comparative differences between cultures are not always known. *Scalar equivalence* or full comparability is the highest level of equivalence and is characterised by ratio scale characteristics, comparing cultural groups on the same construct(s) in terms of the same measuring unit relative to the same origin. In other words different cultural groups would be on the same ratio scale when scalar equivalence is achieved. In the current study, however, only the first level equivalence, namely construct equivalence will be computed.

Item bias, the second important computation in cross-cultural settings, concerns aspects of measurement validity in inter-cultural group comparisons (Van de Vijver & Leung, 1997). An unbiased item would provide the same average score on an item if two people from different cultural groups are similar in terms of the construct measured by this item. Stated differently, candidates with an equal standing in terms of the underlying construct measured by the instrument would obtain the same score on a given item, irrespective of group membership. This does not, however, imply that the averages of the cultural groups must be exactly the same, but only that those individuals who are in reality equal in terms of their standing on the construct under study, should in fact obtain the same average score on the given item even though they differ in terms of group membership. In reality, differences in group averages occur, but these differences could be ascribed either to bias or legitimate differences between cultures, also known as impact.

Bias can be caused by incidental differences in appropriateness of item content, inadequate item formulation and translation, but also from response characteristics of the sample and administration effects. The danger associated with bias is that it would lower the equivalence of the measuring instrument. Two types of bias can be distinguished, namely uniform and non-uniform bias (Van de Vijver & Leung, 1997). *Uniform bias* refers to the main effects of cultural differences, in other words the influence of bias on an item is consistent for all the score levels of that particular item. *Non-uniform bias* refers to the interaction effects of cultural differences and score level, indicating that across all score levels of an item, significantly larger differences in terms of a particular item exists in one group when compared to the other group across the different score levels for the specific item (Mellenbergh, 1982).

Only one study was conducted on the construct validity and item bias of the MBI. Storm and Rothmann (in press) investigated the construct equivalence and item bias of the MBI-GS for different race groups in the South African Police Service. They found construct equivalence for the MBI-GS, while no evidence of item bias could be found. Even though a different version of the MBI was used in this study, similar findings are expected for the MBI-HSS in the present study.

The hypotheses of this study are as follows:

- H1: Burnout, as measured by the MBI-HSS, can be defined as a three-dimensional construct with acceptable levels of internal consistency for each of its subscales, namely Emotional Exhaustion, Depersonalisation and Personal Accomplishment.
- H2: The MBI-HSS is an equivalent and unbiased measuring instrument for the different language groups of the emergency worker in Gauteng.

METHOD

Research design

A cross-sectional survey design was used. Cross-sectional designs are appropriate where

groups of subjects at various stages of development are studied simultaneously, whereas the survey technique of data collection gathers information from the target population by means of questionnaires (Burns & Grove, 1993). Although Schaufeli and Enzmann (1998) criticise the use of cross-sectional designs in the study of burnout research and recommend that experiments and longitudinal designs should be used as far as possible, it offers the best possible design for the validation of the MBI-HSS.

Study population

The study population could be defined as an accidental sample of emergency workers in the different regions of Gauteng, namely West Rand, Ekurhuleni, Sedibeng, Johannesburg Metropolitan, Tshwane, Kungwini and Nokeng Tsa Taemane. The total population of 2100 emergency workers in Gauteng was targeted. A response rate of 21,6% was achieved due to the nature of the job, e.g. call-outs, rotating working schedules and leave, of which 405 responses (19,3%) could be utilised. Descriptive information of the sample is given in Table 1.

Table 1
Characteristics of the Participants

Item	Category	Percentage
Home Language	Afrikaans	35,40
	English	15,59
	Sotho ¹	27,72
	Nguni ²	15,35
	Indigenous Independent Languages ³	2,23
	Eastern	1,49
	European	2,23
Position	Management	14,22
	Medical Specialists	7,11
	Emergency Medical Technicians	72,79
	Support Services	5,88
Area	West Rand	11,62
	Ekurhuleni	42,93
	Sedibeng	15,66
	Johannesburg Metro	11,11
	Tshwane	7,32
	Kungwini	10,10
	Nokeng Tsa Taemane	1,26
Education	Grade 11 or below	11,66
	Grade 12	20,86
	Tertiary education: Diploma	41,10
	Tertiary education: Degree	26,38
Gender	Male	77,72
	Female	22,28
Marital status	Single	25,62
	Engaged	10,10
	Married	58,37
	Separated/Divorced/Deceased	5,91

The sample consisted mainly of Afrikaans-speaking, married men (77,72%) with a tertiary education (diploma). The mean age of the participants was 33,50 years while the average length of service was 9,02 years.

¹ Sipedi; Sesotho; Setswana

² Siswati; isiNdebele; isiXhosa; isiZulu

³ Tshivenda; Shona; Tsonga

Measuring Battery

The Maslach Burnout Inventory – Human Services Survey (MBI-HSS) (Maslach & Jackson, 1986; Maslach, Jackson & Leiter, 1996) was used in this study. Also, biographical information was gathered regarding language, position, education, gender and marital status.

The *Maslach Burnout Inventory – Human Services Survey* (MBI-HSS) (Maslach & Jackson, 1986; Maslach, Jackson & Leiter, 1996) measures respondents' perceived experience of burnout in relation to the recipients of their service, care or treatment. The MBI-HSS consists of 22 items phrased as statements about personal feelings and attitudes, which is self-scored on a seven-point frequency scale, ranging from 0 “never” to 6 “every day”. The three subscales of the MBI-HSS include Emotional Exhaustion (EE) (nine items; e.g. “I feel emotionally drained from my work”), Depersonalisation (Dep) (five items; e.g. “I feel I treat some recipients as if they were impersonal objects”), and Personal Accomplishment (PA) (eight items; e.g. “I have accomplished many worthwhile things in this job”). High scores on Emotional Exhaustion and Depersonalisation and low scores on Personal Accomplishment are indicative of burnout. The subscales represent a related (Emotional Exhaustion and Depersonalisation) and independent (Personal Accomplishment), but separate multi-dimensional concept of the burnout construct. As such, the psychometric soundness of the MBI-HSS is well documented in the literature with internal consistencies usually well above the 0,70 Cronbach alpha level, except for the Depersonalisation scale in some samples (Schaufeli et al., 2001). Test-retest reliability ranging from three months to one year has been reported in the range of 0,50 to 0,82 (Leiter & Durup, 1996).

Statistical analysis

The statistical analysis was carried out with the SAS-program (SAS Institute, 2000). In the first step, means, standard deviations, skewness and kurtosis were determined to describe the data. The reliability and validity of the MBI-HSS were also determined by means of Cronbach alpha coefficients, mean inter-item correlations and their distribution scales, as well as confirmatory factor analysis with the use of the AMOS-program (Arbuckle, 1997).

It was decided to test for construct equivalence and item bias prior to commencing with the confirmatory factor analysis stage. Further analysis of the data would be more meaningful if possible inequivalence and item bias could be accounted for and removed before conducting covariance analysis (structural equation modelling analysis), resulting in more interpretable findings by eliminating unwanted error variance due to cultural group effects.

Construct (structural) equivalence was computed to compare the factor structure for different language groups included in this study. Exploratory factor analysis with a Procrustean target rotation was used to determine the construct equivalence of the MBI-HSS for the different language groups (Van de Vijver & Leung, 1997). According to Van de Vijver and Leung (1997), the comparison between the similarities of the factor structure of two cultural groups could be underestimated due to the arbitrary spatial allocation of factors during factor analysis. Rather, it is suggested that target rotation be conducted prior to comparing the factor solutions of cultural groups by rotating the factor loading matrices with regards to each other in order to maximise the agreement between the factors. During this process, one group is arbitrarily assigned the target group and the factor loadings of the other group rotated towards the target group to form a common factor loading matrix, also known as the centroid. Factorial agreement between the two groups is then estimated with Tucker's coefficient of agreement (Tucker's phi). Because this index is insensitive to multiplications of factor loadings, but sensitive to a constant added to factor loadings, sufficient agreement between the factor-solutions of the respective cultural groups would be a reflection of the extent to which a perfect multiplicative agreement is achieved between the factor loadings of the respective factor solutions of both groups in the centroid. The formula for Tucker's phi is as follows:

$$p_{xy} = \frac{\sum x_i y_i}{\sqrt{\sum x_i^2 y_i^2}}$$

Because this index does not have a known sampling distribution, it is impossible to establish confidence intervals. Values higher than 0,95 are deemed to be evident of factorial similarity or equivalence across different cultural groups (Van de Vijver & Leung, 1997), whereas values lower than 0,90 (Van de Vijver & Poortinga, 1994) or even 0,85 (Ten Berge, 1986) should be viewed as an indication of sufficient existing differences. This index is deemed sufficiently adequate to evaluate global factorial agreement, but if construct equivalence is

not acceptable, bias analysis should be conducted to detect possible inappropriate items in the questionnaire. Furthermore, bias analysis is necessary because construct equivalence does not presuppose the absence of bias. An instrument could therefore demonstrate acceptable construct equivalence and still be biased (Van de Vijver & Leung, 1997).

In order to determine item bias, an extension of Cleary and Hilton's (1968) use of analysis of variance were used to identify possible item bias (Van de Vijver & Leung, 1997). Bias was determined for each individual item. In the analysis, the individual item was specified as the dependent variable with cultural (language) groups and score groups as the independent variables in the variance analysis. Score groups were compiled, based on the total score on the MBI-HSS. A total of ten score levels was obtained by using percentiles identified through SAS UNIVARIATE, making it possible to assign at least 50 respondents to each score group. Two effects were tested for significance in the subsequent variance analysis, namely the main effects of culture (uniform bias) and interaction effects of culture and score level (non-uniform bias). If both the main effect of culture and the interaction of culture and score level is found to be non-significant, the item is taken to be unbiased. If any biased items are identified in this process it would be considered inappropriate to include in the next step, namely the structural analysis of the data. Consequently, biased items would be excluded for the remainder of the analysis and testing of theoretical models and their fit to the dataset.

In order to test the factorial validity of the MBI-HSS, structural equation modelling (SEM) methods were used with the maximum likelihood method of the AMOS program (Arbuckle, 1997). SEM is a statistical methodology that takes a confirmatory or hypothesis-testing approach to the analysis of a structural theory bearing on a specific phenomenon (Byrne, 2001, p.3). However, when model-fit with the data is computed, an exploratory factor analysis approach is taken in the post-hoc analysis of the data.

In the SEM analysis, the hypothesised structural (unobserved, latent factor) relationships are empirically tested by means of goodness-of-fit with the sample data. By means of the χ^2 statistic and several goodness-of-fit indices the degree of correspondence between the covariance matrices of the hypothesised theoretical structure and the empirical data is compared. Jöreskog and Sörbom (1993) aptly describe the χ^2 statistic as a badness-of-fit statistic, because smaller values indicate better fit. The χ^2 statistic however, if used in

isolation, can offer certain limitations. The statistic can be equated to the $(N-1)F_{min}$ statistic where N is the sample size and F_{min} the minimum fit function. This value tends to become substantial in the case where the model does not hold and the sample size is large, in which the likelihood of rejecting the null-hypothesis is increased (Byrne, 2001). In addressing this problem, one of the first alternative statistics to be included in the model was the $\chi^2/\text{degrees of freedom}$ or *CMIN/DF* statistic, which is the minimum discrepancy per degrees of freedom (Wheaton, Muthén, Alwin & Summers, 1977).

Various other alternative or so-called practical or ad-hoc indices of fit are utilised in the present study. The Goodness-of-fit Index (GFI) indicates the relative amount of variance and co-variance in the sample predicted by estimates of the population. Its value usually varies between 0 and 1 with values higher than 0,90 indicating good model fit with the data. The Adjusted Goodness-of-fit Index (AGFI) indicates the relative amount of variance accounted for by the model, corrected for the number of parameters that needed to be estimated (degrees of freedom) in the model. Both these values are classified as absolute values, because they compare the hypothesised model with no model at all (Hu & Bentler, 1995). Even though both indexes vary between 0 and 1, the distribution of AGFI is not known, and consequently no critical value can be obtained (Jöreskog & Sörbom, 1986). The Parsimony Goodness-of-Fit Index (PGFI) adds to a more realistic interpretation of the model but combines the issue of parsimony and goodness-of-fit by taking the amount of variables needed to be determined into account (Mulaik et al., 1989). Although this index generally demonstrates lower levels in comparison to the other fit indices at the 0,50 level in comparison to values higher than 0,90, values $> 0,80$ are considered to be more appropriate (Byrne, 2001).

The Normed Fit Index (NFI) is used to measure global model fit, giving an indication of the extent to which the hypothesised model compares with the most restricted model where relationships between variables are zero, in other words a perfectly independent model. This index also varies between 0 and 1 and tends to overestimate fit in smaller samples. The Comparative Fit Index (CFI) also compares the hypothesised and independent models, but takes sample size into account. The Tucker-Lewis Index (TLI) is a relative measure of covariation explained by the hypothesised model which has been specifically designed for the assessment of factor models (Tucker & Lewis, 1973). Critical values for good model fit have

been recommended for the NFI, CFI and TLI to be acceptable above the 0,90 level (Bentler, 1992), although recently Hu and Bentler (1999) recommended a cut-off value of 0,95.

Browne and Cudeck (1993) suggested the use of the Root Mean Square Error of Approximation (RMSEA), as well as the 90% confidence interval of the RMSEA to address the problems associated with sample size. The RMSEA provides an indication of the overall amount of error in the hypothesised model-data fit, relative to the number of estimated parameters (complexity) in the model. The recommended acceptable levels of the RMSEA should be 0,05 or less and should not exceed 0,08. Hu and Bentler (1999) suggest a value of 0,06 to indicate acceptable fit, whereas MacCallum, Browne and Sugawara (1996) suggested values between 0,08 and 1,0 to indicate mediocre fit and values above 1,0 poor fit.

RESULTS

As discussed in the procedure for statistical analysis above, construct equivalence and item basis were tested for the total 22-item MBI-HSS before commencing with the covariance analysis (structural equation modelling) to test the factorial structure of the MBI-HSS. Firstly, the construct equivalence of the MBI-HSS was determined for the different language groups⁴ presented in the sample of emergency workers. In this process, exploratory factor analysis and target (Procrustean) rotation were used by rotating the factor loadings of the different language groups to one target group and estimating factorial agreement based on Tucker's coefficient of agreement (Tucker's phi). These coefficients are given in Table 2 for the different language groups.

Table 2

Construct Equivalence of the MBI-HSS for Different Language Groups

Group	<i>N</i>	Percentage	Tucker's phi – Emotional Exhaustion	Tucker's phi – Depersonalisation	Tucker's phi – Personal Accomplishment
Afrikaans	143	35,40	0,96	0,98	0,96
English	63	15,59	0,95	0,96	0,98
Sotho	112	27,72	0,93	0,97	0,90
Nguni	62	15,35	0,79	0,87	0,71

⁴ The Indigenous independent language group, the Eastern and European language groups were excluded due to inadequate sample sizes.

Inspection of Table 2 shows that the Tucker's phi coefficient for the Afrikaans, English and Sotho groups to be acceptable in most instances above the 0,95 level with emotional exhaustion and depersonalisation for the Sotho group above the 0,90 level. The result of the Nguni group demonstrated an unacceptable Tucker's phi coefficient for all three dimensions of the MBI-HSS. This could also be attributable to small sample size in this category even though the finding was not replicated for the English group. In subsequent analysis it was decided to omit the Nguni group on the basis of incongruence of this group in relation to the other groups with regards to the burnout construct. Consequently, sample size was reduced to 323 henceforth, with only three language groups, namely Afrikaans, English and Sotho.

The item bias analysis was completed in the next step. The results of the individual item analysis of variance for the total 22 item MBI-HSS are presented in Table 3.

Table 3

Item Bias Analyses of the MBI-HSS

Item	Tot_SS	Df_g	SS_g	F_g	Eta square	Df_i	SS_i	F_i	Eta square
Emotional Exhaustion									
MBI1	1012,40	2	1,30	0,40	0,00	18	22,60	0,70	0,02
MBI2	1008,60	2	20,00	4,50	0,02	18	29,60	0,70	0,03
MBI3	1110,40	2	12,90	3,00	0,01	18	48,90	1,30	0,04
MBI6	904,80	2	2,80	0,70	0,00	18	38,10	1,00	0,04
MBI8	1016,40	2	7,20	2,00	0,01	18	19,60	0,60	0,02
MBI13	1073,70	2	33,10	7,30	0,03	18	17,70	0,40	0,02
MBI14	988,10	2	82,70	20,50	0,08*	18	49,30	1,40	0,05
MBI16	1027,00	2	20,4	4,40	0,02	18	42,50	1,00	0,04
MBI20	1119,90	2	2,80	0,70	0,00	18	50,70	1,30	0,05
Depersonalisation									
MBI5	1013,70	2	0,30	0,10	0,00	18	44,90	1,40	0,04
MBI10	1115,50	2	3,00	0,80	0,00	18	26,50	0,80	0,02
MBI11	1073,80	2	4,60	1,00	0,00	18	18,00	0,40	0,02
MBI15	1204,00	2	1,30	0,30	0,00	18	35,90	0,90	0,03
MBI22	1064,80	2	19,50	4,20	0,02	18	32,10	0,80	0,03
Personal Accomplishment									
MBI4	804,20	2	15,90	3,70	0,02	18	50,90	1,30	0,06*
MBI7	830,70	2	8,10	2,30	0,01	18	54,60	1,70	0,07*
MBI9	843,90	2	13,50	3,90	0,02	18	37,10	1,20	0,04
MBI12	824,90	2	4,50	1,30	0,01	18	31,00	1,00	0,04
MBI17	755,70	2	0,70	0,30	0,00	18	25,50	1,10	0,03
MBI18	751,40	2	13,60	5,30	0,02	18	37,80	1,60	0,05
MBI19	786,60	2	11,40	3,80	0,02	18	23,60	0,90	0,03
MBI21	676,60	2	3,50	1,40	0,01	18	29,10	1,20	0,04

* Practically significant difference of medium effect

According to Table 3, significant eta square values were obtained for item 14 (main effect, medium effect size) and for item 4 and item 7 (interaction effects, medium effect size), which means that these items could be regarded as uniformly biased (item 14) and non-uniformly biased (items 4 and 7) for three groups, namely Afrikaans, English and Sotho. In the next data-analysis step, namely the covariance analysis (structural equation modelling), these items were omitted. Consequently, the second research hypothesis is not supported because evidence of inequivalence (language group 4) and uniform (item 14) and non-uniform bias (items 4 and 7) have been detected for the MBI-HSS in the current sample.

Accordingly, these results point to the rejection of Hypothesis 2 because evidence of both uniform and non-uniform bias has been detected for the MBI-HSS in the current sample.

Next, structural equation modelling with the aid of the AMOS-program (Arbuckle, 1999) was used in order to test the original theoretical factorial model of the MBI-HSS (Maslach & Jackson, 1986) with the empirical data with the exclusion of items 4, 7 and 14. The purpose of this analysis was twofold: namely to confirm the factorial model of the MBI-GSS and to standardise the MBI-HSS for emergency workers in Gauteng. According to West, Finch and Curran (1995) an inflated χ^2 goodness-of-fit statistic could be obtained if the frequency distribution of items demonstrated deviations from normality as evidenced by elevated skewness (higher than 2,0) and kurtosis (higher than 7,0) levels. In the present study, however, inspection of the item distribution did not produce possible multivariate outliers and items approaching these critical levels of skewness and kurtosis.

Analysis of the data was done by firstly studying the overall χ^2 goodness-of-fit statistic in conjunction with its degrees of freedom and statistical significance or probability value. Comparative fit indices, such as the Goodness-of-Fit Index (GFI), the Adjusted Goodness-of-Fit Index (AGFI), the Parsimony Goodness-of-Fit Index (PGFI), The Normed-Fit Index (NFI), The Comparative-Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA).

In the second step, exploratory model modification analysis was initiated, based on the information gained from the modification indices where misspecifications in the empirical model were found. Alternative model construction and re-specification resulted in the alternative model being fitted to the data and evaluated during the post-hoc analysis process. This process continued to the point where an acceptable solution, comparable with previously related studies, could be found.

Hypothesised model

The first model tested was a 1-factor model of the MBI-HSS, but very poor overall fit was obtained as indicated by the statistically significant χ^2 value of 835,61 ($df = 152$; $p = 0,00$) (Golembiewski & Munzenrider, 1981; Meier, 1984). All the other fit indices confirmed an

extremely poor fit with the data. The fit statistics for the 19 item 1-Factor model of the MBI-HSS are provided in Table 4.

Table 4

Goodness-of-Fit Statistics for the 19 Item Hypothesised 1-Factor MBI-HSS Model

Model	χ^2	χ^2/df	GFI	AGFI	PGFI	NFI	TLI	CFI	RMSEA
Default model	835,61	5,50	0,73	0,66	0,58	0,51	0,50	0,56	0,12

Next, the full 3-factor model consisting of 19 items was tested. The structural output of the theoretical model is given in Figure 1. Statistics of the fit between the theoretical model and the empirical data is given in Table 5.

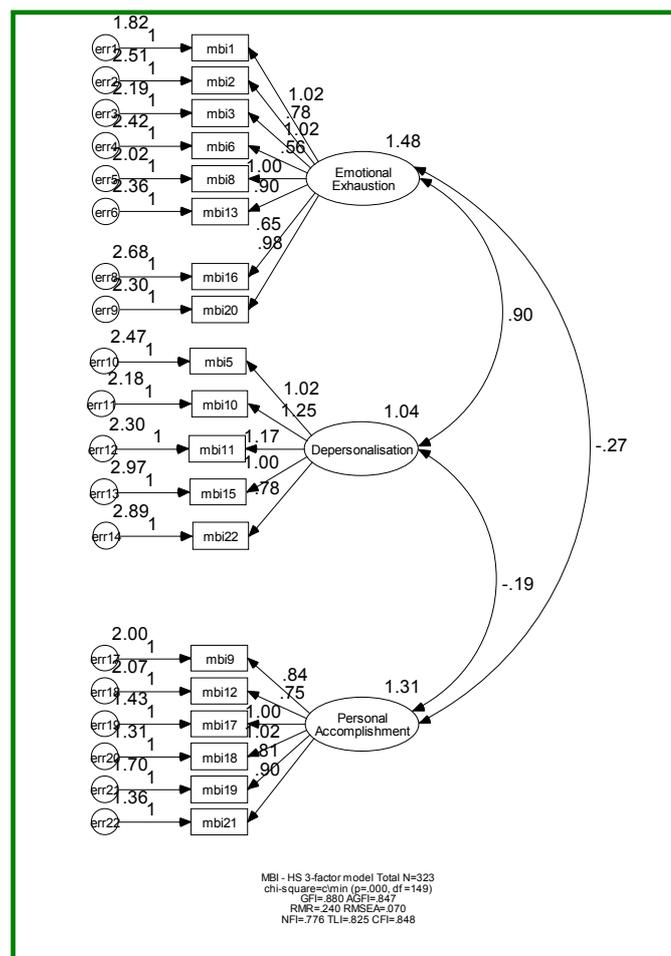


Figure 1. The hypothesised 19-item 3-factor MBI-HSS model

Table 5

Goodness-of-Fit Statistics for the 19 Item Hypothesised 3- Factor MBI-HSS Model

Model	χ^2	χ^2/df	GFI	AGFI	PGFI	NFI	TLI	CFI	RMSEA
Default model	383,24	2,57	0,88	0,85	0,69	0,78	0,83	0,85	0,07

In Table 5, the obtained χ^2 value of 383,24 ($df = 149$; $p = 0,00$) is indicative of a poor overall fit to the theoretical 3-factor model of the MBI-HSS. The goodness-of-fit indices also support this finding by not reaching the recommended critical values. The PGFI is lower than 0,80 and values lower than 0,90 for the NFI, TLI and CFI were found. The RMSEA value is also higher than the recommended value of 0,05. In order to obtain a better fit between the theoretical 3-factor model with the population data, modification of the model is needed. Inspection of the standardised residual covariance matrix led to the identification of items 12 and 22 for possible mis-specification as a result of some of their standardised residuals being larger than 2,58. Standardised residuals are analogous to z scores and make for easy interpretation, because numerically they represent the number of standard deviations the observed residuals are from the zero residuals that would exist in a perfect model fit with the data (Byrne, 2001). Values $> 2,58$ are considered to be large. These values are typically obtained by dividing the residuals of fit with their asymptotical standard errors in large samples (Jöreskog & Sörbom, 1988). Further investigation of the modification indices was done to determine possible mis-specification of factor-loadings in the theoretical model. Based on the regression weights, considerable cross-factor loadings were detected within the theoretical model for item 12 (Depersonalisation and Emotional Exhaustion). Also, considerable constrained error covariation was detected between error 4 and error 8 (items 6 and 16) ($MI = 26,41$). This is consistent with the finding of Byrne (2001) in a sample of teachers. Subsequent post hoc-analysis is required to re-specify the theoretical model and test it against the empirical data of the emergency worker population.

Post-hoc analyses

The rejection of the postulated theoretical model in the previous section initiated, by implication, a model development process, in other words an exploratory factor analysis process where the constructs of burnout are studied specifically in the emergency worker

population. Given the high cross-loading levels of item 12, it was decided to re-specify the model by deleting this variable. Also, error 4 and error 8 were allowed to correlate given the comparative high covariance associated with these errors. Although the values associated with the modification indices in this sample are not large in comparison with other related studies (Byrne, 1993, 2001; Leiter & Durup, 1994; Schaufeli & Van Dierendonck, 1993) they do represent significant mis-specifications in the model which could be alleviated by allowing these constrained error covariances to correlate within their postulated dimensions in the model, ultimately resulting in a better fit to the data. In her study of the MBI-HSS Byrne (1993) also deleted item 12 from a teacher sample. Subsequent analysis therefore includes only 18 items, labelled Model 2. Fit statistics for Model 2 are presented in Table 6.

Table 6
Goodness-of-Fit Statistics for Model 2

Model	χ^2	χ^2/df	GFI	AGFI	PGFI	NFI	TLI	CFI	RMSEA
Default model	311,32	2,38	0,90	0,87	0,69	0,80	0,85	0,87	0,07

The various fit statistics in Table 6 indicate an incremental improvement from the first model fit (Table 5) with the empirical data. With the exception of the GFI, all fit indices indicated a marginally acceptable fit at best with the data with $\chi^2 = 311,32$ ($df = 131$; $p = 0,00$). Inspection of the standardised residuals revealed that item 22 accounts for considerable misfit in the model. Further inspection of the modification indices confirmed considerable cross-loading of item 22 in the model. Also, error 10 and 13 (items 5 and 15) demonstrated comparatively higher constrained covariance levels ($MI = 14,95$). Once again, the values associated with the modification indices in this sample are not large in comparison with other related studies (Byrne, 1993, 2001; Leiter & Durup, 1994; Schaufeli & Van Dierendonck, 1993). They do represent significant mis-specifications in the model which could be alleviated by allowing these constrained error covariances to correlate within their postulated dimensions in the model, ultimately resulting in a better fit to the data. Consequently, Model 2 was re-specified to allow these parameters (error variance of items) to be freely estimated in Model 3. Also, item 22 will be omitted.

In the third model of the MBI-HSS as shown in Figure 2 only 17 items of the original 22 were retained, inclusive of correlated error between items 6 and 16 as well as items 15 and 5. The results of the analysis of fit with the empirical data are given in Table 7.

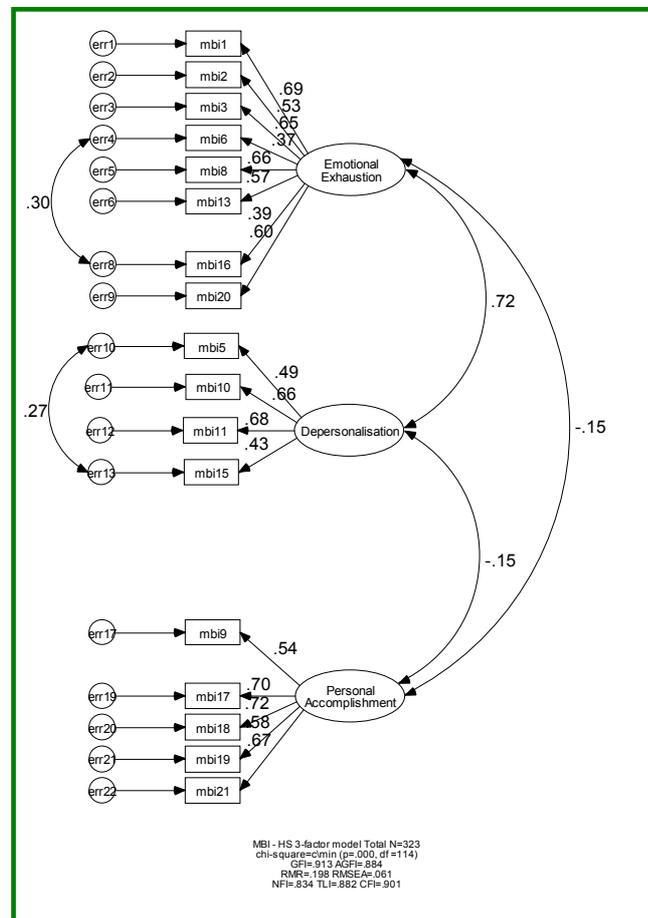


Figure 2. The third model of the 17-item 3-factor MBI-HSS model

Table 7

Goodness-of-Fit Statistics for Model 3

Model	χ^2	χ^2/df	GFI	AGFI	PGFI	NFI	TLI	CFI	RMSEA
Default model	249,41	2,19	0,91	0,88	0,68	0,83	0,88	0,90	0,06

The fit statistics in Table 7 indicate a good overall fit with the re-specified theoretical Model 3. The χ^2 value of 249,41 ($df = 114$; $p = 0,00$) is much lower than that of Model 1. The difference between Model 1 ($\Delta\chi^2_{(149)} = 383,24$) and Model 3 ($\Delta\chi^2_{(114)} = 249,41$) is ($\Delta\chi^2_{(35)} = 133,83$), which is substantial. A difference of $\Delta\chi^2_{(17)} = 61,91$ is found between Model 2 and

Model 3, which is still significant. The other fit statistics seem to support, in part, an acceptable fit of Model 3 with the empirical data. The GFI and AGFI both approach 0,90 and the CFI reached the 0,90 level. The PGFI = 0,68, NFI = 0,83 and TLI = 0,88, however, are below the acceptable levels of fit. Even though the RMSEA are above the 0,05 level, it is still below 0,08, which represents reasonable approximation errors in the population (Browne & Cudeck, 1989). Because this model represented acceptable comparative evidence of fit between the empirical data and a theoretical model in line with the theoretical premises of the MBI-HSS, no further modification of the model was deemed necessary. Correlations between the dimensions were the highest for EE and DP ($r = 0,72$) followed by DP and PA and EE and PA both with a correlation of -0,15. The re-specified model is given in Figure 2.

The descriptive statistics, alpha coefficients and inter-item correlations of the three factors of the MBI-GS are given in Table 8.

Table 8

Descriptive Statistics, Alpha Coefficients and Inter-Item Correlations of the MBI-HSS

Item	Mean	SD	Skewness	Kurtosis	$r(\text{Mean})$	α
Emotional Exhaustion (EE)	26,59	10,26	-0,08	-0,30	0,32	0,79
Depersonalisation (DP)	13,67	6,43	0,01	-0,44	0,35	0,68
Personal Accomplishment (PA)	32,11	8,22	-0,40	-0,24	0,41	0,78

The information in Table 8 indicates that the three factors of the MBI-HSS are normally distributed. With regards to the internal consistency of the scales, both Emotional Exhaustion and Personal Accomplishment seem to demonstrate acceptable coefficient alphas above the 0,70 guideline provided by Nunnally and Bernstein (1994). Furthermore, acceptable levels of inter-item correlations have been obtained for all three factors consistent with the guideline of $0,15 < r < 0,50$ suggested by Clark and Watson (1995). According to these authors, measures of internal consistency (Cronbach alpha) is a not an indication of the homogeneity or unidimensionality of a scale, but it is necessary to take the range of inter-item correlations into consideration when considering homogeneity and unidimensionality. In terms of these guidelines, the MBI-HSS seems to satisfy the requirements of homogeneity (internal consistencies acceptable) and unidimensionality (acceptable clustering of inter-item correlations around the mean).

These results provide support for Hypothesis 1, but the rejection of Hypothesis 2 because evidence of both uniform and non-uniform bias was found.

DISCUSSION

The aim of this study was to investigate the psychometric qualities of the MBI-HSS for emergency workers in the Gauteng Province of South Africa, and also to determine construct equivalence and bias for the different occupational groups in the sample with regards to the burnout construct. Prior to testing for the construct validity and internal consistency of the MBI-HSS, construct equivalence and item bias were tested for the total 22-item questionnaire to determine possible sources of inappropriate comparisons across language groups in this multicultural sample of emergency workers.

The results show that the burnout construct was not equivalent for the Nguni-group. Also evidence of uniform bias (item 14, “I feel I’m working too hard on my job”) and non-uniform bias (item 4, “I can easily understand how my recipients feel about things” and item 7, “I deal very effectively with the problems of my recipients”) was found for the MBI-HSS. In the case of uniform bias these results point to the fact that for item 14 differences between the Afrikaans, English and Sotho language groups differed from each other in a systematic manner. This means that even though the same total score on this item could be obtained for members of these language groups, systematic differences in mean scores above (or below) zero could be obtained for individual members of these language groups across all scoring possibilities of this item.

In the case of non-uniform bias systematic differences between the mean scores of language group members were also found. This means that the effect of cultural influences on these items allow for systematic differences in the mean scores of different language groups, which could be attributed to either consistent differences (uniform bias) or substantially progressive (or declining) (non-uniform bias) comparative differences in mean scores of language group members. In both instances membership to a specific language group precipitates systematic differences in mean scores, which is not reflective of the influence of valid differences between members of different cultural groups (also known as impact), but a reflection of language group membership. These findings seem to be contrary to the findings by Storm and

Rothman (in press) in the Police Service where no evidence of construct inequivalence, uniform or non-uniform bias was found for different cultural groups.

These findings could possibly be explained in terms of the possibility of semantic differences in terms of understanding of the content of the items by the different language groups. It is possible that these items were misunderstood by some of the language groups which led to inconsistent responses by the different language groups in this sample. Alternatively, the limitations due to sample size ($N = 323$), which has been reduced due to obtained inequivalence of the Nguni-group in terms of burnout levels, as well as inadequate subgroup sample sizes in terms of the respective language groups could significantly influence the findings. For instance during the bias analysis, the recommended number of observations per score level ($n = 50$) for each item could not be reached, opening the possibility of ascribing these results to pure chance.

In the next step, the psychometric soundness of the MBI-HSS was tested. Firstly, the 3-factor structure of the MBI-HSS was confirmed by means of a structured equation modelling analysis, which is consistent with literature findings across various samples, groups and countries (Enzmann et al., 1994; Leiter & Schaufeli, 1996; Schaufeli & Enzman, 1998). Also, reliability analysis confirmed sufficient internal consistency of the subscales. The observed correlations between the subscales were found to be outside the range of values reported in the Maslach Burnout Inventory Manual (Maslach et al., 1996). The correlation between Emotional Exhaustion and Depersonalisation ($r = 0,72$) is significantly higher than the value of 0,52 reported in the test manual. Correlations of -0,15 for Emotional Exhaustion and Personal Accomplishment and for Depersonalisation and Personal Accomplishment are slightly lower than the respective values of -0,22 and -0,26 reported in the test manual. Results from a meta-analytical study by Lee and Ashforth (1996) reported relationships of 0,64 for Emotional Exhaustion and Depersonalisation, -0,22 for Emotional Exhaustion and Personal Accomplishment, and -0,34 for Depersonalisation and Personal Accomplishment.

Based on conceptual and empirical grounds, items 12 and 22 were deleted from the original MBI-HSS, subsequently resulting in a 17-item scale being fitted to the data in the post-hoc analysis (including deletion of biased items 4, 7 and 14). This is consistent with the study of Byrne (1993) where item 12 was deleted in a cross-sectional study on the factorial validity of

the MBI-HSS in a teacher sample. In her study, Byrne (1993) argued that item 12 (“I feel very energetic”) probably doesn’t apply to the teacher sample, accounting for significant cross-loading in the modification index. Even though item 22 (“I feel recipients blame me for some of their problems”) were also found to contribute to unwanted variance in the model, no theoretical premise could be found for its omission in the post-hoc analysis. Possibly, this could be attributed to small sample size ($N = 323$) in subsequent analysis, or alternatively, that this item is perceived by emergency workers as not relevant in their work reality. Taken together, even though item 12 formed part of the post-hoc analysis, and validation is needed in future studies, the decision to eliminate this item is consistent with previous research (Byrne, 1993) and should therefore not be viewed as omission for the sole purpose of model re-specification to improve data fit. Even though item 22 increased model fit, its omission in post-hoc analysis can be explained on conceptual grounds and should be validated in future, larger, replicated studies in the emergency worker context.

Furthermore, error terms within the subscales were allowed to correlate in order to improve model fit. Although correlated error terms may be derived from specific characteristics of either the respondents or the items of a survey, they represent systematic rather than random measurement error in item responses. This could indicate, for example, a small omitted factor or, which is more likely the case in the current study, could be reflective of respondent characteristics contributing to the bias of an instrument by means of randomly responding to items without really reading the items, social desirability (Aish & Jöreskog, 1990) as well as a high degree of item content overlap (different wording of an item, but essentially meaning the same thing) (Byrne, 2001).

In conclusion, this study could serve as a standard regarding burnout levels in the Gauteng Emergency Services. The three-factor structure of the burnout construct is largely confirmed, as well as the internal consistency of the Emotional Exhaustion, Depersonalisation and Personal Accomplishment scales of the MBI-HSS. Based on the results obtained in the study, it would seem that the MBI-HSS could be regarded as a suitable instrument for measuring burnout in the Emergency Services in Gauteng. The MBI-HSS, therefore paves the way for future burnout research in the Emergency Services in South Africa.

A limitation of this study is its reliance solely on self-report measures. According to Schaufeli, Enzmann and Girault (1993) the exclusive use of self-report measures in validation studies increases the likelihood that at least part of the shared variance between measures can be attributed to method variance. Another limitation is the size of the sample, specifically the distribution of language groups and the sampling procedure in the present study, which have significant limitations in terms of the generalisation of the findings applied to the total study population. Future studies could benefit hugely in terms of a stratified random-sample design which would ensure sufficient representation of the different groups in the total population of emergency workers. Also, in terms of the research design, future studies should focus on longitudinal designs where inferences in terms of cause and effect could be made. Future studies conducted in this manner would confirm whether bias and equivalence does indeed exist for the different language groups of the Emergency Services regarding their levels of burnout as measured by the MBI-HSS. Also, the sample should be extended to include the emergency services of other provinces in South Africa in order to standardise the MBI-HSS for the Emergency Services in South Africa.

RECOMMENDATIONS

According to the results obtained in this study, the use of the MBI-HSS is recommended to assess burnout in Emergency Medical Services in Gauteng. However, items 4, 7 and 14, as well as items 12 and 22 should be omitted from the questionnaire in the multicultural context.

It is suggested that future research focus on the MBI-HSS in the emergency services in other provinces in South Africa to verify the current findings in terms of inequivalence and bias, as was the case in the present study. Also, although the MBI-HSS was found to be reliable and valid for this sample, other occupational settings should also be investigated in a similar manner. It is also important to determine norm levels for other occupations in South Africa. It is recommended that larger samples with a more powerful sampling method be utilised to enable generalisation of the findings to other similar groups. Also, the usage of adequate statistical methods, such as structural equation modelling, equivalence and bias analysis is recommended. It might also be necessary to translate the MBI-HSS to other languages used in South Africa.

In line with recent critique in terms of the negative wording of the items of the MBI-HSS, it is also recommended that future burnout research should focus on the usage of both positively and negatively phrased items to measure burnout in emergency workers. In reaction to building criticism on the negative phrasing of items of the MBI-scales (MBI-HSS, MBI-GS, MBI-ED) in the operationalisation of the burnout construct (Demerouti & Nachreiner, 1996; Lee & Ashforth, 1990), recent research demonstrated that the psychometric value of the MBI-GS could be greatly enhanced by including positively phrased items of the Disengagement Scale of the Oldenburg Burnout Inventory (OLBI) (Demerouti, Bakker, Vardakou & Kantas, 2003). Disengagement, described as distancing oneself from work and experiencing negative attitudes towards work, its content and work in general, was found to be significantly related to Cynicism (the opposite of Depersonalisation in the MBI-HSS). Therefore, it is recommended that future studies on burnout in the emergency work setting include the measurement of burnout in a general occupational sense (MBI-GS) with the inclusion of the Depersonalisation scale of the MBI-HSS.

Furthermore, positively phrased items of the Depersonalisation scale of the MBI-HSS should be developed and tested in future studies to determine whether this scale is an artefact of the MBI-HSS due to its one-sidedness. In the general sense, the measurement of burnout could be improved psychometrically by including positively phrased items which could even lead to the expansion of the burnout construct beyond Cynicism to a factor measuring mental disengagement from the work object, work content and work in general.

Finally, it cannot be ascertained beyond reasonable doubt that the influence of the “healthy worker effect” (Karasek & Theorell, 1990) contaminated the current findings, because those seriously affected by the possible prevalence of illness and disabling syndromes, could have left the organisation, leaving the so-called “healthy worker” behind. Furthermore, even if these workers formed part of the present study, identification could be difficult since no clinical guidelines for the identification of burnout has been developed for the South African labour force in different occupational settings. This is furthermore compounded by the nonprobability sampling procedure used in the present study. Future research should therefore focus on the development of clinical guidelines in terms of burnout in various occupational settings to enable comparison and identification across occupations according to national guidelines.

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THE VALIDATION OF THE UTRECHT WORK ENGAGEMENT SCALE FOR EMERGENCY WORKERS IN GAUTENG*

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ABSTRACT

The objectives of this research were to validate the Utrecht Work Engagement Scale (UWES) for emergency workers in the Gauteng Province of South Africa and to determine its construct equivalence and bias for different language groups. A cross-sectional survey design was used with an accidental sample ($N = 405$) of emergency workers in Gauteng. The UWES and a biographical questionnaire were administered. Structural equation modelling confirmed a 3-factor model of work engagement, consisting of Vigour, Dedication and Absorption with acceptable internal consistencies. Exploratory factor analysis with target rotations confirmed the construct equivalence of the engagement construct for the Afrikaans, English and Sotho groups, but not for the Nguni group. No evidence of uniform bias was found. Evidence of non-uniform bias was detected for Item 16 of the UWES for Afrikaans, English and Sotho groups.

OPSOMMING

Die doelstellings van hierdie navorsing was om die Utrecht-werksbegeesteringskaal (UWES) te valideer vir Nooddiensterkers in Gauteng en om die konstrukekwivalensie en sydigheid daarvan vir die verskillende taalgroepe te bepaal. 'n Dwarsnee opname-ontwerp met 'n beskikbaarheidsteekproef ($N = 405$) is gebruik. Die UWES en 'n biografiese vraelys is afgeneem. Strukturele vergelykingsmodellering het 'n 3-faktormodel, bestaande uit Energie, Toewyding en Absorpsie, bevestig met aanvaarbare interne konsekwenheid vir al drie skale. Eksploratiewe faktoranalise met teikenrotasies het konstrukekwivalensie vir die Afrikaanse, Engelse en Sotho groepe getoon, maar nie vir die Nguni groep nie. Nie-uniforme sydigheid is gevind vir Item 16 vir die Afrikaanse, Engelse en Sotho groepe.

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Researchers and practitioners in psychology are increasingly questioning the prevailing post-Second World War paradigm, described as the pathogenic paradigm where the orientation towards the abnormal, the origin of the “pathos” (disease, ill-health) is taken as the starting point of interventions and strategies aimed at fixing and treating ill-health (Seligman, 2002). This paradigm assumes maladjustment and ill-health of individuals and neglects positive aspects of human functioning (Barnard, 1994). The prevalence of the pathogenic paradigm in the health and social sciences is confirmed by Diener, Suh, Lucas and Smith (1999) reporting that 17 times more scientific articles were published on negative feelings than on positive feelings.

Recently, the field of psychology has been subjected to a transformation, in essence questioning many strongly held beliefs and premises at an individual, group and meta-theoretical level (Snyder & Lopez, 2002). The emergence of a new thinking-set or paradigm takes into account these strengths and resources, enabling the studying of “normal” or superhuman functioning which could previously not be understood in a problem-focused framework (Strümpfer, 2001). Seligman and Csikszentimihalyi (2000) call this the rising of “positive psychology”, a move from a preoccupation with the worst things in life towards also building and investigating positive qualities. According to these authors, psychology is not just the study of pathology, weakness and damage, but also the study of strength and virtue.

In a special edition of the *American Psychologist* called “Positive Psychology” an international attempt was made to stimulate research into positive psychology (Seligman & Csikszentimihalyi, 2000). Amongst the constructs investigated in this special edition were the concepts of striving for superiority (Adler, 1927), individuation (Jung, 1971), the mature personality (Allport, 1937), fully functioning personality (Rogers, 1951), internal-external locus of control (Rotter, 1966), will to meaning (Frankl, 1967), self-actualisation (Maslow, 1972), self-efficacy (Bandura, 1977), sense of coherence (Antonovsky, 1979), self-control (Rosenbaum, 1988) and intrinsic motivation (Ryan & Deci, 2000).

Similar tendencies can be detected in the burnout research literature. Empirical studies revealed that some employees, regardless of high job demands and long working hours, do not develop burnout in comparison to others but seemed to find pleasure in hard work and dealing with job demands (Schaufeli & Bakker, 2001). Consequently, theoretical and

empirical studies commenced on the concept of engagement, theoretically viewed as an antithesis of the burnout construct.

Development of the engagement construct took two different, but related paths. Firstly, Maslach and Leiter (1997) rephrased burnout as an “erosion of engagement with the job”. Subjective experience of work that started out as important, meaningful and challenging becomes unpleasant, unfulfilling and meaningless. Engagement, according to these authors, are characterised by energy, involvement and efficacy, the direct opposites of burnout, namely exhaustion, cynicism and lack of professional efficacy respectively. Consequently, engagement could theoretically be measured by means of the Maslach Burnout Inventory (MBI) when low scores on exhaustion and cynicism, and high scores on professional efficacy are obtained.

The second path was taken by Schaufeli and his colleagues, agreeing in part with the description of engagement proposed by Maslach and Leiter (1997), with the difference that engagement be measured with a different instrument worthy of operationalisation in its own right (Schaufeli, Salanova, Gonzáles-Romá & Bakker, 2002). They further argue that the simultaneous empirical investigation of burnout and engagement would be impossible with one instrument. Based on a theoretical analysis, burnout and engagement were conceptually related to each other, resulting in two work-related dimensions of well-being being identified, namely (1) *activation*, ranging from exhaustion to vigour, and (2) *identification*, ranging from cynicism to dedication (Schaufeli & Bakker, 2001). Also, personal accomplishment and absorption were included in the burnout and engagement constructs respectively, but not in an antithetical manner. It was argued that personal accomplishment was added only afterwards in the development of the Maslach Burnout Inventory (MBI) when a third factor was discovered during a factor-analysis of a preliminary version of the MBI (Maslach, 1993). Similarly, absorption was discovered as a related dimension of the engagement construct during 30 in-depth interviews (Schaufeli et al., in press).

Engagement is identified as a positive, fulfilling, work-related state of mind that is characterised by vigour, dedication and absorption. Furthermore, it is not a momentary and specific state, but a more persistent and pervasive affective-cognitive state which is not focussed on a particular object, event, individual or behaviour (Schaufeli Salanova, Gonzáles-Romá & Bakker, 2002). *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 the ability to persist even in the face of difficulties. *Dedication* is characterised by a sense of significance in one's work, feeling enthusiastic, inspired, proud and by viewing it as a challenge. *Absorption* is characterised by being totally happily immersed in one's work to the extent that it is difficult to detach oneself from it. Absorption comes close to the concept of "flow", an optimal state of experience where focussed attention, a clear mind, unison of body and mind, effortless concentration, complete control, loss of self-consciousness, time distortion and intrinsic enjoyment is experienced (Csikszentmihalyi, 1990).

Engagement, therefore, can be distinguished but not divorced from burnout in terms of its structure and operationalisation. Engagement is theoretically viewed as the opposite end of the continuum from burnout, which cannot be effectively measured by the Maslach Burnout Inventory (MBI), but with its own survey, the Utrecht Work Engagement Scale (UWES) (Schaufeli Salanova, Gonzáles-Romá & Bakker, 2002).

Since the development of the UWES by Schaufeli Salanova, Gonzáles-Romá and Bakker (2002), only a couple of studies could be found in the literature regarding work engagement. Schaufeli, Martinez, Pinto, Salanova, and Bakker (2002) conducted a confirmatory factor-analytical cross-national study amongst students from three different countries. Only one study in this regard could be found in South Africa, namely the study of Storm and Rothmann (in press) in the South African Police Service. As a result, information regarding the internal consistency, construct validity and comparability across cultural groups for the UWES, are lacking, especially in the multicultural South African context.

Not only is it important to obtain a valid and reliable measurement of engagement in South Africa from an empirical point of view, but also to enable the individual measurement of engagement in a valid and reliable manner in the emergency worker context in South Africa. According to Van de Vijver and Leung (1997), issues of measurement equivalence and bias should be computed for measuring instruments in any multicultural setting where groups from different cultural groups are compared in terms of a specific construct. This is particularly relevant where no norms exist for the different cultural groups, which is often the case in cross-cultural research. In line with recommendations of Poortinga (1989) and Van de Vijver and Leung (1997) measurement equivalence and bias should be tested for in a multi-

cultural context where differences in scores could be attributed to cultural influences in terms of item meaning and understanding, rather than differences resulting from the measuring of the constructs by the measuring instruments. If cultural influences are not accounted for, invalid conclusions regarding the constructs under study could be made with serious implications for culturally diverse settings such as South Africa. Where measurement equivalence is concerned with measurement and the comparability of scores, bias is concerned with factors that influence the validity of cross-cultural comparisons.

The objectives of this study were to determine the construct validity, internal consistency and cross-cultural comparability (construct equivalence and item bias) of the UWES in the South African Emergency Services in Gauteng.

The Utrecht Work Engagement Scale

Schaufeli, Salanova, Gonzáles-Romá and Bakker (2002) developed the Utrecht Work Engagement Scale (UWES) and reported acceptable internal consistency for it. Recent confirmatory factor-analytic studies confirmed the factorial validity of the UWES (Schaufeli et al., 2002; Schaufeli, Martinez, Pinto, Salanova & Bakker, 2002; Schaufeli, Bakker, Hoogduin, Schaap & Kladler, 2001). The findings showed internal consistent results for the three scales of the UWES. In a sample of undergraduate students ($N = 314$) and a sample of employees ($N = 619$) adequate Cronbach alphas were found as follows: Vigour (6 items), $\alpha = 0,68$ and $0,80$; Dedication (5 items), $\alpha = 0,91$ for both samples and Absorption (6 items), $\alpha = 0,73$ and $0,75$. In the student sample, the value of α could be improved by eliminating three items ($\alpha = 0,79$). The scales seems to be moderately to strongly related with the mean $r = 0,63$ in the sample of undergraduate students and the mean $r = 0,70$ in the sample of employees. Also, the fit of the hypothesised three-factor model with the data was found to be superior to the one-factor solution (Maslach, Schaufeli & Leiter, 2001; Schaufeli, Martinez, Pinto, Salanova & Bakker, 2002).

In a cross-cultural study regarding the UWES for students in Spain, Portugal and the Netherlands, the factorial validity of the UWES was confirmed and the internal consistency of the scales was found to be satisfactory (Schaufeli, Martinez, Pinto, Salanova & Bakker, 2002). Factor loadings of Absorption were found to be invariant across all samples, while

factor loadings of Vigour were invariant for only two of the three groups. The 3-factor model fit to the data was found to be superior in all three samples after removing three items, namely items 17, 16 and 11. Internally consistent Cronbach alphas ranged from 0,65 to 0,79 for Vigour (5 items); 0,77 to 0,85 for Dedication (5 items); and 0,65 and 0,73 for Absorption (4 items).

According to Van de Vijver and Leung (1997), three types or levels of equivalence can be identified, namely construct equivalence, measurement unit equivalence and scalar equivalence. *Construct equivalence* (also known as structural equivalence), the first level of equivalence, indicates the extent to which the same construct is measured across the cultural groups under study - in other words the comparison of cultural groups, because their scores are related to the same construct. On the other hand, in the case of structural inequivalence, no comparison could be made because scores obtained are not related to the same construct. In the second type (level) of equivalence, the measuring unit for the cultures under study is the same but the origins not. This is called *measurement unit equivalence* and normally reflects the characteristics of interval scale measurement where differences between groups can be obtained, but the amount of difference cannot be quantified unless a point of origin can be determined or assumed (as is the case with ratio scales). This is often problematic in cross-cultural research because the real comparative differences between cultures are not always known. *Scalar equivalence* or full comparability is the highest level of equivalence and is characterised by ratio scale characteristics, comparing cultural groups on the same construct(s) in terms of the same measuring unit relative to the same origin. In other words, different cultural groups would be on the same ratio scale when scalar equivalence is achieved. In the current study, however, only the first level equivalence, namely construct equivalence will be computed.

Item bias, the second important computation in cross-cultural settings, concerns aspects of measurement validity in inter-cultural group comparisons (Van de Vijver & Leung, 1997). An unbiased item would provide the same average score on an item if two people from different cultural groups are similar in terms of the construct measured by this item. Stated differently, candidates with an equal standing in terms of the underlying construct measured by the instrument would obtain the same score on a given item, irrespective of group membership. This does not, however, imply that the averages of the cultural groups must be exactly the same, but only that those individuals who are in reality equal in terms of their

standing on the construct under study, would in fact obtain the same average score on the given item even though they differ in terms of group membership. In reality, differences in group averages occur, but these differences could be ascribed either to bias or legitimate differences between cultures, also known as impact.

Bias can be caused by incidental differences in appropriateness of item content, inadequate item formulation and translation, but also from response characteristics of the sample and administration effects. The danger associated with bias is that it would lower the equivalence of the measuring instrument. Two types of bias can be distinguished, namely uniform and non-uniform bias (Van de Vijver & Leung, 1997). *Uniform bias* refers to the main effects of cultural differences, in other words the influence of bias on an item is consistent for all the score levels of that particular item. *Non-uniform bias* refers to the interaction effects of cultural differences and score level, indicating that across all score levels of an item, significantly larger differences in terms of a particular item exists in one group when compared to the other group across the different score levels for the specific item (Mellenbergh, 1982).

Concerning the study of UWES in South Africa, only one study regarding the internal consistency, factorial validity, structural equivalence and bias could be found in South Africa. In their study, Storm and Rothmann (in press) found that a re-specified one-factor model (after deleting items 3, 11, 15 and 16) fitted the data the best in their random, stratified sample of police members in South Africa ($N = 2396$). Although a re-specified 3-factor model (deleting items 4 and 14 and allowing items 8 and 9, items 15 and 16 to correlate) was also initially tested and satisfactory results obtained ($\chi^2 = 1130,28$; $df = 85$; $p < 0,001$; TLI = 0,93; CFI = 0,95; RMSEA = 0,07), the fit with the data was superior for a 1-factor model ($\chi^2 = 777,52$; $df = 63$; $p < 0,001$; TLI = 0,95; CFI = 0,96; RMSEA = 0,06). Internal consistencies of the three subscales were confirmed at acceptable levels according to the guideline of $\alpha = 0,70$ (Nunnally & Bernstein, 1994). Cronbach alphas were determined at 0,78 (Vigour); 0,89 (Dedication) and 0,78 (Absorption). No evidence of structural inequivalence or item bias was found for the UWES in this particular study. Since no South African studies in the emergency worker context could be found that considered the construct equivalence and item bias for the UWES, it is anticipated that these findings would be replicated in the current study and that

no evidence of construct equivalence and item bias would be found for the UWES in the South African Emergency services.

Accordingly, the research hypotheses pertaining to the present study can be formulated as follows:

H1: The Utrecht Work Engagement Scale (UWES) is an internally consistent and valid measurement for the work engagement construct for emergency workers in Gauteng.

H2: The construct equivalence of the Utrecht Work Engagement Scale (UWES) is acceptable and none of the items are biased towards different language groups of emergency workers in Gauteng.

METHOD

Research design

A cross-sectional survey design was used to reach the objectives of this research. According to Burns and Grove (1993) cross sectional designs are appropriate where groups of subjects at various stages of development are studied simultaneously, whereas the survey technique of data collection gathers information from the target population by means of questionnaires. Although Schaufeli and Enzmann (1998) criticise the use of cross-sectional designs in the study of burnout research and recommend that experiments and longitudinal designs should be used as far as possible, it offers the best possible design for the validation of the UWES.

Study population

An accidental sample of emergency workers in the different regions of Gauteng, namely West Rand, Ekurhuleni, Sedibeng, Johannesburg Metropolitan, Tshwane, Kungwini and Nokeng Tsa Taemane, was used. The total population of about 2100 emergency workers in Gauteng was targeted. A response rate of 21,6% was achieved due to the nature of the job, e.g. call-outs, rotating working schedules and leave, of which 405 responses (19,3%) could be utilised. Descriptive information of the sample is given in Table 1.

Table 1
Characteristics of the Participants

Item	Category	Percentage
Home Language	Afrikaans	35,40
	English	15,59
	Sotho ¹	27,72
	Nguni ²	15,35
	Indigenous Independent Languages ³	2,23
	Eastern	1,49
	European	2,23
Position	Management	14,22
	Medical Specialists	7,11
	Emergency Medical Technicians	72,79
	Support Services	5,88
Area	West Rand	11,62
	Ekurhuleni	42,93
	Sedibeng	15,66
	Johannesburg Metro	11,11
	Tshwane	7,32
	Kungwini	10,10
	Nokeng Tsa Taemane	1,26
Education	Grade 11 or below	11,66
	Grade 12	20,86
	Tertiary education: Diploma	41,10
	Tertiary education: Degree	26,38
Gender	Male	77,72
	Female	22,28
Marital status	Single	25,62
	Engaged	10,10
	Married	58,37
	Separated/Divorces/Deceased	5,91

The sample consisted mainly of Afrikaans-speaking, married men (77,72%) with a tertiary education (diploma). The mean age of the participants was 33,50 years while the average length of service was 9,02 years.

¹ Sipeedi; Sesotho; Setswana

² Siswati; isiNdebele; isiXhosa; isiZulu

³ Tshivenda; Shona; Tsonga

Measuring battery

The Utrecht Work Engagement Scale (UWES) (Schaufeli Salanova, González-Romá, & Bakker, 2002) was used in the present study. Also, biographical information was gathered regarding language, position, education, gender and marital status.

The *Utrecht Work Engagement Scale (UWES)* (Schaufeli Salanova, González-Romá, & Bakker, 2002) measures levels of engagement. Initially engagement was viewed as the positive antithesis of burnout, but according to the scale developers, it can be operationalised in its own right. The UWES is scored on a seven point frequency scale, ranging from 0 “never” to 6 “every day”. Three dimensions of engagement can be distinguished, namely Vigour (6 items; e.g. “I am bursting with energy in my work”), Dedication (5 items; e.g. “I find my work full of meaning and purpose”) and Absorption (6 items; e.g. “When I am working, I forget everything else around me”). Engaged individuals are characterised by high levels of Vigour and Dedication and also elevated levels of Absorption. Empirically, certainty needs to be obtained whether burnout and engagement are indeed opposites of the same continuum, while theoretically there seems to be a dichotomous relationship. Burnout and Engagement can be described as related but distinct concepts (Schaufeli, Salanova, González-Romá, & Bakker, 2002). In terms of internal consistency, reliability coefficients for the three subscales have been determined between 0,68 and 0,91. Improvement of the alpha coefficient (ranging from 0,78 to 0,89) seems possible without adversely affecting the internal consistency of the scale (Storm & Rothmann, in press). In light of the fact that most items on the UWES are framed in a positive manner it was decided to include and mix the MBI-HSS items in one questionnaire. The latter is predominantly phrased in a negative manner and should guard against the possibility of response sets.

Statistical analysis

The statistical analysis was carried out with the SAS-program (SAS Institute, 2000). In the first step, means, standard deviations, skewness and kurtosis were determined to describe the data. The reliability and validity of the UWES were also determined by means of Cronbach alpha coefficients, mean inter-item correlations and their distribution scales, as well as confirmatory factor analysis with the use of the AMOS-program (Arbuckle, 1997).

Construct (structural) equivalence was determined to compare the factor structure of the UWES for different language groups included in this study. Exploratory factor analysis with a Procrustean target rotation was used to determine the construct equivalence of the UWES for the different language groups (Van de Vijver & Leung, 1997). According to Van de Vijver and Leung (1997) the comparison between the similarities of the factor structure of two cultural groups could be underestimated due to the arbitrary spatial allocation of factors during factor analysis. Rather, it is suggested that target rotation be conducted prior to comparing the factor solutions of cultural groups by rotating the factor-loading matrices with regard to each other in order to maximise the agreement between the factors. During this process, one group is arbitrarily assigned the target group and the factor loadings of the other group rotated towards the target group to form a common factor loading matrix, also known as the centroid. Factorial agreement between the two groups is then estimated with Tucker's coefficient of agreement, also known as Tucker's phi. Because this index is insensitive to multiplications of factor loadings, but sensitive to a constant added to factor loadings, sufficient agreement between the factor-solutions of the respective cultural groups would be a reflection of the extent to which a perfect multiplicative agreement is achieved between the factor loadings of the respective factor solutions of both groups in the centroid. The formula for Tucker's phi is as follows:

$$p_{xy} = \frac{\sum x_i y_i}{\sqrt{\sum x_i^2 y_i^2}}$$

Because this index does not have a known sampling distribution, it is impossible to establish confidence intervals. Values higher than 0,95 are deemed to be evident of factorial similarity or equivalence across different cultural groups (Van de Vijver & Leung, 1997), whereas values lower than 0,90 (Van de Vijver & Poortinga, 1994) or even 0,85 (Ten Berge, 1986) should be viewed as an indication of sufficient existing differences. This index is deemed sufficiently adequate to evaluate global factorial agreement, but if construct equivalence is not acceptable, bias analysis should be conducted to detect possible inappropriate items in the questionnaire. Furthermore, bias analysis is necessary because construct equivalence does not presuppose the absence of bias. An instrument could therefore demonstrate acceptable construct equivalence and still be biased (Van de Vijver & Leung, 1997).

In order to determine item bias, an extension of Cleary and Hilton's (1968) use of analysis of variance was used to identify possible item bias (Van de Vijver & Leung, 1997). Bias was determined for each individual item. In the analysis, the individual item was specified as the independent variable with cultural (language) groups and score groups as the independent variables in the variance analysis. Score groups were compiled, based on the total score on the UWES. A total of ten score levels was obtained by using percentiles identified through SAS UNIVARIATE, making it possible to assign at least 50 respondents to each score group. Two effects were tested for significance in the subsequent variance analysis, namely the main effects of culture (uniform bias) and interaction effects of culture and score level (non-uniform bias). If both the main effect of culture and the interaction of culture and score level is found to be non-significant, the item is taken to be unbiased. If any biased items are identified in this process it would be considered inappropriate to include it in the next step, namely the structural analysis of the data. Consequently, biased items would be excluded for the remainder of the analysis and testing of theoretical models and their fit to the dataset.

In order to test the factorial validity of the UWES, structural equation modelling (SEM) methods was used with the maximum likelihood method of the AMOS program (Arbuckle, 1997). SEM is a statistical methodology that takes a confirmatory or hypothesis-testing approach to the analysis of a structural theory bearing on a specific phenomenon (Byrne, 2001, p. 3). However, when model-fit with the data is computed, an exploratory factor analysis approach is taken in the post-hoc analysis of the data.

In the SEM analysis, the hypothesised structural (unobserved, latent factor) relationships are empirically tested by means of goodness-of-fit with the sample data. By means of the χ^2 statistic and several goodness-of-fit indices the degree of correspondence between the covariance matrices of the hypothesised theoretical structure and the empirical data is compared. Jöreskog and Sörbom (1993) aptly describe the χ^2 statistic as a badness-of-fit statistic, because smaller values indicate better fit. The χ^2 statistic however, if used in isolation, can present certain limitations. The statistic can be equated to the $(N-1)F_{min}$ statistic where N is the sample size and F_{min} the minimum fit function. This value tends to become substantial in the case where the model does not hold and the sample size is large, in which the likelihood of rejecting the null-hypothesis is increased (Byrne, 2001). In addressing this problem, one of the first alternative statistics to be included in the model was the $\chi^2/\text{degrees}$

of freedom or *CMIN/DF* statistic, which is the minimum discrepancy per degrees of freedom (Wheaton, Muthén, Alwin & Summers, 1977).

Various other alternative or so-called practical or ad-hoc indices of fit are utilised in the present study. The Goodness-of-Fit Index (GFI) indicates the relative amount of variance and co-variance in the sample predicted by estimates of the population. Its value usually varies between 0 and 1 with values higher than 0,90 indicating good model fit with the data. The Adjusted Goodness-of-Fit Index (AGFI) indicates the relative amount of variance accounted for by the model, corrected for the number of parameters that needed to be estimated (degrees of freedom) in the model. Both these values are classified as absolute values, because they compare the hypothesised model with no model at all (Hu & Bentler, 1995). Even though both indexes vary between 0 and 1, the distribution of AGFI is not known, and consequently no critical value can be obtained (Jöreskog & Sörbom, 1986). The Parsimony Goodness-of-Fit Index (PGFI) adds to a more realistic interpretation of the model but combines the issue of parsimony and goodness-of-fit by taking the number of variables needed to be determined into account (Mulaik et al., 1989). Although this index generally demonstrates lower levels in comparison to the other fit indices at the 0,50 level in comparison to values higher than 0,90, values > 0,80 are considered to be more appropriate (Byrne, 2001).

The Normed Fit Index (NFI) is used to measure global model fit, giving an indication of the extent to which the hypothesised model compares with the most restricted model where relationships between variables are zero, in other words, a perfectly independent model. This index also varies between 0 and 1 and tends to overestimate fit in smaller samples. The Comparative Fit Index (CFI) also compares the hypothesised and independent models, but takes sample size into account. The Tucker-Lewis Index (TLI) is a relative measure of covariation explained by the hypothesised model which has been specifically designed for the assessment of factor models (Tucker & Lewis, 1973). Critical values for good model fit have been recommended for the NFI, CFI and TLI to be acceptable above the 0,90 level (Bentler, 1992), although recently Hu and Bentler (1999) recommended a cut-off value of 0,95.

Browne and Cudeck (1993) suggested the use of the Root Mean Square Error of Approximation (RMSEA), as well as the 90% confidence interval of the RMSEA to address the problems associated with sample size. The RMSEA provides an indication of the overall amount of error in the hypothesised model-data fit, relative to the number of estimated

parameters (complexity) in the model. The recommended acceptable levels of the RMSEA should be 0,05 or less and should not exceed 0,08. Hu and Bentler (1999) suggested a value of 0,06 to indicate acceptable fit, whereas MacCallum, Browne and Sugawara (1996) suggested that values between 0,08 and 1,0 indicate mediocre fit and values above 1,0 poor fit.

RESULTS

As discussed in the procedure for statistical analysis above, construct equivalence and item basis was tested for the total 17 item UWES before commencing with the factorial structure of the UWES by means of covariance analysis (structural equation modelling). Firstly, the construct equivalence of the UWES was determined for the different language groups⁴ presented in the sample of emergency workers. In this process, exploratory factor analysis and target (Procrustean) rotation were used by rotating the factor loadings of the different language groups to one target group and estimating factorial agreement based on Tucker's coefficient of agreement (Tucker's phi). These coefficients are given in Table 2 for the different language groups.

Table 2

Construct Equivalence of the UWES for Different Language Groups

Group	N	Percentage	Tucker's phi – Vigour	Tucker's phi - Dedication	Tucker's phi – Absorption	Total Congruence
Afrikaans	143	35,40	0,95	0,96	0,84	0,93
English	63	15,59	0,97	0,88	0,70	0,88
Sotho	112	27,72	0,98	0,92	0,89	0,94
Nguni	62	15,35	0,94	0,73	0,72	0,82

Inspection of Table 2 shows that the Tucker's phi coefficients for the Afrikaans, English and Sotho groups to be acceptable in most instances above the 0,90 level with Absorption for all three groups comparatively lower than the others coefficients. The phi coefficient for Dedication for the English group approaches 0,90. These results point to the fact that Absorption is not equivalent for the language groups. Overall, the total congruence seems to near to 0,90 with the exception of the Nguni group with lowered phi coefficients for both

⁴ The Indigenous independent language group, the Eastern and European language groups were excluded due to inadequate sample sizes.

Depersonalisation and Personal Accomplishment. Consequently, it was decided to omit the Nguni group in subsequent analysis due to lack of construct congruence of this group in relation to the other groups with regard to the engagement construct. As a result, sample size was reduced to 323 in the subsequent analysis with only three language groups, namely Afrikaans, English and Sotho.

The item bias analysis was completed in the next step. The results of the item analysis of variance for the total 17-item UWES are presented in Table 3.

Table 3
Item Bias Analyses of the UWES

Item	Tot_SS	Df_g	SS_g	F_g	Eta square	Df_i	SS_i	F_i	Eta square
Vigour									
UWES1	883,30	2	5,00	1,40	0,01	18	34,70	1,10	0,04
UWES4	759,20	2	1,10	0,40	0,00	18	31,20	1,20	0,04
UWES8	917,40	2	18,20	5,50	0,02	18	18,50	0,60	0,02
UWES12	866,50	2	5,80	1,50	0,01	18	20,90	0,60	0,02
UWES15	811,30	2	6,10	1,60	0,01	18	35,50	1,00	0,04
UWES17	712,50	2	0,70	0,20	0,00	18	32,10	1,10	0,05
Dedication									
UWES2	621,50	2	15,40	6,60	0,03	18	35,10	1,70	0,06
UWES5	715,60	2	3,90	2,00	0,01	18	28,60	1,60	0,04
UWES7	770,90	2	0,10	0,10	0,00	18	26,20	1,30	0,03
UWES10	552,10	2	7,10	3,00	0,01	18	18,10	0,90	0,03
UWES13	662,40	2	1,50	0,60	0,00	18	19,00	0,80	0,03
Absorption									
UWES3	973,10	2	2,10	0,60	0,00	18	21,70	0,60	0,02
UWES6	1125,80	2	8,90	1,60	0,01	18	26,20	0,50	0,02
UWES9	715,90	2	0,90	0,30	0,00	18	21,10	0,70	0,03
UWES11	807,70	2	6,50	1,90	0,01	18	45,00	1,50	0,06
UWES14	892,40	2	0,70	0,20	0,00	18	23,50	0,80	0,03
UWES16	941,70	2	8,50	1,80	0,01	18	72,70	1,70	0,08*

* Practically significant difference of medium effect

According to Table 3, a significant eta square value was obtained for item 16 (interaction effect, medium effect size), which means that this item could be regarded as non-uniform biased for the three groups, namely Afrikaans, English and Sotho. In the next data analysis step this item was omitted.

Consequently, the second research hypothesis is not supported because evidence of non-uniform bias (item 16) has been detected for the UWES in the current sample.

In the next step of the data-analysis process, the theoretical 3-factor model of the UWES is compared with the empirical data in a covariance analysis (also known as structural equation modelling) with the AMOS-program (Arbuckle, 1999). The purpose of this analysis is twofold, namely to investigate the factorial composition of the UWES scale and to standardise it for the Gauteng emergency worker. Based on the assertion of West, Finch and Curran (1995) of possible inflation of the χ^2 goodness-of-fit statistic, the frequency distribution of the items was inspected to identify deviations higher than 2,0 for skewness and higher than 7,0 for kurtosis. In the present study no multivariate outliers or elevated levels of skewness and kurtosis could be found in the item distributions.

In the first step, the obtained χ^2 goodness-of-fit statistic, degrees of freedom and probability or significant level are studied. Comparative fit indices, such as the Goodness-of-Fit Index (GFI), the Adjusted Goodness-of-Fit Index (AGFI), the Parsimony Goodness-of-Fit Index (PGFI), The Normed Fit Index (NFI), The Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA).

In the second step, exploratory model modification analysis was initiated based on the information gained from the modification indices in the instances where misspecifications in the empirical model were found. Alternative model construction and re-specification resulted in the alternative model being fitted to the data and evaluated during the post-hoc-analysis process. This process continued to the point where an acceptable solution, comparable with previous, related studies, could be found.

Hypothesised model

In this procedure, the 16-item theoretical model, as proposed by Schaufeli, Salanova, González-Romá and Bakker (2002), was tested. Firstly, the unidimensional model, which assumes that all 16 UWES items load on one single factor, was tested. Table 4 provides a summary of the fit statistics for the hypothesised 1-factor model. This model, however,

revealed very poor overall fit as indicated by the statistically significant χ^2 value of 329,99 ($df = 104; p = 0,00$). All the other fit indices confirmed a poor fit with the data.

Table 4

Goodness-of-Fit Statistics for the 16-Item Hypothesised 1-Factor UWES Model

Model	χ^2	χ^2/df	GFI	AGFI	PGFI	NFI	TLI	CFI	RMSEA
Default model	329,99	3,17	0,86	0,82	0,66	0,82	0,85	0,87	0,08

Consequently, the hypothesised 16 item 3-factor UWES model was fitted with the data. In Table 5 the fit statistics are provided for the fit between the original model and the empirical data. The structural output is provided in Figure 1.

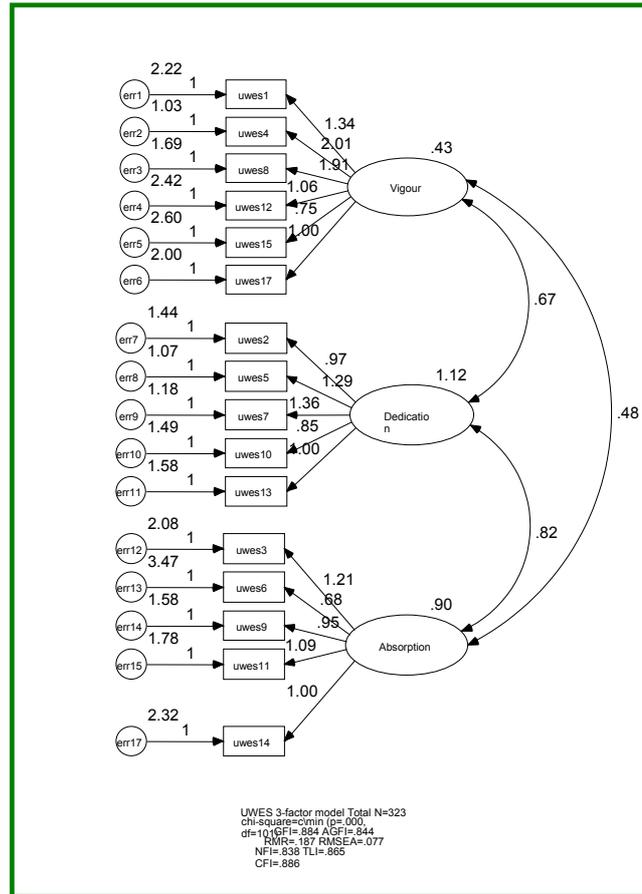


Figure 1. The hypothesised 16-item 3-factor UWES model

Table 5

Goodness-of-Fit Statistics for the 16-Item Hypothesised 3-Factor UWES Model

Model	χ^2	χ^2/df	GFI	AGFI	PGFI	NFI	TLI	CFI	RMSEA
Default model	291,94	2,89	0,88	0,84	0,66	0,84	0,87	0,87	0,08

According to Table 5, it is evident that the SEM analysis yielded a marginal fit at most between the theoretical model and empirical data. The statistically significant χ^2 value of 291,94 ($df = 101$; $p = 0,00$), the relatively low PGFI and elevated RMSEA value indicate possible existing misspecifications in the theoretical model could be modified for model-fit improvement in the post-hoc analysis.

Firstly, by studying the standardised regression weightings, item 15 demonstrated a comparatively low value of 0,29. Further inspection of the standardised residual covariances confirmed the problematic nature of item 15 with 2 loadings $> 2,58$. Standardised residuals

are analogous to z scores and make for easy interpretation, because numerically they represent the number of standard deviations the observed residuals are from the zero residuals that would exist in a perfect model fit with the data (Byrne, 2001). Values $> 2,58$ are considered to be large. These values are typically obtained by dividing the residuals of fit with their asymptotical standard errors in large samples (Jöreskog & Sörbom, 1988). The modification indices revealed a high cross-loading of item 15 on item 17 (MI = 38,51), accounting for significant misspecification in the model. Investigation of the error covariance matrix confirmed the same trend by identifying a constrained parameter loading between error 5 and error 6 (item 15 and item 17) (MI = 42,49). This is consistent with the findings of Storm and Rothmann (in press) allowing for item 15 and item 16 to be freely estimated (MI = 125,23). Having identified possible areas of misspecification in the model, modification of the theoretical model and fit with the empirical data is carried out in the post-hoc analysis process.

Post-hoc analysis

Since theoretical and empirical data-fit in the first model were unsatisfactory, the second theoretical model is specified by deleting item 15 due to its misspecifications in the first hypothesised theoretical model. The exploratory phase of this research therefore includes only 15 items of the original UWES scale of Schaufeli, Salanova, González-Romá and Bakker (2002) in the second 3-factor model-data fit process. The results are given in Table 6 with the structural output in Figure 2.

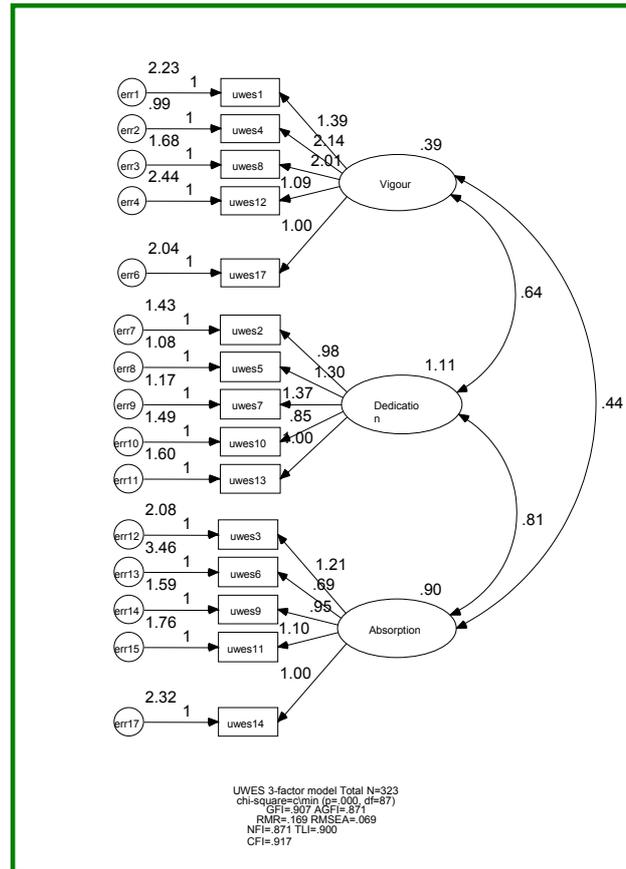


Figure 2. The second model of the 15-item 3-factor UWES

Table 6

Goodness-of-Fit Statistics for Model 2 of the UWES 3-Factor Structure

Model	χ^2	χ^2/df	GFI	AGFI	PGFI	NFI	TLI	CFI	RMSEA
Default model	219,23	2,52	0,91	0,87	0,66	0,87	0,90	0,92	0,07

According to the fit statistics in Table 6, an overall good fit with the data is obtained by the second re-specified 3-factor model. The χ^2 value of 219,23 ($df = 87$; $p = 0,00$) is significantly higher than that of the first 3-factor model fitted to the data ($\Delta\chi^2_{(14)} = 72,71$). Furthermore, the goodness-of-fit statistics indicate acceptable levels of model fit for the GFI, TLI and CFI, with AGFI and NFI approaching 0,90. Also, the RMSEA value is lower than 0,80 and is indicative of acceptable fit. Disappointing was the lowered level of PGFI, which is understandable, considering that 2 items were deleted from the initial theoretical model as postulated by Schaufeli, Salanova, González-Romá and Bakker (2002). Since model fit was determined to be acceptable and the results agreed with the theoretical assumptions

underlying the structure of the UWES (Schaufeli, Salanova, González-Romá, & Bakker, 2002), no further modifications of the model were deemed necessary. The correlations between the three engagement dimensions were quite high. Vigour (VI) and Dedication (DE) were the highest with a correlation of 0,97, followed by DE and Absorption (AB) with a correlation of 0,82, and VI and AB with a correlation of 0,75. The re-specified model is illustrated in Figure 2.

The descriptive statistics, alpha coefficients and inter-item correlations of the three factors of the UWES are given in Table 7.

Table 7

Descriptive Statistics, Alpha Coefficients and Inter-Item Correlations of the UWES

Item	Mean	SD	Skewness	Kurtosis	$r(\text{Mean})$	α
Vigour (VI)	23,82	6,46	-0,37	0,14	0,32	0,70
Dedication (DE)	22,64	6,37	-0,92	0,48	0,49	0,83
Absorption (AB)	21,82	6,58	-0,23	0,06	0,29	0,67

From the results in Table 7 it is evident that the scales are normally distributed with all three scales somewhat negatively skew and positively peaked. The internal consistency of the three scales of the UWES is reasonably acceptable. Even though the Absorption scale is below the guideline of 0,70 (Nunnally & Bernstein, 1994), it is consistent with the findings of Schaufeli, Martinez, Pinto, Salanova and Bakker (2002) in their cross-national study of students' engagement and burnout levels where alpha coefficients for Absorption ranged between 0,65 and 0,73. Concerning the mean inter-item correlations, acceptable correlations were found for all three scales in line with the guideline of $0,15 < r < 0,50$ (Clark & Watson, 1995). Because internal consistency is a prerequisite for homogeneity, but not for unidimensionality, the distribution of the inter-item correlations was studied in terms of their spread around the inter-item correlation mean. Acceptable clustering of inter-item correlations around the mean inter-item correlations were found for all three scales of the UWES, therefore confirming the unidimensionality of the scales. In summary, the three scales of the UWES demonstrated acceptable levels of internal consistency, homogeneity and unidimensionality.

These findings provide support for Hypothesis 1, while Hypothesis 2 is rejected on the basis of evidence of non-uniform bias for the UWES in the current sample.

DISCUSSION

The psychometric properties of the UWES were investigated in this study, specifically for emergency workers in the Gauteng Province of South Africa. The objectives were to determine the construct validity and internal consistency of the UWES and to test for construct equivalence and bias for the different language groups in the sample of emergency workers.

In the first analysis, both construct equivalence and bias were tested to determine whether the construct of engagement are comparable across language groups and to control for possible cultural influences in items responses. Construct inequivalence was detected for the three scales of the UWES for the Nguni language group and evidence of non-uniform bias was found for item 16 (“It is difficult to detach myself from my job”) of the UWES in this study. These findings seem to be contrary to the findings of Storm and Rothmann (in press) where no evidence of inequivalence for different cultural groups and no evidence of either uniform or non-uniform bias was detected in their South African Police Service sample, thus item 16 seems to be discriminate in comparatively different measures for the different language groups. This finding suggests that the effect of cultural influences on this item allow for substantially progressive (or declining) differences in the mean scores of the different language groups across all scoring possibilities of this item. If one considers the possibility of semantic differences in terms of understanding of the item (“It is difficult to detach myself from my job”) by the different language groups, it is possible that this item was misunderstood by some of the language groups which led to inconsistent responses in this sample.

Next, the structural validity of the UWES was investigated with the aid of structural equation modelling analysis. The 3-factor structure of the UWES was confirmed for the three scales of the UWES, namely Vigour, Dedication and Absorption, a finding supported by research in different samples, groups and countries (Schaufeli, Martinez, Pinto, Salanova & Bakker, 2002; Schaufeli, Salanova, González-Romá & Bakker, 2002; Storm & Rothmann, in press).

Also, the internal consistency of the scales was found to be satisfactory and in line with reported findings in the literature.

Observed correlations between the subscales were consistent with previous findings where very high inter-correlations were found for the subscales of the UWES (Schaufeli, Martinez, Pinto, Salanova & Bakker, 2002; Schaufeli, Salanova, González-Romá & Bakker, 2002). The highest correlation was found between Vigour and Dedication (0,97), followed by Dedication and Absorption with $r = 0,82$ and $r = 0,75$ between Vigour and Absorption.

The elimination of item 15 (“I am very resilient, mentally, in my job”) can be validated on both conceptual and theoretical grounds, resulting in a 15-item UWES scale. In their study, Storm and Rothmann (in press) found considerable cross-loadings pertaining to this item in their validation of the UWES for police members. Even though deletion of this item formed part of the post-hoc analysis, and validation is needed in future studies, the decision to eliminate this item is based partly on previous research (Storm & Rothmann, in press) and should therefore not be viewed as a strategy for model modification solely for the purpose of data fitting.

Notwithstanding the motivation for deleting variables from the UWES for reasons of bias and model-fit improvement, it is disconcerting that model parsimony is sacrificed in the process, in other words, relationships have been eliminated which could be viewed as an erosion in meaning of the work engagement construct. Also, it is possible, due to the relatively small sample size and sampling procedure (subgroup representation) that these findings could have been obtained by pure chance. Furthermore, the possibility of semantic differences in meaning attributed to these items cannot be excluded, especially in view of the comparison between groups on the basis of linguistic groupings.

In conclusion, the results of this study could serve as a standard for measuring engagement levels of Emergency workers in Gauteng. The three-factor structure of the UWES is largely confirmed with suitable internal consistency of its subscales of Vigour, Dedication and Absorption. The results further show that the UWES is a suitable instrument for measuring engagement of emergency workers in Gauteng and further possibilities in terms of research is made possible along similar lines.

A limitation of this study is its reliance solely on self-report measures. According to Schaufeli, Enzmann and Girault (1993), the exclusive use of self-report measures in validation studies increases the likelihood that at least part of the shared variance between measures can be attributed to method variance. Another limitation is the size of the sample, specifically the distribution of language groups and the sampling method. Future studies could benefit greatly by utilising a random, stratified sample with the proportionate inclusion of all language or race groups in the sample. Future studies conducted in this manner would confirm whether bias and equivalence does indeed exist for the different language groups of the Emergency Services regarding their levels of engagement as measured by the UWES. Also, the sample should be extended to include the emergency services of other provinces in South Africa in order to standardise the UWES for the Emergency Services in South Africa.

RECOMMENDATIONS

According to the results obtained in this study, the use of the UWES is recommended to assess engagement in Emergency Medical Services in Gauteng. However, items 15 and 16 should be omitted from the questionnaire in the multicultural context.

It is suggested that future research could focus on the UWES in the Emergency Services in other provinces in South Africa, to verify the current findings in terms of inequivalence and bias, as was the case in the present study. Also, although the UWES was found to be reliable and valid for this sample, other occupational settings should also be investigated in a similar manner. It is also important to determine norm levels for other occupations in South Africa. It is also recommended that larger samples with a more powerful sampling method be utilised to enable generalisation of the findings to other similar groups. Also, the usage of adequate statistical methods, such as structural equation modelling, equivalence and bias analysis is recommended.

In future studies some of the items of the UWES (e.g. 15 and 16) could be changed so that it would be more understandable to different language groupings. The possibility of translating the UWES to other South African languages should also be considered.

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OCCUPATIONAL STRESS OF EMERGENCY WORKERS IN GAUTENG*

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ABSTRACT

The objectives of this study were to determine the construct validity, internal consistency, construct equivalence and item bias of the Emergency Worker Stress Inventory (EWSI) and to identify occupational stressors for emergency workers. A cross-sectional survey design was design. An accidental sample ($N = 405$) of emergency workers in Gauteng was used. The EWSI was developed as a measuring instrument and administered together with a biographical questionnaire. Three internally consistent factors, namely Lack of Resources, Job Demands and Inherent Emergency Work Stressors were extracted. Low structural equivalence regarding perceived stressors was detected for the Nguni-language group. Practically significant differences were found between occupational stressors of emergency workers in different positions, but not for language groups.

OPSOMMING

Die doelstellings van hierdie navorsing was om die konstrugeldigheid, interne konsekwentheid, konstrukekwivalensie en itemsydigheid van die Nooddienswerker Stresvraelys (NWSV) te bepaal en beroepstressore vir nooddienerswerkers te identifiseer. 'n Dwarssnee opname-ontwerp is gebruik. Die studiepopulasie is met behulp van 'n beskikbaarheidsteekproef ($N = 405$) van nooddienerswerkers in Gauteng verkry. Die NWSV is ontwikkel vir die studie en saam met 'n biografiese vraelys afgeneem. Drie interne konsekwente faktore, naamlik Tekort aan Hulpbronne, Poseise en Inherente Nooddiens Stressore is onttrek. Lae konstrukekwivalensie is ten opsigte van waargenome stressore vir die Nguni taalgroep gevind. Prakties betekenisvolle verskille is tussen die beroepstressore van nooddienerswerkers in verskillende posisies gevind, maar nie ten opsigte van taalgroepe nie.

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The emergency work profession has been identified as one of the most stressful environments (Phipps, 1988; Whitley, Gallery, Allison & Revicki, 1989; Young & Cooper, 1995). Also, emergency workers tend to experience very high levels of stress both in their work and their family lives (Anshel, 2000; Beaton, Murphy, Pike & Corneil, 1997; Violanti & Paton, 1999). According to Marmar, Weiss, Metzler, Ronfeldt and Foreman (1996) and Mitchell and Dyregrov (1993) emergency workers such as paramedics demonstrate higher levels of psychological stress which are already elevated above the general population. The demands that these emergency workers are exposed to lead to a range of social, physical and psychological responses which may be extremely stressful and threatening to their well-being (Moran & Britton, 1994).

The voluminous body of stress literature is quite clear about the negative effects of occupational stress. These effects include impaired performance or reduction in productivity, diminishing levels of customer service, health problems, absenteeism, turnover, industrial accidents, alcohol and drug usage and purposefully destructive behaviours (e.g. spreading of rumours and stealing) (Cooper & Payne, 1988; Karasek & Theorell, 1990; Levi, 1981; Matteson & Ivancevich, 1982; Perrewé, 1991; Quick, Quick, Nelson & Hurrell, 1997; Wright & Smye, 1996). The potential direct and indirect costs associated with various stress-related consequences command more than adequate attention from the manager of any business. In the United States alone it is estimated that the overall business and industry costs associated with burned-out or dispirited employees to be in the range of \$150 to \$180 billion per annum (Wright & Smye, 1996).

In the literature many approaches exist towards the understanding of the stress-response in occupational settings, such as the Person-Environment Fit model (French, Kaplan & Harrison, 1982) and the Demand-Control Model (Fox, Dwyer & Ganster, 1993). Where the former views psychological and physical stress consequences as a result of an incongruent person-environment fit, the Demand-Control Model looks at the interaction between the demands of the situation and the individual's decisional freedom in terms of meeting the job requirements. Although these models influenced a considerable body of research on stress, they focus on general demands of the job and the skills and abilities of the incumbent, not taking into account the specific pressures and the role of individual differences in personality and coping resources (Spielberger & Vagg, 1999). The transactional approach as offered by Lazarus (1991) views the interaction between the individual and his or her environment as a

transaction, allowing for the individual's cognitive appraisal of stressful situations and the selective identification and utilisation of coping resources. According to Dewe, Cox and Ferguson (1993), stress is not a factor that resides in either the individual or the environment; rather it is viewed as a dynamic cognitive state where the individual interaction with the environment can be described as an ongoing transaction. In this transaction, individuals make appraisals of their encounters with their environments and attempt to cope with the issues arising from this interaction.

In terms of the current research, the stressful experience of the emergency worker is studied. Emergency work is often associated with negative health outcomes, such as an increased risk of injury, cardiovascular disease and other health problems, psychological health disorders and burnout (Grigsby & McKnew, 1988; Hammer, Mathews, Lyons & Johnson, 1986; Kowalski & Vaught, 2001; Palmer, 1983). In South Africa, the context is no different. In a survey ($N = 1000$) conducted by the Work Trauma Foundation in South Africa, emergency workers (ambulance personnel, technical assistants and hospital personnel) indicated safety concerns, physical and verbal abuse (racist comments) as major stressors in their jobs. Alarmingly, in 75% of the cases surveyed, weapons were used to threaten medical personnel (Smith, 2003). When emergency workers are not able to cope with stressful events, they often experience undesirable psychological and somatic outcomes, which could lead to chronic stress, burnout and even quitting the profession (Anshel, 2000).

Consequently, the study of stressors specific to the emergency worker seems imperative from a research point of view. Not only is it important to establish reliable and valid methods of measurement with regards to perceived stress, it is also important to consider cultural diversity in a multicultural setting such as South Africa. In this regard, Van de Vijver and Leung (1997) recommended that issues of measurement equivalence and bias should be computed for measuring instruments in any multicultural setting where groups from different cultural groups are compared in terms of a specific construct. This is particularly relevant where no norms exist for the different cultural groups, which is often the case in cross-cultural research. In line with recommendations of Poortinga (1989) and Van de Vijver and Leung (1997) measurement equivalence and bias should be tested for in a multi-cultural context where differences in scores could be attributed to cultural influences in terms of item meaning and understanding, rather than differences resulting from the measuring of the constructs by the measuring instruments. If cultural influences are not accounted for, invalid

conclusions regarding the constructs under study could be made with serious implications for culturally diverse settings such as in South Africa. Where measurement equivalence is concerned with measurement and the comparability of scores, bias is concerned with factors that influence the validity of cross-cultural comparisons.

According to Spielberger and Vagg (1999), the identification of major sources of stress at work offers a twofold benefit for both management and employees; firstly by resulting in work environment changes that reduce stress and increase productivity, and secondly by facilitating the development of effective interventions that could reduce the debilitating effects of occupational stress. In terms of stress research, Meyerson (1994) and Handy (1988, 1991) point to important considerations. According to these authors, stress occurs in a particular context, since individuals differ in the meaning they attribute to stressful experiences. The influence of social construction of stressful experiences should also be taken into account.

Dewe (1989) adds another dimension to the measurement of stress in occupational settings by noting that the specific meaning attributed to stressful events and the perceived intensity should also be extended to include the frequency of the experienced stressor. Consequently, severity of a stressor can be obtained where an infrequently experienced stressor is not overestimated by only taking its perceived intensity into account. A further useful taxonomy of stressors in terms of their intensity and frequency is the distinction between acute and chronic stressors. Where an acute stressor is derived from a rather sudden event with relative short duration in which an almost immediate psychological reaction is evoked, chronic stressors are experienced less frequently and intensely in the sense that they don't require large amounts of physical and psychological adaptation (Farmer, 1990; Newton, 1989).

Not only is it important to determine the stressors endemic to the emergency worker, but also to validate a suitable instrument for the early identification of stressors to address these in suitable interventions. Since no valid and reliable measurement instrument could be found for the measurement of emergency worker stress in the South African context, it is one of the objectives of this research to develop a reliable and valid stress measure for the emergency worker in South Africa. Only one related study could be found in this regard, namely the study of Pienaar and Rothmann (in press) that developed a valid and reliable occupational stress measure for the South African Police Services.

The objectives of this study were to determine the construct validity, internal consistency, construct equivalence and item bias of an occupational stress measure and to identify job stressors for emergency workers.

Occupational stress

According to Schaufeli and Bakker (2002), any occupation can be viewed from a stress perspective in terms of two elements, namely job demands and job resources. Job demands are those physical, psychological, social or organisational aspects of the job which require sustained physical and/or psychological (i.e. cognitive or emotional) effort and as a consequence are associated with physiological or psychological costs, e.g. work overload, personal conflicts and emotional demands, such as demanding clients. Although these demands are not necessarily negative, they can turn into stressors when trying to meet these demands requires sustained effort, and consequently they become associated with negative responses in the long run, such as depression, anxiety, or burnout. Job resources, on the other hand, refer to those physical, psychological, social or organisational aspects of the job that: (1) reduce the job demands and therefore the associated physiological and psychological costs, or (2) are functional in the achievement of work goals, or, (3) stimulate personal growth, learning and development, through, for example, social support, autonomy, feedback and job security.

Based on the Demand-Control model of Karasek (Fox, Dwyer & Ganster, 1993) and research results on the Maslach Burnout Inventory (MBI), Maslach and Jackson (1986) postulated that the presence of particular demands (i.e. work overload and personal conflicts) and the absence of particular resources (i.e. control coping, social support, autonomy and decision involvement) would lead to the prevalence of burnout, resulting in other expected negative outcomes, such as physical illness, turnover, absenteeism, and diminished organisational commitment. Subsequent research used this descriptive heuristic framework to understand the well-being of employees in stressful occupational environments. Demerouti, Bakker, Nachreiner and Schaufeli (2001) successfully tested their Job Demands-Resources (JD-R) model in a diverse employee sample which stated that job demands are primarily related to the exhaustion component of burnout whilst job resources are primarily related to disengagement or mental withdrawal from one's work, its content and work in general. This

finding was also replicated by Schaufeli and Bakker (2002) in successfully testing their Job Demands-Resources model in a multi-sample study where burnout and engagement were found to mediate the relationship between job demands and reported health problems and the relationship between job resources and turnover intention respectively.

In a qualitative study on the stressors experienced by emergency workers (ambulance and rescue services) in a South African coastal city, Sparrius (1992) found a range of individual, inter-group and extra-organisational stressors, both unique and commonly associated with the emergency services. Interestingly, of the 19 stressors identified, almost 15 stressors could be attributed to organisational-based stressors, reflecting high levels of negativity towards the organisation. These stressors include the experience of the structure of the organisation as paramilitary, managerial favouritism and the lack of motivation which results in conflict and which in turn results in upward, downward and lateral communication problems between management and employees. Other individual stressors identified were interaction with patients, unexciting tasks, dealing with patients, slow shifts, physical danger in terms of geographical location, physical and verbal abuse from bystanders, lack of equipment, travelling long distances, shift-work, meeting deadlines and administrative work. Some interpersonal stressors were clashing personalities at work, colleagues not accepting change and pettiness among colleagues. Some extra-organisational stressors included the perceived low occupational status of South African Health Services, remuneration in comparison with other emergency workers in South Africa, lack of suitably qualified employees and a shortage of dedicated workers.

According to Cloete (1985), five sources of stressors can be identified for high-stress occupations, such as the emergency workers, namely: the degree of uncertainty, physical reaction to the alarm signal, interpersonal tension, exposure to loss of life and fear. In a similar vein, Mitchell (1983) identified personal and work-related stress, further subdividing the work-related stressors into those due to environmental working conditions (e.g. physical dangers such as fires, poor working relationships and lack of advancement opportunities) and those resulting from assistance of others (e.g. exposure to physical suffering, neurotic and violent people, as well as responsibility for other people's lives). In a study by Myles, Ramsden, Levene and Swansen (as cited in Peterson, Prout & Schwartz, 1991) stressors reported by paramedics as extremely traumatic include child abuse, mass casualties, disasters, infant deaths and high rise fires.

Research seems to suggest that occupational groups experience stressors in different ways. Young and Cooper (1995) conducted a study in north-west of England to assess occupational stress amongst a group of ambulance and fire services personnel ($N = 427$). The results showed that for the ambulance group significantly more stress was reported for factors intrinsic to the job, career and achievement and organisational structure and climate when compared to the normative group. Significant differences in perceived stress were only found for the fire-fighter group in terms of their relationship with others. Analysis of variance revealed that organisational structure and climate were perceived as more stressful for the ambulance sample, whereas relationships with others produced more stress for the fire-fighter sample.

In a study on the occupational stress of primary physicians, it was found that in terms of gender, female paediatricians were less stressed than men, and family physicians' stress levels were significantly negatively related to their age (Kushnir, Cohen & Kitai, 2000). According to Von Hallmayer, Klingbeil and Kohn-Seyer (1981) fire-fighters tend to evaluate risks differently and more negatively as they get older and more experienced, whereas Preuss and Schaeke (1998) found no relationship between age, experience and level of perceived strain.

The study of Pienaar and Rothmann (in press) in the South African Police Services seems to suggest that differences in the levels of perceived strain exist for language groups. More stress in terms of lack of job resources was found for the Afrikaans and English groups in comparison with the other groups. Also, these groups demonstrated higher levels of strain with regards to stressors inherent to police work relative to the other groups in the sample ($N = 2145$).

Accordingly, the following hypotheses were formulated:

H1: The EWSI is an internally consistent and valid measuring instrument of occupational stress of emergency workers in Gauteng.

H2: The EWSI is a structurally equivalent and unbiased measuring instrument of occupational stress for the different emergency worker language groups in Gauteng.

H3: Significant differences exist for the different occupational and language groups in terms of occupational stress.

METHOD

Research design

A cross-sectional survey design was used to reach the objectives of this research. According to Burns and Grove (1993) cross sectional designs are appropriate where groups of subjects at various stages of development are studied simultaneously, whereas the survey technique of data collection gathers information from the target population by means of questionnaires. This design is also suitable for the development and validation of questionnaires (Shaughnessy & Zechmeister, 1997).

Study population

The study population could be defined as an accidental sample of emergency workers in the different regions of Gauteng, namely West Rand, Ekurhuleni, Sedibeng, Johannesburg Metropolitan, Tshwane, Kungwini and Nokeng Tsa Taemane. The total population of about 2100 emergency workers in Gauteng was targeted. A response rate of 21,6% was achieved due to the nature of the job, e.g. call-outs, rotating working schedules and leave of which 405 responses (19,3%) could be utilised. Language groups and positions were grouped together to facilitate analysis of the data. Language groupings are explained in a footnote, while positions were broadly grouped together as follows: Management, Medical Specialists (e.g. medical practitioners and pathologists), Emergency Medical Technicians (e.g. fire-fighters, ambulance drivers, emergency staff and paramedics) and Support Services (e.g. administration, training, assistants and support services). Descriptive information of the sample is given in Table 1.

Table 1
Characteristics of the Participants

Item	Category	Percentage
Home Language	Afrikaans	35,40
	English	15,59
	Sotho ^a	27,72
	Nguni ^b	15,35
	Indigenous Independent Languages ^c	2,23
	Eastern	1,49
	European	2,23
Position	Management	14,22
	Medical Specialists	7,11
	Emergency Medical Technicians	72,79
	Support Services	5,88
Area	West Rand	11,62
	Ekurhuleni	42,93
	Sedibeng	15,66
	Johannesburg Metro	11,11
	Tshwane	7,32
	Kungwini	10,10
	Nokeng Tsa Taemane	1,26
Education	Grade 11 or below	11,66
	Grade 12	20,86
	Tertiary education : Diploma	41,10
	Tertiary education : Degree	26,38
Gender	Male	77,72
	Female	22,28
Marital status	Single	25,62
	Engaged	10,10
	Married	58,37
	Separated/Divorced/Deceased	5,91

The sample consisted mainly of Afrikaans and Sotho-speaking emergency workers (72,79%). They were mostly married men (77,72%) with a tertiary education (diploma), a mean age of 33,50 years and an average length of service of 9,02 years.

^a Sipedidi; Sesotho; Setswana

^b Siswati; isiNdebele; isiXhosa; isiZulu

^c Tshivenda; Shona; Tsonga

Measuring Battery

The *Emergency Worker Stress Inventory (EWSI)* consists of 78 items and was developed for the purpose of this study. A number of research studies have been published regarding the typical stressors specific to the emergency worker (Anshel, 2000; Beaton et al., 1997; Cloete, 1985; Grigsby & McKnew, 1988; Hammer et al., 1986; Kowalski & Vaught, 2001; Kushnir et al., 2000; Marmar et al., 1996; Mitchell, 1983; Mitchell & Dyregrov, 1993; Moran & Britton, 1994; Palmer, 1983; Peterson et al., 1991; Phipps, 1988; Preuss & Schaeke, 1998; Sparrius, 1992; Violanti & Paton, 1999; Von Hallmayer et al., 1981; Whitley et al., 1989; Young & Cooper, 1995). These sources were consulted in the construction of the current instrument. In line with the recommendations of Dewe (1989) and Spielberger and Vagg (1999) both the severity and frequency of stressors were addressed in the scale construction. Firstly, participants rated each of the 39 statements in terms of perceived intensity of the particular stressor on a 9-point scale, ranging from 1 (Low) to 9 (High). In the second part of the questionnaire, the participants were asked to respond in terms of perceived frequency in experiencing these stressors over a period of the past six months on a 10 point scale ranging from 0 (no days) to 9+ (more than 9 days). In each instance, the respondents are given the option to indicate whether a given stressor is relevant in terms of their experience or not.

A biographical questionnaire was also developed. Participants were given the option of providing their names and contact details in the case of feedback. Other information gathered included position, area, education, gender, marital status and language.

Statistical analysis

The statistical analysis was carried out with the aid of the SAS program (SAS Institute, 2000). Principal factor extraction with both oblique and varimax rotation were carried out by means of SAS FACTOR for the EWSI. Prior to principal factor extraction, principal component extraction was done to determine the number of factors, the presence of outliers and the factorability of the correlation matrices.

Construct (structural) equivalence was determined to compare the different language groups included in this study. Exploratory factor analysis with a Procrustean target rotation was used to determine the construct equivalence of the EWSI for the different language groups in the

sample (Van de Vijver & Leung, 1997). According to Van de Vijver and Leung (1997), the comparison between similarities of the factor structure of two cultural groups could be underestimated due to the arbitrary spatial allocation of factors during factor analysis. Rather, it is suggested that target rotation be conducted prior to comparing the factor solutions of cultural groups by rotating the factor-loading matrices with regard to each other in order to maximise the agreement between the factors. During this process, one group is arbitrarily designated the target group and the factor loadings of the other group rotated towards the target group to form a common factor loading matrix, also known as the centroid. Factorial agreement between the two groups is then estimated with Tucker's coefficient of agreement, also known as Tucker's phi. Because this index is insensitive to multiplications of factor loadings, but sensitive to a constant added to factor loadings, sufficient agreement between the factor-solutions of the respective cultural groups would be a reflection of the extent to which a perfect multiplicative agreement is achieved between the factor loadings of the respective factor solutions of both groups in the centroid. The formula for Tucker's phi is as follows:

$$p_{xy} = \frac{\sum x_i y_i}{\sqrt{\sum x_i^2 y_i^2}}$$

Because this index does not have a known sampling distribution, it is impossible to establish confidence intervals. Values higher than 0,95 are deemed to be evident of factorial similarity or equivalence across different cultural groups (Van de Vijver & Leung, 1997), whereas values lower than 0,90 (Van de Vijver & Poortinga, 1994) or even 0,85 (Ten Berge, 1986) should be viewed as an indication of sufficient existing differences. This index is deemed sufficiently adequate to evaluate global factorial agreement, but if construct equivalence is not acceptable, bias analysis should be conducted to detect possible inappropriate items in the questionnaire. Furthermore, bias analysis is necessary because construct equivalence does not presuppose the absence of bias. An instrument could therefore demonstrate acceptable construct equivalence and still be biased (Van de Vijver & Leung, 1997).

In order to determine item bias, an extension of Cleary and Hilton's (1968) use of analysis of variance were used to identify possible item bias (Van de Vijver & Leung, 1997). Bias was determined for each individual item. In the analysis, the individual item was specified as the dependent variable with language groups and score groups as the independent variables in the

variance analysis. Score groups were compiled, based on the total scores on the EWSI. A total of ten score levels were obtained by using percentiles identified through SAS UNIVARIATE, making it possible to assign at least 50 respondents to each score group. Two effects were tested for significance in the subsequent variance analysis, namely the main effects of culture (uniform bias) and interaction effects of culture and score level (non-uniform bias). If both the main effect of culture and the interaction of culture and score level is found to be non-significant, the item is taken to be unbiased. If any biased items are identified in this process it would be considered inappropriate to include them in the next step, namely the principal component and factor extraction analysis.

Descriptive statistics (means, standard deviations, skewness and kurtosis) were also computed to describe the data. Cronbach alpha coefficients and inter item-correlations were used to determine the internal consistency, homogeneity and unidimensionality of the measuring instruments (Clark & Watson, 1995). Coefficient alpha contains important information regarding the proportion of variance of the items of a scale in terms of the total variance explained by that particular scale. According to Clark and Watson (1995) the average inter-item correlation (which is a straightforward measure of internal consistency) provides useful information in conjunction with the alpha coefficient of a scale (which is an indication of homogeneity of a scale), but as such cannot ensure unidimensionality of a scale. The range of inter-item correlations around the mean inter-item correlation should also be inspected in this regard. Sufficient clustering of correlations around the mean should provide sufficient support for the unidimensionality of a scale.

One-way analysis of variance (ANOVA) was used to determine the differences between the subgroups of the sample. Tuckey's Standardised Range t-tests were used to determine the statistical significance of differences obtained during ANOVAs. Practical significance of the differences in means between two groups was computed with the following formula (Cohen, 1988; Steyn, 1999) :

$$d = \frac{Mean_A - Mean_B}{SD_{MAX}}$$

where

$Mean_A$ = Mean of the first group

$Mean_B$ = Mean of the second group

SD_{MAX} = Highest standard deviation of the two groups

The following formula was used to determine the practical significance of means of more than two groups (Steyn, 1999):

$$d = \frac{Mean_A - Mean_B}{\text{Root MSE}}$$

where

$Mean_A$ = Mean of the first group

$Mean_B$ = Mean of the second group

Root MSE = Root Mean Square Error

According to Cohen (1988), $0,10 \leq d \leq 0,50$ = small; $0,50 \leq d \leq 0,80$ = medium and $d \geq 0,80$ = large. In terms of the current research, a cut-off point of 0,50 (medium effect) was set for the practical significance of the differences between group means.

RESULTS

The results of the factor analysis of the Emergency Worker Stress Inventory (EWSI) are provided in Table 2. Variable-factor loadings, communalities and percentage variance and covariance are given. The variables are ordered and grouped according to loading-size to facilitate interpretation and loadings below 0,45 (21% of variance shared with the total variance of factor) were replaced with zeros. Labels for each factor are suggested in a footnote.

Table 2

Factor Loadings, Communalities (h^2), Percentage Variance and Covariance for Principal Factors Extraction and Varimax Rotation on EWSI Items

Item	Description	F ₁ ^a	F ₂	F ₃ ^d	h^2
22	Poor or inadequate supervision/management	0,61	0,00	0,00	0,43
19	Lack of participation in policy-making decisions	0,59	0,00	0,00	0,46
6	Inadequate support by supervisor/management	0,57	0,00	0,00	0,33
8	Lack of recognition	0,56	0,00	0,00	0,33
20	Inadequate salary	0,56	0,00	0,00	0,41
30	Poorly motivated co-workers	0,55	0,00	0,00	0,43
13	Difficulty getting along with supervisor/management	0,54	0,00	0,00	0,38
16	Lack of specialised personnel	0,54	0,00	0,00	0,36
3	Lack of opportunity for advancement	0,51	0,00	0,00	0,29
9	Performing tasks not in job description	0,49	0,00	0,00	0,40
15	Insufficient personnel to handle workload	0,47	0,00	0,00	0,33
26	Budgetary constraints	0,47	0,00	0,00	0,30
14	Negative attitudes towards organisation/emergency services	0,47	0,00	0,00	0,29
25	Frequent changes from boring to demanding activities	0,00	0,58	0,00	0,43
17	Critical on-the-spot decisions	0,00	0,57	0,00	0,42
4	Experiencing new/unfamiliar emergency situations	0,00	0,55	0,00	0,33
23	Work area dependent on emergency situation	0,00	0,55	0,00	0,41
34	Performing duties in dangerous situations	0,00	0,53	0,00	0,53
24	Frequent interruptions	0,00	0,50	0,00	0,42
7	Dealing with crisis situations	0,00	0,47	0,00	0,33
36	Negative attitudes of other health care personnel towards emergency services	0,00	0,00	0,68	0,53
31	Conflicts with other departments/health care providers	0,00	0,00	0,57	0,40
33	Dealing with other health care professionals	0,00	0,00	0,56	0,39
37	Unnecessary call-out and public abuse	0,00	0,00	0,56	0,43
35	Security risk in terms of emergency geographical location	0,00	0,00	0,54	0,42
32	Dealing with difficult customers/patients	0,00	0,00	0,51	0,49
39	Constant public and traumatised relative scrutiny at emergency scene	0,00	0,00	0,50	0,51
Squared Multiple Correlations (SMC)		0,84	0,78	0,77	
Percentage variance		14,71	11,22	9,74	
Percentage covariance		41,24	31,45	27,30	

^d Factor labels : F₁ Lack of Resources F₂ Job Demands F₃ Inherent Emergency Work Stressors

Inspection of Table 2 shows that three factors were extracted, accounting for 35,67% of the total variance in the data. As indicated by the SMCs, all three factors were internally consistent and well defined by the variables. The variables also seem to be reasonably well represented by this factor solution. Communality values can be described as moderate. With a cut-off point of 0,45 (sharing at least 21% of the variance in a factor) for inclusion of a variable in the interpretation of a factor, only 28 of the 39 variables were retained in the factor-loading matrix. In terms of the complexity of the factor solution, items 34, 32 and 39 proved to load significantly on more than one factor.

It was decided to continue with orthogonal or varimax rotation due to insufficient inter-factor correlations yielded during oblique rotation (Factor 2 and 3, $r = 0,36$; Factor 1 and 3, $r = 0,33$; Factor 1 and 2, $r = 0,26$). The first factor seems to address the lack of organisational support, in other words the *lack of resources*. Items included in this factor include aspects such as lack of supervisory or managerial support, not being able to get along with supervisory and managerial levels, not having enough specialised personnel, poorly motivated co-workers and colleagues not doing their jobs. The second factor seems to relate to the *demands of the job*, namely having to deal with constant unfamiliar emergency situations, making critical on-the-spot decisions, working on the scene of an accident and frequent changes in the intensity and demand of activities. The third factor seems to refer to *inherent emergency worker stressors*, namely the safety of emergency workers in terms of the danger often associated with emergency work, negative attitudes towards emergency personnel, dealing with difficult customers or patients, constant public scrutiny and often unnecessary call-out and public abuse.

In their study in the police service in South Africa, Pienaar and Rothmann (in press) also reported the extraction of three factors, namely Job Demands, Lack of Resources and Inherent Police Stressors.

Next, the construct equivalence analysis was conducted for the EWSI to determine whether the constructs are equal for all the language groups^c in the sample. In this process, exploratory factor analysis and target (Procrustean) rotation were used by rotating the factor loadings of the different language groups to one target group and estimating factorial agreement based on

^c The Indigenous independent language group, the Eastern and the European language groups were excluded due to inadequate sample sizes.

Tucker's coefficient of agreement (Tucker's phi). These coefficients are given in Table 3 for the different language groups.

Table 3

Construct Equivalence of the EWSI for Different Language Groups

Group	N	Percentage	Tucker's phi – Lack of Resources	Tucker's phi – Job Demands	Tucker's phi – Inherent Emergency Work Stressors	Total Congruence
Afrikaans	143	35,40	0,98	0,97	0,98	0,98
English	63	15,59	0,96	0,87	0,83	0,90
Sotho	112	27,72	0,98	0,94	0,86	0,94
Nguni	62	15,35	0,96	0,91	0,65	0,86

Inspection of Table 3 shows that the Tucker's phi coefficient for the Afrikaans, English and Sotho groups to be acceptable in most instances above the 0,90 level and approaching the critical level of 0,95. It is worth mentioning that sample size could influence these values. On the EWSI, the Nguni-group demonstrated significant inequivalence below 0,90 in terms of total congruence and in terms of Inherent Emergency Work Stressors. Even though values lower than 0,90 were obtained for the English and Sotho groups in terms of Inherent Emergency Work Stressors, the total congruence indicate significant equivalence in terms of perceived occupational stress. In summary, it can be concluded that significant construct congruence exists for the Afrikaans, English and Sotho groups in terms of perceived occupational stress, but not for the Nguni group. Consequently, in terms of subsequent analysis of the data, the Nguni group was excluded.

The item bias analysis was completed in the next step. The results of the individual item analysis of variance for the EWSI are presented in Table 4.

Table 4

Item Bias Analyses of the EWSI

Item	Tot_SS	Df_g	SS_g	F_g	Eta square	Df_i	SS_i	F_i	Eta square
Lack of Resources									
EWSI22	1788,30	2	7,10	1,10	0,00	18	73,00	1,20	0,04
EWSI19	1737,10	2	14,10	2,20	0,01	18	56,20	1,00	0,03
EWSI16	1668,40	2	0,40	0,10	0,00	18	85,70	1,20	0,05
EWSI15	1758,40	2	109,20	14,60	0,06*	18	70,00	1,00	0,04
EWSI18	1960,70	2	0,00	0,00	0,00	18	102,10	1,30	0,05
EWSI20	1682,10	2	5,90	0,08	0,00	18	54,10	0,90	0,03
EWSI30	1790,30	2	16,80	2,20	0,01	18	91,60	1,30	0,05
EWSI13	2113,70	2	18,90	2,20	0,01	18	65,90	0,90	0,03
EWSI16	1847,60	2	27,50	3,50	0,02	18	37,00	0,50	0,02
EWSI13	2124,40	2	15,40	1,60	0,01	18	95,40	1,10	0,05
EWSI19	2040,60	2	74,60	9,40	0,04	18	90,90	1,30	0,05
EWSI15	1631,00	2	29,60	4,70	0,02	18	62,60	1,10	0,04
EWSI26	1928,10	2	4,60	0,50	0,00	18	50,70	0,60	0,03
EWSI14	2021,30	2	0,60	0,10	0,00	18	101,20	1,30	0,05
Job Demands									
EWSI25	1597,10	2	8,30	1,30	0,01	18	57,10	1,00	0,04
EWSI17	1734,80	2	5,40	0,90	0,00	18	39,9	0,70	0,02
EWSI14	1839,10	2	52,80	6,80	0,03	18	56,30	0,80	0,03
EWSI23	1633,50	2	5,20	0,90	0,00	18	39,30	0,80	0,02
EWSI34	1868,50	2	23,50	3,30	0,01	18	80,70	1,30	0,04
EWSI24	1549,20	2	14,80	2,60	0,01	18	33,50	0,70	0,02
EWSI17	1485,80	2	4,40	0,80	0,00	18	53,60	1,00	0,04
Inherent Emergency Work Stressors									
EWSI36	1770,60	2	17,40	2,80	0,01	18	42,10	0,80	0,02
EWSI31	2215,60	2	23,30	2,70	0,01	18	60,30	0,80	0,03
EWSI33	1926,70	2	6,90	1,00	0,00	18	45,20	0,70	0,02
EWSI37	1851,00	2	2,20	0,30	0,00	18	40,60	0,60	0,02
EWSI35	1956,20	2	2,90	0,40	0,00	18	46,90	0,70	0,02
EWSI32	1657,30	2	8,90	1,40	0,01	18	32,40	0,60	0,02
EWSI39	1687,40	2	13,20	2,20	0,01	18	50,70	0,90	0,03

* Practically significant difference of medium effect

According to Table 4, a significant eta square value was obtained for item 5 (main effect, medium effect size) of the EWSI, which means that this item could be regarded as uniformly biased for the Afrikaans, English and Sotho language groups. This means that for item 5, consistent cultural effects were obtained across all score levels of the item and would therefore be excluded in the subsequent analysis.

Consequently, hypothesis 2 is not supported for the EWSI.

In the next step, descriptive statistics for the intensity, frequency and severity of the EWSI are given in Table 5. Severity is expressed as the product of intensity and frequency of stressors.

Table 5

Descriptive Statistics of Stressor Intensity and Frequency of EWSI Items

Item Description	Intensity		Frequency		Severity
	Mean	SD	Mean	SD	
Poor or inadequate supervision/management	5,35	2,54	4,59	3,36	24,56
Lack of participation in policy-making decisions	5,58	2,48	4,69	3,40	26,17
Inadequate support by supervisor/management	5,92	2,44	5,12	3,36	30,31
Lack of recognition	5,92	2,58	5,83	3,23	34,51
Inadequate salary	6,70	2,46	5,98	3,33	40,07
Poorly motivated co-workers	6,17	2,47	5,99	3,13	36,96
Difficulty getting along with supervisor/management	4,82	2,68	4,17	3,39	20,10
Lack of specialised personnel	6,41	2,49	5,79	3,31	37,11
Lack of opportunity for advancement	6,10	2,71	5,28	3,55	32,21
Performing tasks not in job description	5,66	2,60	5,31	3,37	30,05
Insufficient personnel to handle workload	7,14	2,28	6,82	2,94	48,69
Budgetary constraints	5,89	2,59	5,37	3,44	31,63
Negative attitudes towards organisation/emergency services	5,85	2,62	5,19	3,25	30,36
Frequent changes from boring to demanding activities	4,95	2,41	5,01	3,18	24,80
Critical on-the-spot decisions	4,94	2,50	5,10	3,21	25,19
Experiencing new/unfamiliar emergency situations	5,12	2,54	5,13	3,45	26,27
Work area dependant on emergency situation	5,17	2,47	5,32	3,27	27,50
Performing duties in dangerous situations	5,84	2,69	5,90	3,28	34,46
Frequent interruptions	5,15	2,32	5,04	3,14	25,96
Dealing with crisis situations	5,41	2,29	5,55	3,22	30,03
Negative attitudes of other health care personnel	5,88	2,53	5,20	3,24	30,57
Conflicts with other departments/health care providers	5,14	2,75	4,24	3,31	21,79
Dealing with other health care professionals	5,06	2,62	5,17	3,32	26,16
Unnecessary call-out and public abuse	6,41	2,61	6,29	3,21	40,32
Security risk in terms of emergency geographical location	5,71	2,67	5,45	3,30	31,12
Dealing with difficult customers/patients	5,63	2,47	5,98	3,03	33,67
Constant public and traumatised relative scrutiny	5,51	2,51	5,30	3,16	29,20

According to Table 5 stressors experienced by emergency workers in terms of highest severity are related to insufficient personnel to handle the workload, unnecessary call-out and abuse by the public, inadequate remuneration, lack of specialised personnel, poorly motivated co-workers, performing duties in dangerous situations, lack of recognition, dealing with difficult customers or patients and lack of opportunity for advancement.

In terms of the intensity of stressors experienced by emergency workers, the following items proved to be very stressful, namely insufficient personnel to handle the workload, unnecessary call-out and abuse by the public, lack of specialised personnel, inadequate remuneration, inadequate support by supervisor or management, lack of recognition, budgetary constraints and negative attitudes towards the organisation or the emergency services.

Pienaar and Rothmann (in press) reported similar stressors most experienced by officers in the Police Service in South Africa, namely officers not doing their job, inadequate or poor quality equipment, inadequate salary, fellow officers killed in the line of duty and seeing criminals go free.

In terms of the regular experience of stressors, the following stressors proved to be experienced very regularly, namely insufficient personnel to handle the workload, unnecessary call-out and abuse by the public, poorly motivated co-workers, inadequate remuneration, dealing with difficult customers or patients, performing of duties in dangerous situations, lack of recognition, lack of specialised personnel and dealing with crisis situations.

Pienaar and Rothmann (in press) found that officers not doing their job, inadequate or poor quality equipment, lack of officers to handle specific tasks, inadequate salary, high load of paperwork, poor motivation of other officers and staff shortages were reported most often by police members in South Africa.

Emergency workers in Gauteng reported moderate levels of intensity and frequency with regards to the following aspects:

- Budgetary constraints
- Security risk in terms of geographical location

- Negative attitudes of other health care personnel towards the emergency services
- Negative attitudes towards the organisation or the emergency services
- Inadequate support by supervisor or management
- Performance of tasks not in job description
- Dealing with crisis situations
- Constant public and traumatised-relative scrutiny while performing service
- Work area dependent on the emergency situation
- Experiencing of new or unfamiliar emergency situations.

Similar findings were reported by Pienaar and Rothmann (in press) in the Police Services in South Africa with regards to having to deal with crisis situations, performing tasks not in job description, experiencing negative attitudes towards the organisation and having to make critical and immediate decisions.

Emergency workers seem to experience the lowest levels of tension with regard to conflicts with other departments or health care providers and also with regards to difficulty in getting along with supervisor or management.

The descriptive statistics, alpha coefficients and mean inter-item correlation coefficients for the extracted factors of the EWSI are reported in Table 6.

Table 6
Descriptive Statistics, Alpha Coefficients and Mean Inter-item Correlation Coefficients of the EWSI

Item	Mean	SD	Skewness	Kurtosis	r(Mean)	α
Lack of Resources	83,86	22,17	-0,46	-0,04	0,34	0,88
Job Demands	36,58	11,93	-0,01	-0,47	0,39	0,82
Inherent Emergency Work Stressors	39,33	12,86	-0,33	-0,02	0,42	0,83

Table 6 shows that the three extracted factors of the EWSI are normally distributed in the sample. Also, coefficient alphas for the three factors compare well with the guideline of 0,70, demonstrating that a large proportion of the variance is explained by the factors (internal consistency of the scales) (Nunnally & Bernstein, 1994). The mean inter-item correlations of

the factors are well within the guideline of $0,15 < r < 0,50$ (Clark & Watson, 1995). According to these authors, a measure of internal consistency (alpha coefficient) is not an indication of the homogeneity or unidimensionality of a scale, but it is necessary to take the range of inter-item correlations around the inter-item mean into consideration when considering homogeneity and unidimensionality. In this case, the scales of the EWSI seem to demonstrate internal consistency (homogeneity) and an acceptable distribution of inter-item correlations around the mean inter-item correlation (unidimensionality).

These results provide support for hypothesis 1 in terms of internal consistency and validity of the newly developed EWSI for the emergency worker in Gauteng.

The differences for various biographical groups were analysed in terms of perceived strain (job demands or stressors) of emergency workers. The differences in the EWSI for the different positions are given in Table 7.

Table 7
Differences in EWSI for Positions

Item	Management (1)	Medical Specialists (2)	Emergency Medical Technicians (3)	Support Services (4)	Root MSE	<i>p</i>
Lack of Resources	87,41	77,41	84,08	76,75	22,13	0,18
Job Demands	36,82 ^b	30,71 ^a	37,48 ^b	29,80 ^a	11,76	0,01 [*]
Inherent Emergency Work Stressors	36,72	36,41	41,04 ^c	29,60 ^a	12,55	0,00 [*]

* Statistically significant difference ($p < 0,05$) where letter in superscript indicates differences from other positions

a Practically significant difference between means of positions (small), b (practical significance of medium effect, $d \geq 0,50$) or c (practical significance of large effect, $d \geq 0,80$)

Table 7 shows that emergency medical technicians and management scored significantly higher than support services (practically significant, medium effect) and medical specialists in terms of Job Demands. Emergency medical technicians also obtained significantly higher scores than support services on Inherent Emergency Work Stressors (practically significant, large effect).

Lastly, the differences in the EWSI for the different language groups are given in Table 8.

Table 8

Differences in EWSI for Language Groups

Item	Afrikaans (1)	English (2)	Sotho (3)	Root MSE	<i>p</i>
Lack of Resources	86,30	86,07	79,95	21,86	0,05
Job Demands	35,88	34,76	38,55	11,87	0,08
Inherent Emergency Work Stressors	38,26	41,89	39,55	12,75	0,17

* Statistically significant difference ($p < 0,05$) where letter in superscript indicates differences from other positions

According to Table 8, no significant differences were found between the means of the language groups in terms of perceived strain. Consequently, these findings provide partial support for the acceptance of hypothesis 3 on the basis of significant differences obtained for positions, but not for language groups.

DISCUSSION

It was the aim of this study to develop and validate the EWSI for the emergency worker in Gauteng. A 3-factor solution, (consisting of Lack of Resources, Job Demands and Inherent Emergency Work Stressors) describing the perceived strain of emergency workers, fitted the data the best. The extracted factors can be broadly related to the results of similar studies in other contexts (Alexander, Walker, Innes & Irving, 1993; Biggam, Power, MacDonald, Carcary & Moodie, 1997; Brown & Campbell, 1990, 1994; Pienaar and Rothmann, in press). Satisfactory internal consistency and unidimensionality was obtained for the EWSI, pointing to the utility of the instrument developed for the current research.

Regarding cross-cultural group comparison, evidence of inequivalence was found for the EWSI with regards to the Nguni language group in the present study. Also, evidence of uniform bias were found for item 5 (“Fellow workers not doing their job”), which means that systematic differences in the means of the Afrikaans, English and Sotho groups were obtained for this item. This means that even though similar total scores on this item can be obtained for members of these groups, systematic differences consistently above (or below) zero were found for individual group members. These differences are caused by the group membership (cultural influences) and not ascribed to valid individual differences in terms of

responses to items. This finding could be attributed to the fact that a stratified random sample was not used in the present study and that the sample size, specifically in the case of the subgroups (language groups), was significantly smaller. Insufficient subgroup sizes could cause artificial differences between subgroups.

In terms of the acuteness of perceived strain, emergency workers reported that the stressors most experienced by them in their current jobs are mostly related to a lack of organisational support. These stressors include a lack of job resources, such as insufficient personnel to handle the workload, inadequate remuneration, co-workers not doing their jobs, a lack of specialised personnel, poorly motivated co-workers, a lack of recognition and a lack of opportunity for advancement. Highly strenuous aspects related to inherent job characteristics unique to emergency work included unnecessary call-out and abuse by the public, as well as having to deal with difficult customers or patients, while factors associated with high strain in terms of the demands of the job were associated with having to perform duties in dangerous situations. It is disconcerting that most of the stressors reported by emergency workers in the present study are associated with aspects that the organisations are capable of doing something about. Despite the fact that research showed incumbents of highly stressful occupations, such as the police services and emergency work, regard stressful occupational events as being unchangeable (Violanti & Paton, 1999), these organisational stressors might nevertheless be more easily addressed than inherent ones (Gulle, Tredoux & Foster, 1998).

Contrary to the findings of Pienaar and Rothmann (in press) where most of the reported stressors could be categorised in the medium to low frequency categories, most of the reported stressors for emergency workers showed average to high levels of intensity and frequency. Possibly this could also be a reflection of sampling size and methods utilised in the different studies. In the present study, chronic stressors (average intensity and frequency) were mostly associated with the cal demands placed on the emergency workers by the job, but also by the lack of organisational support in terms of job resources and the inherent characteristics unique to the emergency worker context. Typical chronic stressors reported in the current study were related to dealing with crisis situations, the dependence of the work area on the emergency situation, security concerns of the emergency worker, the experience of negative attitudes and the experience of new or unfamiliar emergency situations. These findings also echo those found with police members in South Africa (Pienaar and Rothmann, in press).

In terms of differences between groups regarding stressful experiences, it was found that emergency medical technicians and their managers scored significantly higher than support staff with regards to the demands placed on them by the job, as well as by the unique characteristics associated with emergency work. This finding is understandable since many of the support staff are not exposed to the inherently stressful experiences of emergency workers.

No significant differences were found in terms of experienced strain for the different language groups in the present study, which is contrary to the findings of Pienaar and Rothmann (in press), where significantly higher levels of lack of resources and stressors inherent to the police service were found for the English and Afrikaans groups.

Limitations of the present study include sample size ($N = 323$), which has been reduced due to obtained inequivalence of the Nguni-group in terms of perceived strain in the present study. Also, inadequate subgroup sample sizes in terms of the respective language groups could significantly influence the findings. For instance during the bias analysis, the recommended number of observations per score level ($n = 50$) for each item could not be reached. Also, the sampling procedure in the present study has significant limitations in terms of the generalisation of the findings to the total study population. Future studies could benefit in terms of a stratified random-sample design which would ensure sufficient representation of the different groups in the total population of emergency workers. In terms of the research design, future studies should also focus on longitudinal designs where inferences in terms of cause and effect could be made.

RECOMMENDATIONS

In terms of perceived strain, this study is a first step towards the development of a comprehensive perceived strain profile of emergency workers in South Africa. As such, the current study only considered the Gauteng Province and it is recommended that the study be expanded to the other eight provinces in South Africa as well, specifically with the aid of randomised sampling design. In terms of stress research in the emergency services it is also important to take a holistic approach in terms of the both the work and non-work domains of the emergency worker (Cooper, Dewe & O'Driscoll, 2001) in future research. Also, further

refining and testing of the EWSI is needed in other emergency worker samples, possibly even in other African countries. Furthermore, criterion-related validity studies are also necessary to establish the validity of this instrument, using it in conjunction with existing tests to determine its concurrent validity.

In terms of the experience of acute stressors by emergency workers, the high incidence of lack of support by the organisation in terms of resources is a concern. The findings suggest that a large portion of the stressors reported can be viewed as acute. If these stressors are allowed to continue unattended to, the organisation can expect to find negative costs associated with continued, elevated levels of stress, such as burnout, employee turnover and lowered levels of service. The organisation is therefore advised to prioritise the issue of staff shortages and the motivational aspect of workers by means of the recruitment of specialised personnel, the filling of vacant positions and the reviewing the remuneration structures of emergency workers by means of benchmarking initiatives. The high incidence of turnover (especially in the specialised occupations) reported by management during the course of this study seems to suggest that a benchmarking exercise would be beneficial to the organisation.

Furthermore, with regards to motivation of co-workers and the lack of recognition reported by emergency workers, it is recommended that the organisation should consider an intervention aimed at maximising group effectiveness. A leadership skills intervention aimed at first-line management could also be considered in the different regions in this regard. Considering the decentralised nature of management within the different regions, as well as the significant changes that are taking place within national government structures, it is recommended that a change management initiative be considered, including these recommendations in a structured plan.

Finally, it is recommended that with regards to the perceived strain of emergency workers in South Africa, that construct equivalence and item bias should be computed in line with the recommendations of Van de Vijver and Leung (1997). Not only do the current findings need to be validated with regards to the equal comparison of the perceived strain construct across cultural groups, but cross-cultural comparisons would be greatly enhanced in terms of validity of findings in the multi-cultural South African context.

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COPING STRATEGIES OF EMERGENCY WORKERS IN GAUTENG*

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ABSTRACT

The objectives of this study were to determine the internal consistency, construct validity and equivalence, as well as item bias of the COPE questionnaire. A cross-sectional survey design was used. An accidental sample ($N = 405$) of emergency workers in Gauteng was taken. The COPE and a biographical questionnaire were administered. Four internally consistent factors, namely Active Coping, Seeking Social Support, Passive Coping and Turning to Religion were extracted for the COPE. Structural inequivalence regarding coping strategies was detected for the Nguni-language group. Non-uniform bias was obtained regarding some items of the COPE. Analysis of variance revealed differences in coping strategies for position and language.

OPSOMMING

Die doelstellings van hierdie studie was om die interne konsekwentheid, konstruegeldigheid en -ekwivalensie, asook die itemsydigheid van die COPE-vraelys te bepaal. 'n Dwarssnee opname-ontwerp is gebruik. 'n Beskikbaarheidsteekproef ($N = 405$) van nooddienerswerkers in Gauteng is geneem. Die COPE en 'n biografiese vraelys is afgeneem. Vier interne konsekwente faktore, naamlik Aktiewe Coping, Soeke na Sosiale Ondersteuning, Passiewe coping en Keer-na-Religie is vir die COPE onttrek. Strukturele on-ekwivalensie is bevind vir die Nguni taalgroep wat betref coping-strategieë. Nie-uniforme sydigheid is ten opsigte van items van die COPE gevind. Variansie-analise het verskille ten opsigte van coping-strategieë in terme van pos en taalgroep opgelewer.

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Emergency work is considered to be one of the most stressful work environments (Phipps, 1988; Whitley, Gallery, Allison & Revicki, 1989; Young & Cooper, 1995). According to Bhagat et al. (2001), the level of stress experienced and the extent to which adverse psychological and physiological effects of stress occur depends on how well the individual utilises coping strategies in the organisational setting. Anshel (2000) argues in support by stating that when emergency workers are not able to cope with stressful events, they often experience undesirable psychological and somatic outcomes which could lead to chronic stress, burnout and even to quitting the job.

The literature on stress-research is frequently linked to coping mechanisms. This is evident in the conception of the individual-stress interaction of Lazarus (1980) where stress is described as any event that exceeds the normal adjustment mechanisms of the individual, determined by the perception and interpretation of the event, in other words the perception of the perceived strain that the individual experiences. In this appraisal process, the individual evaluates his/her capability to deal with the perceived stressor (according to resources available to the individual) and the associated strain caused by this trade-off. Stress is only experienced (with its associated consequences) should the perceived ability to deal with the resulting strain exceed the self-evaluated capability of the individual to deal with it (Cranwell-Ward, 1990; Handy, 1988, 1991; Lazarus, 1991; Meyerson, 1994).

According to Lazarus (1991), the individual processing or appraisal of a stressful event takes place on two levels. In primary appraisal significance is given to the situation to determine whether the particular situation poses a potential or actual threat to the individual's well-being. In the secondary appraisal process the perceived ability of coping resources to deal with the event is evaluated. According to Folkman and Lazarus (1984), these appraisal processes can be viewed as interdependent, influencing each other and shaping the nature of any encounter on an individual level. Consequently, coping is taken as a process whereby the individual interacts with his/her environment in order to comprehend what people actually think and do in a stressful encounter (Holroyd & Lazarus, 1982).

Accordingly, viewed from an interaction perspective, coping can be defined as the efforts that individuals make to manage situations appraised as potentially harmful or stressful (Kleinke, 1991). Coping refers to the perceptual, cognitive or behavioural responses used to manage, avoid or control situations that could be regarded as difficult (Folkman & Lazarus, 1984,

Moos, 1994; Zeidner & Endler, 1996). Coping could either refer to strategies or results (Fleishman, 1984). As a strategy, which also forms the approach to coping in terms of the current research, coping refers to the different methods that individuals apply to manage their specific circumstances. Coping as a result refers to the eventual outcomes of the chosen strategy for the individual. Non-coping is defined by Callan (1993) as failed efforts to cope, accompanied by various physical and psycho-social disturbances, eventually resulting in higher stress levels. According to Carver, Scheier and Weintraub (1989), non-coping results in higher levels of depression and anxiety, which are some of the outcomes often associated with stressful experiences.

Initial conceptualisations of the coping construct included a broad taxonomy of coping as direct efforts to change the demands posed by the stressful situation on the available resources of the individual to cope with it (problem-focused coping), as well as regulatory attempts to manage the emotional aspects of the stressful encounter (emotion-focused coping) (Lazarus & Folkman, 1984). Problem-focused strategies include such strategies as defining the problem, generating and weighing alternative solutions, and following a plan of action, whereas emotion-focused strategies include processes such as avoidance, denial, seeking emotional support, and positive appraisal (Stanton, Parsa & Austenfeld, 2002).

Recently, however, hierarchical factor analysis revealed a more fundamental distinction in terms of coping strategies, namely approach-orientated and avoidance-orientated processes in coping strategies (Tobin, Holroyd, Reynolds & Wigal, 1989). Consequently, coping strategies could also be viewed from an active, as well as a passive approach where movement towards or away from the stressor is taken as broad strategies. According to Cox and Ferguson (1992) and Ferguson and Cox (1997), two broad dimensions could be added to the study of coping, namely reappraisal and avoidance.

In terms of the present study, the manner in which emergency workers deal with stress seems imperative from a research point of view. Not only is it important to establish reliable and valid methods of measurement with regards to coping, it is also important to consider cultural diversity in a multicultural setting such as South Africa. Furthermore, research seems to point to the fact that the nature and context of a stressor, the range of coping resources available and the emotional reaction of the individual, might be influenced by aspects of cultural and racial affiliations (Coyne & Gottlieb, 1996; Slavin, Rainer, McCreary & Gowda, 1991). In

this regard, Van de Vijver and Leung (1997) recommended that issues of measurement equivalence and bias should be computed for measuring instruments in any multicultural setting where groups from different cultural groups are compared in terms of a specific construct. This is particularly relevant where no norms exist for the different cultural groups, which is often the case in cross-cultural research. In line with recommendations of Poortinga (1989) and Van de Vijver and Leung (1997) measurement equivalence and bias should be tested for in a multi-cultural context where differences in scores could be attributed to cultural influences in terms of item meaning and understanding, rather than differences resulting from the measuring of the constructs by the measuring instruments. If cultural influences are not accounted for, invalid conclusions regarding the constructs under study could be made with serious implications for a culturally diverse setting such as South Africa. Measurement equivalence is concerned with measurement and the comparability of scores, whereas bias is concerned with factors that influence the validity of cross-cultural comparisons.

Not only is it important to determine the coping strategies of the emergency worker, but also to validate a suitable instrument for the identification of coping strategies. Only one related study could be found in this regard, namely the study of Pienaar and Rothmann (in press) that validated the COPE for the South African Police Services. Furthermore, no studies evaluating the structural equivalence of the COPE could be found in South Africa.

The objectives of this study were to validate the COPE for emergency workers in Gauteng, and to determine its internal consistency, construct equivalence and item bias.

Coping

An alternative to the interactionist view of coping seems to be cognition that coping could be viewed from a dispositional point of view, in other words considering personality variables of a more stable nature within the individual to influence the process of coping strategy selection (Stone, Greenberg, Kennedy-Moore & Newman, 1991). According to Carver et al. (1989), individuals have consistent coping preferences or dispositions that are employed across a wide range of situations. The established link between personality variables and coping seems to support the dispositional approach to coping in the literature (Parkes, 1994). Conceptually, this assertion makes sense in terms of the secondary appraisal process where

the individual assesses the availability of coping resources when confronted with a stressful encounter. This could include the assessment of dispositional variables, such as coping strategies available within the individual to aid in the selection of a suitable coping strategy. In terms of the measurement of coping dispositions, studies have instructed participants to think about the manner in which they usually cope with stress, for example in the dispositional version of the Coping Orientation to Problems Experienced (COPE) scale (Carver et al., 1989).

Effective coping strategies have been found to enable emergency workers to deal better with stress. In a study by Beaton, Murphy, Pike and Corniel (1997) the relationships between social support, network conflict, occupational stress, job satisfaction, and health in a sample of fire-fighters ($N = 1730$) and paramedics ($N = 253$) was investigated. It was found that perceived social support and network conflict at work were strongly associated with job satisfaction and work morale. A path model in this study suggested that appraisal of occupational stress mediated the effects of perceived social support and network conflict at work on job dissatisfaction and stress outcomes.

Research with regards to coping strategies in the emergency services would seem to suggest that different occupational groups utilise coping strategies differently. Young and Cooper (1995) conducted a study in north-west of England to assess occupational stress and coping strategies amongst a group of ambulance and fire services personnel ($N = 427$). In terms of coping mechanisms, comparisons with the normative group revealed significant differences in terms of using home-work relationships more often for both the ambulance and fire-fighter groups, while the ambulance group reported using social support less often when compared to the norm group. Consequently, in terms of the present study, differences in the utilisation of Seeking Social Support are expected for the different occupational groups.

In a study amongst ambulance drivers ($N = 160$) in the United Kingdom, it was found that the majority of respondents felt that the more they were exposed to critical incidents, the better they coped with it (Alexander & Klein, 2001). For 12% of the sample, experience did not contribute to enhanced ability to cope with emergency stressors. Also, 10% indicated that exposure to stressful situations helped initially, but that subsequent exposure made it difficult for them to cope. In terms of coping strategies, it was indicated that 60% ($n = 62$) respondents felt that it was helpful to think about outside interests (mentally escaping the reality). Also,

59% ($n = 74$) respondents reported that they did not find that keeping their thoughts or feelings to themselves helped them. In a similar vein, an explorative study in South Africa was conducted in a sample of paramedics with regards to the prevalence of Post Traumatic Stress Disorder (PTSD) and work-related attitudes. It was found that 17% (compared to 15% in other research settings) of the sample suffered from PTSD, while nearly 40% of the sample were found to be suffering from avoidance responses, implying that intrusive images were blocked out by denial mechanisms (Cocotos & Ortlepp, 1999). In terms of the current research, it is expected to find significant differences amongst the different occupational groups in terms of the utilisation of mentally disengaging or avoiding techniques as a means of coping with the demands of the job.

Recent research results in the South African setting would seem to suggest that differences in coping strategies exist for different language groups. In a sample ($N = 1431$) in the South African Police Services, Pienaar (2002) reported that when compared to the other language groups, the Pedi, Zulu and Sotho language groups demonstrated higher avoiding coping strategies, while higher levels of Seeking Emotional Support was found for the Sotho, Venda, Zulu and Pedi groups.

In light of the fact that membership to different language and cultural grouping can influence the manner in which we perceive the world around us, it is advised to account for these differences by computing equivalence and bias of measuring instruments in multi-cultural research settings (Van de Vijver & Leung, 1997). Three types or levels of equivalence can be identified, namely construct equivalence, measurement unit equivalence and scalar equivalence. Only one type of equivalence, namely construct (structural) equivalence was relevant for this study. Construct equivalence indicates the extent to which the same construct is measured across the cultural groups under study, in other words, the comparison of cultural groups because their scores are related to the same construct. On the other hand, in the case of construct inequivalence, obtained scores are not related to the same construct and no comparison could be made.

Item bias, the second important computation in cross-cultural settings, concerns aspects of measurement validity in inter-cultural group comparisons (Van de Vijver & Leung, 1997). An unbiased item would provide the same average score on an item for two individuals from different cultural groups that could be regarded as similar in terms of a specific construct

measured by an item. Stated differently, candidates with an equal standing in terms of the underlying construct measured by the instrument would obtain the same score on a given item, irrespective of group membership. This does not, however, imply that the averages of the cultural groups must be exactly the same, only that those individuals who are in reality equal in terms of their standing on the construct under study, should in fact obtain the same average score on the given item even when differences in terms of group membership exists. Differences in group averages do occur in reality, but these differences could be ascribed either to bias or legitimate differences between cultures, also known as impact.

Various contributory causes exist for bias. It can be caused by incidental differences in appropriateness of item content, inadequate item formulation and translation, from response characteristics of the sample and also by administration effects. The danger associated with bias is that it would lower the equivalence of the measuring instrument. Two types of bias can be distinguished, namely uniform and non-uniform bias (Van de Vijver & Leung, 1997). *Uniform bias* refers to the main effects of cultural differences, in other words the influence of bias on an item is consistent for all the score levels of that particular item. *Non-uniform bias* refers to the interaction effects of cultural differences and score level, indicating that across all score levels of an item, significantly larger differences in terms of a particular item exists in one group when compared to the other group across the different score levels for the specific item (Mellenbergh, 1982). In terms of equivalence and bias, it is expected that the COPE would be equivalent and unbiased for the different language groups in the present study.

Accordingly, the following hypotheses can be formulated:

- H1: The COPE is an internally consistent and valid measuring instrument of coping strategies of emergency workers in Gauteng.
- H2: The COPE is a structurally equivalent and unbiased measuring instrument of coping strategies for the different emergency worker language groups in Gauteng.
- H3: Significant differences exist for the different occupational groups in terms of coping strategies.

H4: Significant differences exist for the different language groups in terms of coping strategies

METHOD

Research design

A cross-sectional survey design was used to reach the objectives of this research. According to Burns and Grove (1993) cross sectional designs are appropriate where groups of subjects at various stages of development are studied simultaneously, whereas the survey technique of data collection gathers information from the target population by means of questionnaires. This design is also suitable for the development and validation of questionnaires (Shaughnessy & Zechmeister, 1997).

Study population

The study population could be defined as an accidental sample of emergency workers in the different regions of Gauteng, namely West Rand, Ekurhuleni, Sedibeng, Johannesburg Metropolitan, Tshwane, Kungwini and Nokeng Tsa Taemane. The total population of about 2100 emergency workers in Gauteng was targeted. A response rate of 21,6% was achieved due to the nature of the job, e.g. call-outs, rotating working schedules and leave of which 405 responses (19,3%) could be utilised. Language groups and positions were grouped together to facilitate analysis of the data. Language groups are explained in a footnote, while positions were broadly grouped together as follows: Management, Medical Specialists (e.g. medical practitioners and pathologists), Emergency Medical Technicians (e.g. fire-fighters, ambulance drivers, emergency staff and paramedics) and Support Services (e.g. administration, training, assistants and support services). Descriptive information of the sample is given in Table 1.

Table 1
Characteristics of the Participants

Item	Category	Percentage
Home Language	Afrikaans	35,40
	English	15,59
	Sotho ^a	27,72
	Nguni ^b	15,35
	Indigenous Independent Languages ^c	2,23
	Eastern	1,49
	European	2,23
Position	Management	14,22
	Medical Specialists	7,11
	Emergency Medical Technicians	72,79
	Support Services	5,88
Area	West Rand	11,62
	Ekurhuleni	42,93
	Sedibeng	15,66
	Johannesburg Metro	11,11
	Tshwane	7,32
	Kungwini	10,10
	Nokeng Tsa Taemane	1,26
Education	Grade 11 or below	11,66
	Grade 12	20,86
	Tertiary education : Diploma	41,10
	Tertiary education : Degree	26,38
Gender	Male	77,72
	Female	22,28
Marital status	Single	25,62
	Engaged	10,10
	Married	58,37
	Separated/Divorced/Deceased	5,91

The sample consisted mainly of Afrikaans and Sotho-speaking emergency workers (72,79%). They were mostly married men (77,72%) with a tertiary education (diploma), a mean age of 33,50 years and an average length of service of 9,02 years.

^a Sipedidi; Sesotho; Setswana

^b Siswati; isiNdebele; isiXhosa; isiZulu

^c Tshivenda; Shona; Tsonga

Measuring battery

The *Coping Orientation for Problem Experienced Questionnaire (COPE)* (Carver et al., 1989) was used to measure the participants' general coping strategies. The COPE is a multi-dimensional 53-item questionnaire indicating the different ways in which individuals cope in different circumstances. In total, 13 different coping strategies are measured. The subscales can be classified in three groups, namely problem-focused coping, emotion-focused coping and coping strategies that are used less (Amirkhan, 1994; Callan, 1993; Folkman & Lazarus, 1980). Five subscales (4 items each) measure different aspects of problem-focused coping, namely Active Coping, Planning, Suppressing of Competing Activities, Restraint Coping and Seeking Social Support for Instrumental reasons. Five subscales (4 items each) measure aspects of emotion-focussed coping, namely Seeking Social Support for Emotional Reasons, Positive Reinterpretation and Growth, Acceptance, Denial, Turning to Religion. Lastly, four subscales measure coping strategies used less, namely Focus on and Venting of Emotions, Behavioural Disengagement, Mental Disengagement and Alcohol-drug Disengagement (Carver et al., 1989). The COPE has been proven both reliable and valid in different cultural groups (Clark, Bornman, Cropanzano & James, 1995; Van der Wateren, 1997). Carver et al. (1989) also reported alpha coefficients for the COPE ranging from 0,45 to 0,92. With the exception of Mental Disengagement which measures less than 0,60, all the sub-scales demonstrate good levels of reliability. Test-retest reliability varies from 0,46 to 0,86 and 0,42 to 0,89 after 2 weeks (Carver et al, 1989). Acceptable reliability and validity levels have been determined for the COPE in the South African context, rendering it suitable for usage in the South African context (Van der Wateren, 1997; Wissing & Du Toit, 1994).

A biographical questionnaire was also developed. Participants were given the option of providing their names and contact details in the case of feedback. Other information gathered included position, area, education, gender, marital status and language.

Statistical analysis

The statistical analysis was carried out with the aid of the SAS program (SAS Institute, 2000). Principal factor extraction with both oblique and varimax rotation were carried out by means of SAS FACTOR for the COPE. Prior to principal factor extraction, principal

component extraction was done to determine the number of factors, the presence of outliers and the factorability of the correlation matrices.

Construct (structural) equivalence was determined to compare the different language groups included in this study. Exploratory factor analysis with a Procrustean target rotation was used to determine the construct equivalence of the COPE for the different language groups in the sample (Van de Vijver & Leung, 1997). According to Van de Vijver and Leung (1997) the comparison between similarities of the factor structure of two cultural groups could be underestimated due to the arbitrary spatial allocation of factors during factor analysis. Rather, it is suggested that target rotation be conducted prior to comparing the factor solutions of cultural groups by rotating the factor loading matrices with regards to each other in order to maximise the agreement between the factors. During this process, one group is arbitrarily designated the target group and the factor loadings of the other group rotated towards the target group to form a common factor loading matrix, also known as the centroid. Factorial agreement between the two groups is then estimated with Tucker's coefficient of agreement, also known as Tucker's phi. Because this index is insensitive to multiplications of factor loadings, but sensitive to a constant added to factor loadings, sufficient agreement between the factor-solutions of the respective cultural groups would be a reflection of the extent to which a perfect multiplicative agreement is achieved between the factor loadings of the respective factor solutions of both groups in the centroid. The formula for Tucker's phi is as follows:

$$p_{xy} = \frac{\sum x_i y_i}{\sqrt{\sum x_i^2 y_i^2}}$$

Because this index does not have a known sampling distribution, it is impossible to establish confidence intervals. Values higher than 0,95 are deemed to be evident of factorial similarity or equivalence across different cultural groups (Van de Vijver & Leung, 1997), whereas values lower than 0,90 (Van de Vijver & Poortinga, 1994) or even 0,85 (Ten Berge, 1986) should be viewed as an indication of sufficient existing differences. This index is deemed sufficiently adequate to evaluate global factorial agreement. If construct equivalence is found to be not acceptable, bias analysis should be conducted to detect possible inappropriate items in the questionnaire. Furthermore, bias analysis is necessary because construct equivalence does not presuppose the absence of bias. An instrument could therefore demonstrate acceptable construct equivalence and still be biased (Van de Vijver & Leung, 1997).

In order to determine item bias, an extension of Cleary and Hilton's (1968) use of analysis of variance was used to identify possible item bias (Van de Vijver & Leung, 1997). Bias was determined for each individual item. In the analysis, the individual item was specified as the dependent variable with language groups and score groups as the independent variables in the variance analysis. Score groups were compiled, based on the total scores on the COPE. A total of ten score levels were obtained by using percentiles identified through SAS UNIVARIATE, making it possible to assign at least 50 respondents to each score group. Two effects were tested for significance in the subsequent variance analysis, namely: the main effects of culture (uniform bias) and interaction effects of culture and score level (non-uniform bias). If both the main effect of culture and the interaction of culture and score level are found to be non-significant, the item is taken to be unbiased. If any biased items are identified in this process it would be considered inappropriate to include in the next step, namely the principal component and factor extraction analysis.

Descriptive statistics (means, standard deviations, skewness and kurtosis) were also computed to analyse the data. Cronbach alpha coefficients and inter item-correlations were used to determine the internal consistency, homogeneity and unidimensionality of the COPE scales (Clark & Watson, 1995). Coefficient alpha contains important information regarding the proportion of variance of the items of a scale in terms of the total variance explained by that particular scale. According to Clark and Watson (1995), the mean inter-item correlation (which is a straightforward measure of internal consistency) provides useful information in conjunction with the alpha coefficient of a scale (which is an indication of homogeneity of a scale), but as such cannot ensure unidimensionality of a scale. The range of inter-item correlations around the mean inter-item correlation should also be inspected in this regard. Sufficient clustering of correlations around the mean should provide sufficient support for the unidimensionality of a scale.

One-way analysis of variance (ANOVA) was used to determine the differences between the subgroups of the sample. Tuckey's Standardised Range t-tests were used to determine the statistical significance of differences obtained during ANOVAs. The practical significance of the differences in means between groups was computed with the following formula (Cohen, 1988; Steyn, 1999):

$$d = \frac{Mean_A - Mean_B}{\text{Root MSE}}$$

where

$Mean_A$ = Mean of the first group

$Mean_B$ = Mean of the second group

Root MSE = Root Mean Square Error

According to Cohen (1988), $0,10 \leq d \leq 0,50$ = small; $0,50 \leq d \leq 0,80$ = medium and $d \geq 0,80$ = large. A cut-off point of 0,50 (medium effect) was set for the practical significance of the differences between group means.

RESULTS

The results of the factor analysis of the COPE are reported in Table 2. Variable-factor loadings, communalities and percentage variance and covariance are given. The variables are ordered and grouped according to loading-size to facilitate interpretation, while loadings below 0,45 (21% of variance shared with the total variance of factor) were replaced with zeros. Labels for each factor are suggested in a footnote.

Table 2

Factor Loadings, Communalities (h^2), Percentage Variance and Covariance for Principal Factors Extraction and Varimax Rotation on COPE Items

Item	Description	F ₁ ^d	F ₂	F ₃	F ₄	h^2
45	Concentrating on efforts to do something about it	0,69	0,00	0,00	0,00	0,51
35	Attempt coming up with a strategy to handle the situation	0,67	0,00	0,00	0,00	0,47
43	Learning something from the experience	0,64	0,00	0,00	0,00	0,44
32	Taking direct action to get around problem	0,64	0,00	0,00	0,00	0,42
20	Making a plan of action	0,64	0,00	0,00	0,00	0,44
47	Thinking hard about which steps to take	0,58	0,00	0,00	0,00	0,36
23	Doing what has to be done, one step at a time	0,58	0,00	0,00	0,00	0,38
18	Not acting too soon in order not to make things worse	0,55	0,00	0,00	0,00	0,36
48	Accepting the reality of something happening	0,55	0,00	0,00	0,00	0,30
31	Restraining the self from doing something too quickly	0,53	0,00	0,00	0,00	0,34
19	Actively keeping other things interfering with handling efforts	0,53	0,00	0,00	0,00	0,35
46	Keeping the self from getting distracted by other thoughts or activities	0,51	0,00	0,00	0,00	0,33
30	Looking for something good in what is happening	0,47	0,00	0,00	0,00	0,26
6	Taking additional action to try getting rid of the problem	0,47	0,00	0,00	0,00	0,27
3	Trying to grow as a person as a result of the experience	0,45	0,00	0,00	0,00	0,27
8	Talking to someone about how one feels	0,00	0,76	0,00	0,00	0,62
49	Discussing one's feelings with someone	0,00	0,68	0,00	0,00	0,56
15	Trying to obtain emotional support from friends or relatives	0,00	0,68	0,00	0,00	0,49
22	Trying to get advice from someone about what to do	0,00	0,59	0,00	0,00	0,51
41	Talking to someone to find out more about the situation	0,00	0,55	0,00	0,00	0,49
34	Talking to someone who could do something concrete about the problem	0,00	0,48	0,00	0,00	0,42
42	Acting as though nothing has happened	0,00	0,00	0,57	0,00	0,36
26	Giving up the attempt in order to get what one wants	0,00	0,00	0,53	0,00	0,30
29	Pretending that it hasn't happened	0,00	0,00	0,52	0,00	0,28
13	Admitting to oneself that one can't deal with it and then quit trying	0,00	0,00	0,51	0,00	0,30
50	Just giving up trying to reach one's goal	0,00	0,00	0,51	0,00	0,26
52	Daydreaming about other things than this	0,00	0,00	0,50	0,00	0,29
40	Feeling a lot of emotional distress and expressing it frequently	0,00	0,00	0,50	0,00	0,32
16	Try to convince oneself that something isn't real	0,00	0,00	0,49	0,00	0,28
51	Seeking God's help	0,00	0,00	0,00	0,76	0,67
10	Putting one's trust in God	0,00	0,00	0,00	0,71	0,54
24	Praying more than usual	0,00	0,00	0,00	0,67	0,53
37	Trying to find comfort in one's religion	0,00	0,00	0,00	0,66	0,53
Squared Multiple Correlations (SMC)		0,89	0,83	0,83	0,82	
Percentage variance		13,93	7,39	7,21	4,44	
Percentage covariance		42,24	22,41	21,87	13,48	

Inspection of Table 2 reveals that four factors were extracted, cumulatively accounting for 32,97% of the total variance in the data. According to the SMCs, the three factors seem to be

^d Factor Labels : F1 Problem-focused Coping F2 Seeking Social Support F3 Passive Coping F4 Turning to Religion

internally consistent and well defined by the variables. Also, the variables seem to be well defined by the factor solution. Communality values vary from moderately low to moderately high. With a cut-off point of 0,45 (sharing at least 21% of the variance in a factor) for the inclusion of a variable in the factor-loading matrix, only 33 from a possible total of 53 variables were retained. None of these variables proved to be complex in this principal component factor solution.

It was decided to continue with orthogonal (varimax) rotation due to insignificant inter-factor correlations when oblique rotation was requested. The first extracted factor seems to constitute *Problem-focused Coping* with items such as coming up with a strategy, coming up with a plan of action, considering the steps that have to be taken, taking care not to act too quickly, not allowing interference when handling the issue, and taking the planned steps of action one at a time. The second factor seems to be concerned with *Seeking Social Support*. Items such as discussing one's feelings with someone, getting advice on what to do, seeking emotional support from friends or relatives and obtaining definite help from people who can give it, are included in this factor. The third factor seems to constitute *Passive Coping* with items such as acting and pretending that something has not happened, actively convincing oneself that something isn't happening, that it is impossible to deal with the situation and to quit trying to, actively expressing emotional distress and mentally escaping the situation by daydreaming. The fourth factor seems to manifest itself as *Turning to Religion*, evidenced by items such as seeking God's help, putting one's trust in God and finding comfort in one's religion.

Next, the construct equivalence analysis was conducted on the COPE to determine whether the constructs are equal for all the language groups^c in the sample. In this process, exploratory factor analysis and target (Procrustean) rotation were used by rotating the factor loadings of the different language groups to one target group and estimating factorial agreement based on Tucker's coefficient of agreement (Tucker's phi). These coefficients are given in Table 3 for the different language groups.

^c The Indigenous independent language group, the Eastern and the European language groups were excluded due to inadequate sample sizes.

Table 3

Construct Equivalence of the COPE for Different Language Groups

Group	N	Percentage	Tucker's phi – Problem Focused Coping	Tucker's phi – Seeking Social Support	Tucker's phi – Passive Coping	Tucker's phi – Turning to Religion	Total Congruence
Afrikaans	143	35,40	0,99	0,95	0,97	0,97	0,97
English	63	15,59	0,97	0,92	0,93	0,92	0,94
Sotho	112	27,72	0,98	0,85	0,95	0,72	0,90
Nguni	62	15,35	0,94	0,87	0,81	0,57	0,83

Inspection of Table 3 shows that the Tucker's phi coefficient for the Afrikaans, English and Sotho groups to be acceptable in most instances above the 0,90 level and approaching the critical level of 0,95. The Nguni-group demonstrated significant inequivalence below 0,90, both in terms of total congruence and in terms of Seeking Social Support, Passive Coping and Turning to Religion. This finding could be attributable to the small sample size in this particular category. However, this was not the case in the English group where a similar sample size was used. Even though values lower than 0,90 were obtained for the Sotho group in terms of Seeking Social Support and Turning to Religion, the total congruence indicate significant equivalence in terms of coping strategies. In summary, it can be concluded that significant construct equivalence exists for the Afrikaans, English and Sotho groups in terms of coping strategies (as measured by the COPE), but not for the Nguni group. Consequently, in terms of subsequent analysis of the data, the Nguni group was excluded.

The item bias analysis was completed in the next step. The results of the analysis of variance for the COPE are presented in Table 4.

Table 4

Item Bias Analyses of the COPE

Item	Tot_SS	Df_g	SS_g	F_g	Eta square	Df_i	SS_i	F_i	Eta square
Problem Focused Coping									
COPE45	191,00	2	0,30	0,50	0,00	18	6,70	1,00	0,04
COPE35	215,50	2	0,20	0,20	0,00	18	11,00	1,50	0,05
COPE43	184,50	2	1,10	1,50	0,01	18	6,70	1,00	0,04
COPE32	212,90	2	0,00	0,00	0,00	18	11,50	1,50	0,05
COPE20	227,10	2	4,30	5,40	0,02	18	12,40	1,70	0,05
COPE47	218,60	2	0,70	0,80	0,00	18	7,60	0,90	0,04
COPE23	200,90	2	3,20	3,70	0,02	18	7,00	0,90	0,04
COPE18	246,80	2	0,40	0,40	0,00	18	7,10	0,70	0,03
COPE48	212,00	2	0,50	0,50	0,00	18	7,70	0,80	0,04
COPE31	202,90	2	0,20	0,20	0,00	18	7,10	0,90	0,04
COPE19	227,80	2	4,80	4,80	0,02	18	7,80	0,90	0,03
COPE46	238,70	2	0,40	0,30	0,00	18	8,10	0,80	0,03
COPE9	190,60	2	0,90	1,00	0,01	18	17,60	2,20	0,09*
COPE30	250,60	2	1,10	0,90	0,00	18	13,70	1,20	0,05
COPE6	273,40	2	0,60	0,50	0,00	18	9,80	0,90	0,04
COPE3	216,40	2	0,60	0,50	0,00	18	9,50	0,90	0,04
Seeking Social Support									
COPE8	316,90	2	1,10	1,10	0,00	18	10,30	1,20	0,03
COPE49	265,10	2	3,90	5,20	0,02	18	9,20	1,40	0,04
COPE15	308,70	2	0,30	0,30	0,00	18	7,10	0,70	0,02
COPE22	250,90	2	2,40	2,80	0,01	18	12,50	1,60	0,05
COPE41	248,50	2	0,70	0,90	0,00	18	5,30	0,70	0,02
COPE34	255,50	2	1,60	1,60	0,01	18	7,90	0,90	0,03
COPE14	312,20	2	0,20	0,20	0,00	18	19,10	1,60	0,06*
Passive Coping									
COPE42	309,50	2	0,30	0,20	0,00	18	11,10	1,00	0,04
COPE26	328,70	2	1,40	1,00	0,00	18	13,00	1,00	0,04
COPE29	283,80	2	1,10	0,90	0,00	18	9,90	0,90	0,04
COPE13	268,70	2	3,00	2,50	0,01	18	10,30	0,90	0,04
COPE50	317,40	2	4,80	3,50	0,02	18	9,90	0,80	0,03
COPE52	333,20	2	0,40	0,30	0,00	18	12,50	0,90	0,04
COPE40	289,60	2	0,10	0,10	0,00	18	15,20	1,30	0,05
COPE16	317,60	2	3,00	2,30	0,01	18	8,90	0,80	0,03
Turning to Religion									
COPE51	272,80	2	0,30	0,50	0,00	16	2,30	0,50	0,01
COPE10	205,60	2	1,00	1,60	0,01	16	3,90	0,80	0,02
COPE24	247,10	2	0,00	0,00	0,00	16	6,40	1,20	0,03
COPE37	314,70	2	0,80	1,00	0,00	16	3,20	0,50	0,01

* Practically significant difference of medium effect

According to Table 4, significant eta square values were obtained for items 9 and 14 (interaction effects, medium effect size), meaning that these items could be regarded as non-uniformly biased for the Afrikaans, English and Sotho language groups. In statistical terms this means that for these items significant interaction effects between culture and score levels were obtained, in other words membership to a specific language group differentiated the scores of group members in a progressively larger or lesser manner across all possible score levels of these items. In the next step of the data-analysis, items 9 and 14 of the COPE were excluded.

Consequently, hypothesis 2 is not supported for the COPE.

The descriptive statistics, alpha coefficients and mean inter-item correlation coefficients for the extracted factors of the COPE are reported in Table 5.

Table 5

Descriptive Statistics, Alpha Coefficients and Mean Inter-item Correlation Coefficients of the COPE

Item	Mean	SD	Skewness	Kurtosis	$r(\text{mean})$	α
Problem-focused Coping	48,33	8,71	-0,68	0,45	0,34	0,89
Seeking Social Support	19,00	5,22	-0,30	-0,63	0,45	0,85
Passive Coping	16,84	4,90	0,32	-0,35	0,27	0,75
Turning to Religion	12,15	3,25	-0,82	-0,09	0,55	0,83

Table 5 shows that the scores on the four factors of the COPE are normally distributed. Also, Cronbach coefficient alpha levels are acceptable compared to the guideline of 0,70 provided by Nunnally and Bernstein (1994). Consequently, the internal consistencies of the scales are confirmed, meaning that a large proportion of the variance in the scales could be accounted for by the extracted factors. Also, the mean inter-item correlations are in line with the guideline of $0,15 < r < 0,50$ (Clark & Watson, 1995), except for the Turning to Religion Scale. However, this finding is still acceptable when the range of inter-item correlations is inspected, revealing a clustering of inter-item correlations around the mean inter-item correlation. Consequently, the unidimensionality of the scale is confirmed, supported by the internal consistency (homogeneity) of the scale. With regards to the other scales (factors) in

Table 5, similar findings were obtained. In summary, the internal consistency, homogeneity and unidimensionality of the scales of the COPE are confirmed.

These results provide support for hypothesis 1 in terms of internal consistency and construct validity of the COPE for emergency workers in Gauteng.

Next, the differences between various biographical groups were analysed in terms of coping strategies of emergency workers. Firstly, the differences in COPE for the different positions are given in Table 6.

Table 6
Differences in COPE for Positions

Item	Management (1)	Medical Specialists (2)	Emergency Medical Technicians (3)	Support Services (4)	Root MSE	<i>p</i>
Problem-focused Coping	49,59	52,18	47,98	45,85	8,67	0,09
Seeking Social Support	17,70 ^a	21,65 ^b	19,13	18,95 ^a	5,19	0,04*
Passive Coping	14,76 ^a	16,65	17,42 ^b	15,65	4,81	0,00*
Turning to Religion	12,69 ^b	10,47 ^a	12,20 ^b	11,25	3,23	0,00

* Statistically significant difference ($p < 0,05$)

a Practically significant difference from mean of position where, b (practical significance of medium effect, $d \geq 0,50$) or c (practical significance of large effect, $d \geq 0,80$) are indicated

According to Table 6, Medical Specialists scored significantly higher on Seeking Social Support in comparison with Management (practically significant difference, medium effect), as well as Support Services (practically significant difference, medium effect). Also, Emergency Workers scored significantly higher (practically significant, medium effect) than Management in terms of Passive Coping strategies. Finally, in terms of Turning to Religion, Management demonstrated a higher mean score (practically significant, medium effect) than Medical Specialists. Similarly, Emergency Medical Technicians scored higher than Medical specialists (practically significant, medium effect). The differences were not statistically significant for Turning to Religion.

Consequently, supporting evidence is provided for the acceptance of hypothesis 3.

Lastly, the differences in COPE for the different language groups are given in Table 7.

Table 7
Differences in COPE for Language Groups

Item	Afrikaans (1)	English (2)	Sotho (3)	Root MSE	<i>p</i>
Problem Focused Coping	47,14	47,32	50,55	8,60	0,00*
Seeking Social Support	17,11 ^c	18,78 ^b	21,48 ^a	4,89	0,00*
Passive Coping	15,89	16,76	18,13	4,81	0,00*
Turning to Religion	11,81	11,25 ^b	13,13 ^a	3,15	0,00*

* Statistically significant difference ($p < 0,05$) where letter in superscript indicates differences from other positions

a Practically significant difference from mean of group where, b (practical significance of medium effect, $d \geq 0,50$) or c (practical significance of large effect, $d \geq 0,80$) are indicated

Table 7 shows that the Sotho group demonstrated significantly higher than the Afrikaans and English language groups in terms of coping strategies. More specifically, the Sotho group scored significantly higher than the Afrikaans (practically significant, large effect) and English group (practically significant, medium effect) in terms of Seeking Social Support. Also, in terms of Turning to Religion, the Sotho groups demonstrated a significantly higher mean score in comparison with the English group (practically significant, medium effect).

DISCUSSION

It was the aim of this study to validate the COPE for the emergency workers in Gauteng. The results showed that a 4-factor solution, consisting of Problem-focussed Coping, Seeking Social Support, Passive Coping and Turning to Religion, fitted the data the best in the current sample. The findings could be related to broad taxonomies in the literature with regards to the classification of coping strategies, namely approach/active strategies, avoidance strategies and reappraisal (Cox & Ferguson, 1992; Ferguson & Cox, 1997; Tobin et al., 1989). The internal consistency and unidimensionality of the COPE's extracted factors were found to be satisfactory.

The first extracted factor in the present study is concerned with an active, focused approach aimed at finding a solution to problems. This factor was called Problem-focused Coping and

included the original subscales of Active Coping, Planning, Positive Reinterpretation and Growth, Suppressing Competing Activities and Restraint Coping. Similar findings were reported in the literature (Cook & Heppner, 1997; Ingledew, Hardy, Cooper, & Jemal, 1996). The second factor was concerned with obtaining social support and included both original subscales of Seeking Social Support for Emotional Reasons as well as Seeking Social Support for Instrumental Reasons. Similar solutions were obtained in other studies (Finch, Panter & Caskie, 1999; Laurent, Catanzaro & Callan, 1997; Ward & Kennedy, 2001). The third extracted factor in the present study can be related to efforts not handle the issue at hand immediately, but to prolong dealing with it. This factor includes the original subscales of Denial, Behavioural Disengagement and Mental Disengagement. Consistent clustering of subscales is reported in the literature (Ingledew et al., 1996; Kalasmaa & Pulver, 2000; Sica, Novara, Dorz & Sanavio, 1997). The last factor is the reliance on a higher power which has been consistently reported in the literature as a separate factor in factor-analytical studies on the COPE, namely Turning to Religion (Phelps & Jarvis, 1994; Lyne & Roger, 2000; Sica et al., 1997).

Contrary to expectation, evidence of inequivalence was found for the COPE with regards to the Nguni language group in the present study. Also, interaction between culture and score level (non-uniform bias) were detected for items 9 (“I think about how I might best handle the problem”) and 14 (“I let my feelings out”) of the COPE which means that when comparing the means of cultural groups on these items to each other, progressively larger or smaller scores are obtained across all possible scores of an item. Therefore, individual differences in mean scores cannot be attributed to valid differences in item responses, but rather to language group. These findings seem to be contrary to the findings reported by Pienaar and Rothmann (in press) where no inequivalence and bias were found for the COPE in the South African Police Services. The difference in findings could be attributed to the limitations of sample size and design in the present study. Alternatively, the influence of semantic differences between groups in terms of the understanding of the item content could also have influenced the findings.

Regarding the differences in coping strategies between groups, it was found that Medical Specialists scored significantly higher than the Management, as well as Support Services groups in terms of Seeking Social Support. Possibly, this could be attributed to the fact that professional network available to the practicing specialist is more prevalent in their coping

with work realities than it is for Management and Support Services. Alternatively, in comparison with Management and Support Services, it is also possible that the close-knit nature of the professional specialist network facilitates easy access to social support structures. Interestingly, no significant differences were found in the case of the Emergency Worker. The level of social support seeking was, however, higher for the Medical Specialists in comparison with the Emergency Medical Technician, though not significantly different. High levels of usage with regards to this coping mechanism could be attributable to the important role that social support plays in coping with emergency work (Beaton et al., 1997; Young and Cooper, 1995). Emergency Medical Technicians scored significantly higher than Management in terms of their utilisation of passive coping strategies. Conceptually, this makes sense in terms of the extremely traumatic realities that emergency workers face in their daily work. Studies have shown emergency workers to mentally withdraw or escape their reality (Alexander & Klein, 2001; Cocotos & Ortlepp, 1999). Even though not significant statistically, significant practical differences were found with regards to the use of religion as a coping strategy. Emergency Medical Technicians obtained significantly higher scores than Medical Specialists, while Management scored significantly higher than Medical specialists. The comparatively low usage of this strategy by Medical Specialists is quite surprising and could possibly reflect the utilisation of more problem-focused and social support oriented strategies, reflected by the consistently higher scores of this group on all the coping strategies, except for Passive Coping.

In terms of the different language groups' experience of coping strategies, practically significant differences were found for the Sotho group in comparison with the Afrikaans and English language groups. Significant higher scores were obtained for the Sotho group in comparison with the Afrikaans and English groups in terms of Seeking Social Support, as well as for the English group in terms of Turning to Religion. With regards to Seeking Social Support, it is possible that significant differences could be attributed to the so-called "ubuntu" principle, often found in the African cultural groupings, where survival is based on the principle of group-membership and solidarity and not on individual self-reliance, often associated with a Western philosophy (Mbigi & Maree, 1995). In terms of Turning to Religion, the relative importance of religion as a coping strategy seems to be more important for the Sotho language group. These findings are in line with those reported in the South African Police Services where the Sotho group, together with Pedi, Zulu and Venda groups,

were found to be higher than the Afrikaans and English groups in terms of Avoidance and Seeking Emotional Support coping strategies (Pienaar, 2002).

Limitations of the present study include sample size ($N = 323$), which has been reduced due to obtained inequivalence of the Nguni-group in terms of coping strategies in the present study. Also, inadequate subgroup sample sizes in terms of the respective language groups could significantly influence the findings. For instance, during the bias analysis, the recommended number of observations per score level ($n = 50$) for each item could not be reached. Also, the sampling procedure in the present study has significant limitations in terms of the generalisation of the findings to the total study population. Future studies could benefit in terms of a stratified random-sample design which would ensure sufficient representation of the different groups in the total population of emergency workers. In terms of the research design, future studies should focus on longitudinal designs where inferences in terms of cause and effect could be made.

Recently, some criticism has been expressed in the literature with regards to coping. Firstly, in comparison with the dispositional view of coping where it is viewed as a more stable characteristic of the person (disposition), coping was defined in the current context as situational. In other words, coping strategies could be successfully utilised in one context, while a total set of coping strategies could be appropriate in another context. In this regard, Folkman (1984) cautioned against the tendency of labelling coping strategies as invariably adaptive or maladaptive. The current study focused only on coping as a strategy, not as an outcome. Consequently, the findings obtained in this study only serve to describe how the emergency worker in Gauteng transacts with his/her work environment in terms of the strategies that the emergency worker use and can therefore not be evaluated in terms of effectiveness.

In the second instance, criticism has been expressed in terms of the operationalisation of the coping construct regarding the confounded nature of some of the traditional coping measures, such as the COPE. In a recent review Stanton, Danoff-Burg, Cameron and Ellis (1994) found a diverse array of responses under the designation of emotion-focussed coping where some items reflected an approach towards a stressor while others indicated avoidance. Furthermore, Scheier, Weintraub and Carver (1986) reported that some emotion-focussed items are inversely related. Aggregation of items in this manner could make the interpretation of the

association between emotion-focussed coping and dysfunctional outcomes, which has been frequently obtained in the literature, difficult to explain.

RECOMMENDATIONS

In terms of the coping mechanisms reported in the present study, it is recommended that the study be replicated in other provinces in South Africa with the aid of a randomised sampling design to ensure adequate sample size and representation of subgroups in the sample in terms of the emergency worker population. It is important to compile a profile of the typical coping strategies of the emergency worker in South Africa and to further enhance our understanding of the methods used in the emergency services and the manner in which they handle their extremely stressful jobs. The high incidence of passive coping strategies suggests that emergency workers tend to prolong their closure with stressors that they face in their jobs, possibly leading to elongated over-extension and even burnout.

In order to fully understand the emergency worker-environment transactional interaction in terms of coping, the outcomes of coping should also be investigated. It is recommended that future studies with regard to emergency worker coping in South Africa be expanded to include the evaluation of selected coping strategies in terms of the perceived outcomes for the individual.

Future studies should investigate the construct validity and reliability of the COPE should extend beyond the emergency services to other occupations in South Africa. In order to meaningfully compare the original theoretical conception of Carver et al. (1989), and taking the recommendations of Pienaar and Rothmann (in press) in this regard into consideration, it is proposed that future factor-analytical research on coping in South Africa should explore the possibility of a 4-factor solution, namely active coping, passive coping, social/emotional support coping and religion and/or humour coping mechanisms. Future research should also focus on combating the confounding nature of some items reported in traditional coping measures such as the COPE, especially with regards to the operationalisation of emotion-focused coping.

Finally, it is recommended that with regards to the study of coping in South Africa, that construct equivalence and item bias should be computed in line with the recommendations of

Van de Vijver and Leung (1997). Considering the limitations of the present study in terms of sampling procedure and size, it is recommended that sufficient representation of relevant subgroups be considered in future research to ensure sufficient statistical power in the analysis of relationships between these subgroups. Not only do the current findings need to be validated with regards to the equal comparison of the construct of coping across cultural groups for the emergency worker, but cross-cultural research in general would be greatly enhanced in terms of validity of findings in the multi-cultural South African context.

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CAUSAL MODELS OF BURNOUT AND ENGAGEMENT OF EMERGENCY WORKERS IN GAUTENG*

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ABSTRACT

The objective of this research was to develop and test causal models of burnout and engagement in the Emergency Services in Gauteng. A cross-sectional survey design was used. An accidental sample ($N = 323$) was taken from emergency workers in Gauteng. The Maslach Burnout Inventory – Human Services Survey, Utrecht Work Engagement Scale, Emergency Worker Stress Inventory, COPE and Affectometer 2 were administered. The results showed that stress because of a lack of resources predicted Emotional Exhaustion and Depersonalisation. Emotional Exhaustion predicted Depersonalisation, and Problem-focused Coping predicted Personal Accomplishment. Positive Affect (inverse) predicted Emotional Exhaustion. Regression analyses with semi-partial correlations showed moderating effects of coping strategies and affect on the relationship between stress caused by a lack of resources and emotional exhaustion.

OPSOMMING

Die doelstellings van hierdie navorsing was om 'n kousale uitbranding en begeesteringsmodel vir nooddienerswerkers in die Gautengse Nooddienste te ontwikkel en te toets. 'n Dwarsnee opname-ontwerp met 'n beskikbaarheidsteekproef ($N = 323$) is gebruik. Die Maslach Uitbrandingsvraelys – Menslike Dienste-Opname, Utrecht-werksbegeesteringskaal, Nooddienerswerker Stresvraelys, COPE en Affektometer 2 is afgeneem. Resultate het getoon dat stres a.g.v. 'n tekort aan Hulpbronne Emosionele Uitputting en Depersonalisasie voorspel. Emosionele Uitputting het Depersonalisasie voorspel, terwyl Probleem-gefokusde Coping Persoonlike Bereiking voorspel het. Positiewe Affek (invers) het Emosionele Uitputting voorspel. Regressie-analises met semi-parsiële korrelasies het modereringseffekte getoon van coping-strategieë en affek op die verhouding tussen stressore (tekort aan hulpbronne) en emosionele uitputting.

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Emergency work is widely recognised as stressful (Beaton, Murphy, Pike & Corneil, 1997; Young & Cooper, 1995). Not only is emergency work associated with the higher levels of occupational stress than the general working population, significant spill-over effects have been reported in the family lives of emergency workers as well (Anshel, 2000; Beaton et al., 1997; Violanti & Paton, 1999). Consequently, the development of social, physical and psychological responses which can be detrimental to the well-being of emergency workers, are often reported (Moran & Britton, 1994; Vettor & Kossinski, 2000). Burnout is one such a phenomenon, associated with the unsuccessful progression of continued attempts to buffer the impact of environmental stressors, resulting in a general breakdown of resources, and ultimately in the inception of burnout (Schaufeli & Enzmann, 1998).

Recently, the study of burnout has been extended to the inclusion of work engagement (Maslach, Schaufeli & Leiter, 2001). Burnout and engagement can be related in an antithetical manner, both conceptually and empirically (Schaufeli & Bakker, 2001; Schaufeli, Martinez, Pinto, Salanova & Bakker, 2002). Whereas burnout is concerned with the depletion of emotional resources, loss of motivation and belief in efficacy, engagement is about upholding a positive and fulfilling state of mind at work characterised by energy, dedication and intrinsic enjoyment (Schaufeli & Enzmann, 1998; Schaufeli, Salanova, Gonzáles-Romá & Bakker, 2002). Burnout and engagement seem to be differentially related to work-related variables. Schaufeli and Bakker (2002) successfully tested their extended COBE model (including both burnout and work engagement) in a multi-sample study. Burnout and work engagement were found to mediate the relationship between job demands and reported health problems, as well as the relationship between job resources and turnover intention. Consequently, burnout seems to be associated with the demands of the job, while work engagement seems to be related to the availability of job resources.

According to Schaufeli and Bakker (2002) and Jones and Fletcher (1996), any job viewed from an interactional perspective can be analysed in terms of two elements, namely job demands and job resources. *Job demands* are those physical, psychological, social or organisational aspects of the job which require sustained physical and/or psychological strain (i.e. cognitive or emotional) effort, the consequences of which are associated with physiological or psychological costs, e.g. work overload, personal conflicts, emotional demands, such as demanding clients, etc. Although these strains or demands are not necessarily negative, they can turn into job stressors when meeting these high demands

requires sustained effort, consequently being associated with negative causal responses in the long run, such as depression, anxiety, or burnout. *Job resources* on the other hand, refer to those physical, psychological, social or organisational aspects of the job that (1) reduce the job demands and therefore the associated physiological and psychological costs, or (2) are functional in achievement of work goals, or (3) stimulate personal growth, learning and development, e.g. social support, autonomy, feedback and job security.

The literature mentions many possible buffers or exacerbating factors that could aid the employee against the stress often associated with job demands and a lack of resources (Cooper, Dewe & O'Driscoll, 2001). The influence of so-called moderators in terms of demands placed on the individual can only be fully understood in a transactional framework where individuals transact with their environments, make appraisals of the interaction and consequently attempt to deal with it (Cooper et al., 2001). When viewed from this perspective, burnout could be described as a particular and unique variety of strain which is a product of the interaction between environmental factors, such as job demands, and individual perceptions, characteristics and behaviours. Therefore, burnout does not solely reside within the environment or the individual; it is the result of a dynamic transaction between the constituting elements of the environment and individual's cognitive processes. Potential moderators might be grouped as personality or dispositional variables, situational variables and social variables (Cooper et al., 2001).

The aim of this study was to investigate the relationship of burnout and work engagement with occupational stress and the potential moderating effects of coping strategies and affect for emergency workers in Gauteng. A review of the literature, combining these factors in a causal model of burnout and engagement for emergency workers in South Africa, could not be found in the literature. Therefore, it was the objective of this study to develop and test a causal model of burnout and engagement for emergency workers in South Africa inclusive of occupational stress, coping strategies and affect.

Burnout, work engagement and occupational stress

Building on the work of Karasek (Fox, Dwyer & Ganster, 1993) and research on the Maslach Burnout Inventory (MBI), Maslach and Jackson (1986) proposed a descriptive heuristic framework, stating that the presence of particular demands (i.e. work overload and personal

conflicts) and the absence of particular resources (i.e. control coping, social support, autonomy and decision involvement) would lead to the prevalence of burnout, resulting in other expected negative outcomes, such as physical illness, turnover, absenteeism, and diminished organisational commitment. Subsequent research used this theoretical framework to understand the well-being of employees in stressful occupational environments. Demerouti, Bakker, Nachreiner and Schaufeli (2001) successfully tested their Job Demands-Resources (JD-R) model in a diverse employee sample which stated that job demands are primarily related to the exhaustion component of burnout and that job resources are primarily related to disengagement or mental withdrawal from one's work, its content and work in general.

According to Schaufeli and Enzmann (1998), burnout can be defined as a persistent, negative work-related state of mind in "normal" individuals, primarily characterised by emotional exhaustion and accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work. In the current context, however, burnout is defined as a process of disengagement in response to job-related stressors, where the imbalance between job demands and the available job resources leads to an emotional response characterised by anxiety, tension, fatigue and strain (exhaustion). Subsequently, changes in the attitudes and behaviour of individuals can be identified, such as defensive coping (often exhibited in a preoccupation with the gratification of own needs), a cynical detachment from clients/patients and their problems (depersonalisation) and the negative evaluation of the self and the attainment of professional goals (personal accomplishment) (Cooper et al., 2001; Schaufeli & Enzmann, 1998).

Research findings regarding job demands indicated a relationship with feelings of emotional exhaustion, namely physical workload (Janssen, Bakker & De Jong, 2001); poor environmental conditions (Friedman, 1991); demanding clients (Leiter & Maslach, 1988; Whitehead, 1987); time pressure and unfavourable shift work schedules (Kandolin, 1993). Findings also indicate a relationship between a lack of job resources and depersonalisation, namely performance feedback (Åström, Nilsson, Norgerg, Sandman & Winblad, 1990); rewards (Landsbergis, 1988); job security (Dekker & Schaufeli, 1995); job control (Landsbergis, 1988); participation in decision-making (Jackson, Turner & Brief, 1987) and support from supervisors (Leiter, 1989). Recently, a multi-sample study confirmed the mediating effect of burnout on the job demands-health outcome relationship (Schaufeli &

Bakker, 2002). Consequently, in terms of the present study, emotional exhaustion is expected to be predicted by stress because of job demands, while depersonalisation would be predicted by stress due to a lack of job resources.

Coping can be defined as the efforts that individuals make to manage situations appraised as potentially harmful or stressful (Kleinke, 1991). Coping refers to the perceptual, cognitive or behavioural responses used to manage, avoid or control situations that could be regarded as difficult (Folkman & Lazarus, 1984, Moos, 1994; Zeidner & Endler, 1996). Coping could either refer to strategies or results (Fleishman, 1984). As a strategy, coping refers to the different methods that individuals apply to manage their specific circumstances, while coping as a result refer to the eventual outcomes of the chosen strategy for the individual. The former is the focus in the current study. Non-coping is defined by Callan (1993) as failed efforts to cope, accompanied by various physical and psycho-social disturbances, eventually resulting in higher stress levels. Non-copers experience that things just do not make sense and that they lose perspective on issues. According to Carver, Scheier and Weintraub (1989), non-coping results in higher levels of depression and anxiety.

According to Alsoofi, Al-Heeti and Alwashli (2000), burnout and coping strategies seem to be significantly related. The use of withdrawal coping strategies is associated with high levels of burnout, while low burnout levels are associated with constructive coping strategies (Maslach & Jackson, 1982). Burned-out individuals seem to cope with stressful events in a rather defensive manner, whereas confronting coping strategies are associated with less burnout (Schaufeli & Enzmann, 1998). Consequently, passive coping strategies could be associated with higher burnout levels, while problem-focused strategies of coping could be associated with lower burnout levels. Research indicated that the use of a problem-focused strategy is likely to lead to feelings of personal accomplishment (Lee & Ashforth, 1996). In a South African sample of senior managers in a manufacturing industry Jansen van Vuuren and Rothmann (2002) reported that emotional exhaustion was positively related to the use of religion as a coping strategy. In terms of the present study, it is expected that burnout (emotional exhaustion, depersonalisation and low personal accomplishment) would be predicted by passive coping and a lack of problem-focused coping strategies. Furthermore, emotional exhaustion is expected to be predicted by the use of religion as a coping strategy.

Engagement, defined as a positive, fulfilling, work-related state of mind and characterised by vigour, dedication and absorption cannot be described as a momentary and specific state. Rather, it is a more persistent and pervasive affective-cognitive state which is not focused on a particular object, event, individual or behaviour (Schaufeli, Salanova, Gonzáles-Romá & Bakker, 2002). Based on a theoretical analysis, burnout and engagement were conceptually related to each other, resulting in two work-related dimensions of well-being being identified, namely (1) *activation*, ranging from exhaustion to vigour, and (2) *identification*, ranging from cynicism to dedication (Schaufeli & Bakker, 2001). Also, personal accomplishment and absorption were included in the burnout and engagement constructs respectively, but not in an antithetical manner.

Research findings, however, support a somewhat different relationship between burnout and work engagement. In their study, Schaufeli, Salanova, Gonzáles-Romá and Bakker (2002) reported that a reduced burnout factor, consisting of Exhaustion and Cynicism, and an extended engagement factor, consisting of all three engagement scales (Vigour, Dedication and Absorption) and Professional Efficacy, fitted their data the best. Similarly, in their discriminant factor analysis, Demerouti, Bakker, De Jonge, Janssen and Schaufeli (2001) found that levels of job demands and job control were predicted by a reduced burnout dimension (exhaustion and cynicism, substituted by health complaints) and an extended engagement function (including all three engagement scales and professional efficacy). These findings are in line with Green, Walkey and Taylor (1991) calling exhaustion and cynicism the core dimension of burnout. Similarly, Maslach and Leiter (1997) stated that they consider efficacy (personal accomplishment) a constituting element of engagement, while reduced efficacy could be viewed as an element of burnout. Burnout and Engagement scales were also found to be moderately negatively related (Schaufeli, Martinez, Pinto, Salanova, & Bakker, 2002; Schaufeli, Salanova, Gonzáles-Romá & Bakker, 2002). Consequently, in the present study, a moderate, negative relationship between the burnout and engagement scales is expected, while Personal Accomplishment is expected to be more strongly associated with the Vigour, Dedication and Absorption scales in comparison with its theorised relationship with Emotional Exhaustion and Depersonalisation.

Moderators of stressful experiences

According to Cooper et al. (2001), there has been a recent rekindled interest in the moderating effects of personality variables and dispositions in the prediction of employee attitudes, affective reactions and behaviours in terms of the individual stressful experience. Moderator variables affect the direction and/strength of the relation between independent (predictor) variables and dependent (criterion) variables (Baron & Kenny, 1986). A moderator variable exerts influence as a third variable on the zero-order (main effect) correlation between two other variables. Stated differently, the influence of a moderator variable is a function of the relationship between the moderator variable and the independent variable, significantly affecting the main relationship between the independent and dependent variable.

According to Edwards (1996), two possible mechanisms exist whereby dispositional factors influence the stressor-strain relationship on an individual level, namely (a) personality dispositions which might influence the individual's exposure to stressful events, or (b) personality dispositions which might influence individual reactivity to stressful events. The first possibility has been referred to as the *differential exposure* perspective (mediating effects) whereby personality factors determine the extent to which individuals are exposed to certain stressful situations. The second approach is known as the *differential reactivity* approach (moderating effects) where certain dispositional variables might serve to moderate the impact of job stressors on the individual's affective outcomes. Stated differently, this means that the impact of stressful experiences would vary for individuals who score high or low on a specific moderator variable (Bolger & Zuckerman, 1995; Cohen & Edwards, 1989; Cooper et al., 2001).

In terms of the present study, coping strategies and affect are investigated as possible moderating variables in the emergency workers' experience of stress and burnout. According to Kamman and Flett (1983), general well-being can be seen as the balance of positive and negative feelings (affect) in recent experience. Research indicates that high levels of negative affect increase susceptibility to the experience of psychological strain and other negative outcomes of stress such as negative emotions and adversarial social relationships, whereas positive affect is associated with high generalised self-efficacy, subjective well-being and positive social relationships (Church, 1994; Spielberger, Gorsuch & Lushene, 1970).

Therefore, negative affect is expected to be negatively related to seeking social support, while positive affect is expected to be positively related to seeking social support.

In terms of causal relationships, a recent study successfully tested a causal model on burnout in a healthcare worker sample ($N = 478$) (Iverson, Olekalns & Erwin, 1998). Negative affect predicted low social support and job satisfaction and high levels of emotional exhaustion and depersonalisation. Positive affect was associated with higher levels of personal accomplishment, greater autonomy and lower absenteeism. In terms of moderating effects, it was found that those with high negative affect experienced more depersonalisation from co-worker support compared to those with low negative affect (Iverson et al., 1998).

Regarding coping strategies, it would seem that supporting evidence demonstrating moderating effects has not always been successfully demonstrated in a range of studies (Kinicki, McKee & Wade, 1996). However, a recent study conducted in a sample of police officers ($N = 233$) found moderating effects for seeking social support as a coping strategy in the relationship between work events and the experience of distress. Also, a reverse buffering effect was found for the utilisation of problem-focused coping strategies in terms of the relationship between work events and the experience of stress. Stated differently, work events were associated with higher levels of distress due to the utilisation of a problem-focused coping strategy (Patterson, 2003). In terms of burnout, a study in a teacher sample revealed significant moderator effects for support from colleagues and supervisors on both emotional exhaustion and depersonalisation (Greenglass, Fiksenbaum & Burke, 1995).

Consequently, the following research hypotheses can be formulated:

H1: Stress because of job demands will predict emotional exhaustion, while stress because of lack of resources will predict depersonalisation.

H2: Burnout and Engagement will be moderately negatively related

H3: Positive affect will predict emotional exhaustion, depersonalisation and personal accomplishment, while negative affect will predict emotional exhaustion and depersonalisation. Seeking social support will be negatively related to negative affect and positively related to positive affect

H4: Problem-focused coping and Passive Coping will predict Emotional Exhaustion, Depersonalisation and Personal Accomplishment. Turning to Religion will predict Emotional Exhaustion

H5: Personal Accomplishment will be more strongly related to Vigour, Dedication and Absorption than to Emotional Exhaustion and Depersonalisation.

METHOD

Research design

A cross-sectional survey design was used to reach the objectives of this research. According to Burns and Grove (1993) cross sectional designs are appropriate where groups of subjects at various stages of development are studied simultaneously, whereas the survey technique of data collection gathers information from the target population by means of questionnaires. This design is also suitable for the development and validation of questionnaires (Shaughnessy & Zechmeister, 1997).

Study population

An accidental sample of emergency workers in the different regions of Gauteng, namely West Rand, Ekurhuleni, Sedibeng, Johannesburg Metropolitan, Tshwane, Kungwini and Nokeng Tsa Taemane. The total population of about 2100 emergency workers in Gauteng was targeted. A response rate of 21,6% was achieved due to the nature of the job, e.g. call-outs, rotating working schedules, and leave, of which 323 responses (15,38%) could be utilised. Descriptive information of the sample is given in Table 1.

Table 1

Characteristics of the Participants

Item	Category	Percentage
Home Language	Afrikaans	44,97
	English	19,81
	Sotho ¹	35,22
Position	Management	16,77
	Medical Specialists	5,28
	Emergency Medical Technicians	71,74
	Support Services	6,21
Area	West Rand	12,26
	Ekurhuleni	47,42
	Sedibeng	17,42
	Johannesburg Metro	10,00
	Tshwane	8,71
	Kungwini	3,23
	Nokeng Tsa Taemane	0,97
Education	Grade 11 or below	11,36
	Grade 12	20,45
	Tertiary education : Diploma	46,21
	Tertiary education : Degree	21,97
Gender	Male	79,54
	Female	20,46
Marital status	Single	22,19
	Engaged	11,25
	Married	57,81
	Separated/Divorced/Deceased	8,75

The sample consisted mainly of Afrikaans and Sotho-speaking emergency workers (80,19%). They were mostly married men (79,54%) with a tertiary education (diploma), a mean age of 33,19 years and an average length of service of 9,66 years.

Measuring Battery

The following measuring instruments were used in the empirical study:

The *Maslach Burnout Inventory – Human Services Survey (MBI-HSS)* (Maslach & Jackson, 1986) measures respondents' perceived experience of burnout in relation to the recipients of

¹ Sipedi; Sesotho; Setswana

their service, care or treatment. The MBI-HSS consists of 17 self-scored items on a seven-point frequency scale, ranging from 0 “never” to 6 “every day”. Three subscales can be identified, namely Emotional Exhaustion (nine items; e.g. “I feel emotionally drained from my work”), Depersonalisation (five items; e.g. “I feel I treat some recipients as if they were impersonal objects”), and Personal Accomplishment (eight items; e.g. “I have accomplished many worthwhile things in this job”). Naudé and Rothmann (in press, a) confirmed the 3-factor structure of the MBI-HSS in a sample of 323 emergency workers in Gauteng. Structural equivalence was observed for the Afrikaans, English and Sotho groups, but not for the Nguni group. Satisfactory Cronbach alphas were reported for all the subscales, namely Emotional Exhaustion ($\alpha = 0,79$), Depersonalisation ($\alpha = 0,68$) and Personal Accomplishment ($\alpha = 0,78$) (Naudé & Rothmann, in press, a).

The *Utrecht Work Engagement Scale (UWES)* (Schaufeli, Salanova, Gonzáles-Romá and Bakker, 2002) measures levels of engagement of emergency workers on a 15-item seven point frequency scale, ranging from 0 “never” to 6 “every day” (Naudé & Rothmann, in press, b). Three dimensions can be distinguished, namely Vigour (6 items; e.g. “I am bursting with energy in my work”), Dedication (5 items; e.g. “I find my work full of meaning and purpose”) and Absorption (6 items; e.g. “When I am working, I forget everything else around me”). Engaged individuals are characterised by high levels of Vigour, Dedication and Absorption. Naudé and Rothmann (in press, b) confirmed the 3-factor structure of the UWES in a sample of emergency workers ($N = 323$). While structural equivalence was obtained for the Afrikaans, English and Sotho groups, inequivalent results were obtained for the Nguni-group. Satisfactory Cronbach alpha coefficients were obtained for all the subscales, namely Vigour ($\alpha = 0,70$), Dedication ($\alpha = 0,83$) and Absorption ($\alpha = 0,67$) (Naudé & Rothmann, in press, b).

The *Emergency Worker Stress Inventory (EWSI)* was used to measure occupational stress and was developed by Naudé and Rothmann (in press, c) for emergency workers in Gauteng. The EWSI consists of 78 items scored on a frequency and intensity scale. In the first part of the questionnaire, participants rate each of the 39 statements in terms of perceived intensity of the particular stressor on a 9-point scale, ranging from “1” (Low) to “9” (High). In the second part of the questionnaire, the participants are requested to respond in terms of perceived frequency in experiencing the same stressors over a period of the past six months on a 10

point scale ranging from “0” (No days) to “9+” (more than 9 days). Factor analysis with a varimax rotation identified three underlying factors, namely Lack of Resources, Job Demands and Inherent Emergency Work Stressors. Naudé and Rothmann (in press, c) reported acceptable internal consistencies for the EWSI (Lack of Resources, $\alpha = 0,88$; Job Demands, $\alpha = 0,82$; Inherent Emergency Work Stressors, $\alpha = 0,83$).

The *Coping Orientation for Problem Experiences Questionnaire (COPE)* (Carver et al., 1989) was used to measure the participant’s general coping strategies. The COPE is a multi-dimensional 33-item, 4-point frequency scale, ranging from “1” (usually not doing it at all) to “4” (usually doing it a lot). Carver et al. (1989) reported alpha coefficients for the COPE ranging from 0,45 to 0,92. Test-retest reliability varies from 0,46 to 0,86 and 0,42 to 0,89 after two weeks (Carver et al, 1989). Naudé and Rothmann (in press, d) reported a 4-factor solution for the COPE in a sample of emergency worker ($N = 405$) in South Africa, consisting of Problem-focused Coping, Seeking Social Support, Passive Coping and Turning to Religion. Even though construct inequivalence was found for the Nguni group, equivalent results were reported for the Afrikaans, English and Sotho groups. Cronbach alphas of 0,89 (Problem-focused Coping); 0,85 (Seeking Social Support); 0,75 (Passive Coping) and 0,83 for Turning to Religion were reported.

The *Affectometer (AFM)* (Kammann & Flett, 1983) was used to measure the general well-being or sense of well-being in recent experience. The AFM (shortened version) is a 20-item 5-point frequency scale, ranging from “1” (not at all) to “5” (all the time) and gives a bottom-line indication of quality of life experienced on an affective and emotional level. The overall level of well-being or happiness is conceptualised as the extent to which positive feelings dominate over negative feelings. Two subscales, namely Positive Affect and Negative Affect are identified. Kamman and Flett (1983) reported alpha reliabilities of 0,88 to 0,93 as well as indications of validity. Wissing and Van Eeden (1994) reported alpha coefficients for Positive Affect between 0,81 and 0,86, and between 0,83 and 0,90 for Negative Affect in South African studies. Wissing et al. (1999) indicated the validity of this scale for use in an African group and reported reliability coefficients of 0,68 (Positive Affect) and 0,77 (Negative Affect). In the present study, confirmatory factor-analysis supported the 2-factor structure of the AFM. Internal consistency of the two scales was determined for Positive Affect ($\alpha = 0,84$) and Negative Affect ($\alpha = 0,83$).

Statistical analysis

The statistical analysis was conducted with the aid of the SAS program (SAS Institute, 2000). Principal factor extraction with varimax rotation was performed by means of SAS FACTOR on the items of the AFM prior to performing structural equation modelling. Prior to principal factor extraction, principal component extraction was done to estimate the number of factors, the presence of outliers and the factorability of the correlation matrices. Descriptive statistics (means, standard deviations, skewness and kurtosis) were also computed to describe the data.

Cronbach alpha coefficients and inter item-correlations were used to determine the internal consistency, homogeneity and unidimensionality of the measuring instruments (Clark & Watson, 1995). Coefficient alpha contains important information regarding the proportion of variance of the items of a scale in terms of the total variance explained by that particular scale. According to Clark and Watson (1995), the mean inter-item correlation (which is a straightforward measure of internal consistency) provides useful information in conjunction with the alpha coefficient of a scale (which is an indication of homogeneity of a scale), but as such cannot ensure unidimensionality of a scale.

In terms of statistical significance, it was decided to set the value at a 95% confidence interval level ($p \leq 0,05$). Effect sizes (Steyn, 1999) were used to decide on the practical significance of the findings. Pearson product-moment correlation coefficients were used to specify the relationship between the variables. A cut-off point of 0,30 (medium effect, Cohen, 1988) was set for the practical significance of correlation coefficients.

Canonical correlations (r_c) were used to determine the relationships between the dimensions (scales) of burnout, work engagement, occupational stress, coping and affect. Canonical correlations analyse the relationships between sets of variables (Tabachnick & Fidell, 2001) and as such is a descriptive rather than a hypothesis-testing technique.

Covariance analysis or Structural equation modelling (SEM) methods, as implemented by AMOS (Arbuckle, 1997) were used to construct and test the causal model of burnout. SEM is a statistical methodology that takes a confirmatory (i.e. hypothesis-testing) approach to the analysis of a structural theory bearing on some phenomenon (Byrne, 2001).

Hypothesised relationships in the theoretically based model were empirically tested for goodness-of-fit with the sample data. In terms of the degree of correspondence between the implied (hypothesised model) and the observed covariance matrices, the χ^2 statistic and several goodness-of-fit indices were utilised. Jöreskog and Sörbom (1993) aptly describe the χ^2 statistic as a badness-of-fit statistic, because smaller values indicate better fit. The χ^2 statistic however, if used in isolation, can offer certain limitations. The statistic can be equated to the $(N-1)F_{min}$ statistic where N is the sample size and F_{min} the minimum fit function. This value tends to become substantial in the case where the model does not hold and the sample size is large, in which the likelihood of rejecting the null-hypothesis is increased (Byrne, 2001). In addressing this problem, one of the first alternative statistics to be included in the model was the $\chi^2/\text{degrees of freedom}$ or *CMIN/DF* statistic, which is the minimum discrepancy per degrees of freedom (Wheaton, Muthén, Alwin & Summers, 1977). These criteria, often referred to as “subjective” or “practical” indices of fit, are typically used as adjuncts of the χ^2 statistic.

The Goodness-of-fit Index (GFI) indicates the relative amount of variance and co-variance in the sample predicted by estimates of the population. Its value usually varies between 0 and 1 with values higher than 0,90 indicating good model fit with the data. The Adjusted Goodness-of-fit Index (AGFI) indicates the relative amount of variance accounted for by the model, corrected for the number of parameters that needed to be estimated (degrees of freedom) in the model. Both these values are classified as absolute values, because they compare the hypothesised model with no model at all (Hu & Bentler, 1995). Even though both indexes vary between 0 and 1, the distribution of AGFI is not known, and consequently no critical value can be obtained (Jöreskog & Sörbom, 1986). The Parsimony Goodness-of-Fit Index (PGFI) adds to a more realistic interpretation of the model, combining the issue of parsimony and goodness-of-fit by taking the amount of variables needed to be determined into account (Mulaik et al., 1989). Although this index generally demonstrate lower levels in comparison to the other fit indices at the 0,50 level in comparison to values higher than 0,90, values > 0,80 are considered to more appropriate (Byrne, 2001).

The Normed Fit Index (NFI) is used to measure global model fit, giving an indication of the extent to which the hypothesised model compares with the most restricted model where relationships between variables are zero, in other words a perfectly independent model. This

index also varies between 0 and 1 and tends to overestimate fit in smaller samples. The Comparative Fit Index (CFI) also compares the hypothesised and independent models, but takes sample size into account. The Tucker-Lewis Index (TLI) is a relative measure of covariation explained by the hypothesised model which has been specifically designed for the assessment of factor models (Tucker & Lewis, 1973). Critical values for good model fit have been recommended for the NFI, CFI and TLI to be acceptable above the 0,90 level (Bentler, 1992), although recently Hu and Bentler (1999) recommended a cut-off value of 0,95.

Browne and Cudeck (1993) suggested the use of the Root Mean Square Error of Approximation (RMSEA), as well as the 90% confidence interval of the RMSEA to address the problems associated with sample size. The RMSEA provides an indication of the overall amount of error in the hypothesised model-data fit, relative to the number of estimated parameters (complexity) in the model. The recommended acceptable levels of the RMSEA should be 0,05 or less and should not exceed 0,08. Hu and Bentler (1999) suggested a value of 0,06 to indicate acceptable fit, whereas MacCallum, Browne and Sugawara (1996) recently suggested that values between 0,08 and 1,0 to indicate mediocre fit and values above 1,0 poor fit.

Standard multiple regression analysis was carried out to assess the contribution of the independent variables (occupational stress, coping strategies and affect) to burnout. According to Tabaschnick and Fidell (2001), the correlation between an independent variable and a dependent variable reflects variance shared with the dependent variable, but some of the variance may be predictable from other independent variables. The unique contribution of an independent variable to predicting a dependent variable can be assessed by semipartial correlation. Squared semipartial correlation (sr_i^2) expresses the unique contribution of the independent variable to the total variance of the dependent variable. In standard multiple regression sr_i^2 for an independent variable is the amount by which R^2 is reduced if that independent variable is deleted from the regression equation. The difference between R^2 and the sum of sr_i^2 for all independent variables represent shared variance, variance that is contributed to R^2 by two or more independent variables. Effect sizes were calculated with the following formula (Steyn, 1999):

$$f^2 = \frac{sr_i^2}{1 - R^2}$$

Steyn (1999) suggested the following guidelines in terms of effect size, namely $f^2 = 0,01$ (small effect), $f^2 = 0,15$ (medium effect) and $f^2 = 0,35$ (large effect). In the present study a cut-off point of 0,15 (medium effect) was set for the practical significance of f^2 .

RESULTS

In Table 2 the descriptive statistics, Cronbach alpha coefficients and the mean inter-item correlation coefficients of the MBI, UWES, EWSI, COPE and AFM are given.

Table 2

Descriptive Statistics, Alpha Coefficients and Inter-Item Correlations of the MBI-HSS, UWES, EWSI, COPE and AFM

Item	Mean	SD	Skewness	Kurtosis	r(Mean)	α
MBI-HSS						
Emotional Exhaustion	26,59	10,26	-0,08	-0,30	0,32	0,79
Depersonalisation	13,67	6,43	0,01	-0,44	0,35	0,68
Personal Accomplishment	32,11	8,22	-0,40	-0,24	0,41	0,78
UWES						
Vigour	23,82	6,46	-0,37	0,14	0,32	0,70
Dedication	22,64	6,37	-0,92	0,48	0,49	0,83
Absorption	21,82	6,58	-0,23	0,06	0,29	0,67
EWSI						
Lack of Resources	83,86	22,17	-0,46	-0,04	0,34	0,88
Job Demands	36,58	11,93	-0,01	-0,47	0,39	0,82
Inherent Emergency Work Stressors	39,33	12,86	-0,33	-0,02	0,42	0,83
COPE						
Problem-focused Coping	48,33	8,71	-0,68	0,45	0,34	0,89
Seeking Social Support	21,72	5,97	-0,30	-0,63	0,45	0,85
Passive Coping	14,73	4,28	0,32	-0,35	0,27	0,75
Turning to Religion	12,15	3,25	-0,82	-0,09	0,55	0,83
AFM						
Positive Affect	19,05	6,60	0,28	-0,29	0,37	0,84
Negative Affect	33,28	6,67	-0,64	0,47	0,39	0,83

The results in Table 2 indicate that the scores on the MBI-HSS, UWES, EWSI, COPE and AFM are relatively normally distributed (skewness and kurtosis are smaller than one). Regarding the Cronbach alpha coefficients, all subscales of the measuring instruments are considered acceptable in comparison to the guideline of Nunnally and Bernstein (1994), except for the Depersonalisation and Absorption subscales of the MBI-HSS and UWES respectively. These results notwithstanding, acceptable levels of internal consistency in the literature have been reported between 0,65 and 0,73 for Absorption (Schaufeli, Salanova, Gonzáles-Romá & Bakker, 2002), while the prevalence of scores lower than 0,70 have been

reported for the Depersonalisation scale on some occasions (Schaufeli, Bakker, Hoogduin, Schaap & Kladler, 2001).

It appears that the MBI-HSS, UWES, EWSI, COPE and AFM have acceptable levels of internal consistency and could therefore be viewed as suitable for use in the current research.

The product-moment correlation coefficients between the MBI-HSS, UWES, EWSI, COPE and AFM are reported in Table 3.

Table 3

Product-moment Correlation Coefficients between the MBI-HSS, UWES, EWSI, COPE and AFM

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Emotional Exhaustion	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Depersonalisation	0,53**	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Personal Accomplishment	-0,12	-0,15	-	-	-	-	-	-	-	-	-	-	-	-
4. Vigour	-0,26	-0,26	0,61**	-	-	-	-	-	-	-	-	-	-	-
5. Dedication	-0,24	-0,31*	0,64**	0,72**	-	-	-	-	-	-	-	-	-	-
6. Absorption	0,06	-0,08	0,56**	0,57**	0,58**	-	-	-	-	-	-	-	-	-
7. Lack of Resources	0,37*	0,33*	0,05	-0,14	-0,07	-0,10	-	-	-	-	-	-	-	-
8. Job Demands	0,27	0,23	0,04	-0,11	-0,03	-0,15	0,54**	-	-	-	-	-	-	-
9. Inherent Emergency Work Stressors	0,25	0,28	0,06	-0,12	-0,09	-0,13	0,52**	0,65**	-	-	-	-	-	-
10. Problem-focused Coping	-0,08	-0,21	0,48*	0,32*	0,31*	0,24	0,02	0,04	-0,03	-	-	-	-	-
11. Seeking Social Support	-0,10	-0,19	0,31*	0,19	0,24	0,14	-0,05	0,10	0,03	0,54**	-	-	-	-
12. Passive Coping	0,29	0,25	-0,03	-0,08	-0,07	-0,07	0,05	0,20	0,18	0,09	0,25	-	-	-
13. Turning to Religion	-0,07	-0,07	0,20	0,14	0,20	0,15	-0,11	0,11	0,05	0,34*	0,38*	0,17	-	-
14. Positive Affect	-0,28	-0,22	0,41*	0,40*	0,39*	0,32*	-0,16	-0,05	-0,08	0,43*	0,39*	-0,05	0,34*	-
15. Negative Affect	0,42*	0,32*	-0,28	-0,26	-0,29	-0,25	0,17	0,13	0,12	-0,20	-0,12	0,45*	-0,16	-0,46*

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

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

Upon inspection of Table 3, it is evident that Emotional Exhaustion is significantly positively related (large effect) to Depersonalisation, while Personal Accomplishment is significantly related to Vigour, Dedication and Absorption (large effects). Also, Vigour, Dedication and Absorption are significantly positively related to each other (large effects). Both Emotional Exhaustion and Depersonalisation are significantly positive related to Lack of Resources

(medium effect). Depersonalisation is significantly negative related to Dedication (medium effect), while significant positive relationships of medium effect are indicated for Depersonalisation in terms of Negative Affect. Emotional Exhaustion is significantly positive related to Negative Effect (medium effect). In terms of Personal Accomplishment, significant positive relationships are indicated with Problem-focused Coping, Seeking Social Support and Positive Affect respectively (medium effect). Vigour and Dedication are significantly positive related to Problem-focused Coping and Positive Affect (medium effect).

Table 3 also shows that Lack of Resources, Job Demands and Inherent Emergency Work Stressors are significantly positively related (large effect). Problem-focused Coping and Seeking Social Support demonstrate a significant positive relationship of large effect, while significant positive relationships of medium effect are indicated for both Problem-focused Coping and Seeking Social Support in terms of Turning to Religion and Positive Affect respectively. Significant positive relationships of medium effect are also indicated for Passive Coping and Negative Affect, and also for Turning to Religion and Positive Affect. Finally, Positive and Negative Affect are significantly negatively related (medium effect).

Canonical correlation using SAS CANCORR was performed between a set of job stressors, coping strategies, affect and burnout. In Table 4, correlations between the variables in the sets, canonical variates, standardised canonical variate coefficients, within-set variance were accounted for by the canonical variates (percent of variance), redundancies and canonical correlations.

The results of the canonical analysis of occupational stressors, job demands, coping strategies, affect and burnout are shown in Table 4. The first set included occupational stress (Lack of Resources, Job Demands, and Inherent Emergency Worker Stressors), coping strategies (Problem-focused Coping, Seeking Social Support, Passive Coping and Turning to Religion) and affect (Positive and Negative Affect). The second set included the components of burnout, namely Emotional Exhaustion, Depersonalisation and Personal Accomplishment.



Table 4

Results of the Canonical Analysis: Occupational Stressors, Coping Strategies, Affect and Burnout

	First Canonical Variate		Second Canonical Variate		Third Canonical Variate	
	Correlation	Coefficient	Correlation	Coefficient	Correlation	Coefficient
Set 1: Occupational Stressors, Coping Strategies and Affect						
Lack of Resources	0,42	0,28	0,67	0,59	0,09	0,01
Job Demands	0,29	0,08	0,47	-0,03	0,13	-0,25
Inherent Emergency Worker Stressors	0,27	-0,04	0,48	0,17	0,50	0,70
Positive Affect	-0,71	-0,26	0,29	0,26	0,33	0,50
Negative Affect	0,75	0,37	0,16	0,15	-0,39	-0,48
Problem-focused Coping	-0,62	-0,38	0,64	0,58	-0,36	-0,48
Seeking Social Support	-0,47	-0,21	0,33	-0,11	-0,32	-0,44
Passive Coping	0,39	0,26	0,40	0,26	0,02	0,32
Turning to Religion	-0,27	0,06	0,23	0,03	0,09	0,12
Percent of variance	0,25		0,19		0,09	Total = 0,53
Redundancy	0,10		0,04		0,01	Total = 0,15
Set 2: Burnout						
Emotional Exhaustion	0,73	0,45	0,57	0,56	-0,38	-0,93
Depersonalisation	0,72	0,39	0,39	0,22	0,58	1,09
Personal Accomplishment	-0,68	-0,57	0,73	0,82	0,10	0,15
Percent of variance	0,50		0,33		0,16	Total = 0,99
Redundancy	0,20		0,08		0,01	Total = 0,29
Canonical correlation	0,63		0,48		0,24	

From Table 4 it can be seen that three statistically significant canonical variates were found for the canonical correlation of Job Demands, Lack of Resources, Coping Strategies and Affect with Burnout. The first canonical correlation is 0,63 (40% overlapping variance); the second 0,48 (23% overlapping variance) and the third 0,24 (6% overlapping variance). In terms of statistical significance, the first canonical correlation yields an $F(27, 908,92) = 11,10$ ($p < 0,01$), the second $F(16, 624) = 6,70$ ($p < 0,01$) and the third $F(7, 313) = 2,72$ ($p < 0,01$). The data of the canonical correlations are indicated in Table 4. The total percentage of variance and total redundancy (summed up over the three canonical variates) indicates that the first and second pair of the canonical variates are moderately related. The third pair are only marginally related and should consequently be interpreted with caution.

Concerning the interpretation of the canonical variates, only variables above a cut-off point of $r > 0,30$ are included. In the first variate the variables from the Occupational stressors,

Coping Strategies and Affect set that correlate significantly are Lack of Resources (0,42), Positive Affect (-0,71), Negative Affect (0,75), Problem-focused Coping (-0,62), Seeking Social Support (-0,47) and Passive Coping (0,39). Variables in the Burnout set that correlate significantly are Emotional Exhaustion (0,73), Depersonalisation (0,72) and Personal Accomplishment (-0,68). The canonical analysis indicates that a lack of resources, low positive affect, high negative affect, low problem-focused coping, low seeking social support and passive coping are related to emotional exhaustion, depersonalisation and low personal accomplishment.

The second variate include significant correlations of Lack of Resources (0,67); Job Demands (0,47); Inherent Emergency Work Stressors (0,48); Problem-focused Coping (0,64); Seeking Social Support (0,33) and Passive Coping (0,40) in the Occupational Stressors, Coping Strategies and Affect set. The Burnout set includes significant correlations of Emotional Exhaustion (0,57); Depersonalisation (0,39) and Personal Accomplishment (0,73). The canonical relationship between the two sets indicate that stress because of a lack of resources and job demands and inherent emergency work stressors, combined with problem-focused coping, seeking social support and passive coping is associated with high scores on emotional exhaustion, depersonalisation and personal accomplishment.█

In Table 5, the results of the canonical correlation performed between job demands, job resources, coping strategies, affect and engagement are given.

Table 5

Results of the Canonical Analysis: Job Demands, Job Resources, Coping Strategies, Affect and Engagement

	First Canonical Variate	
	Correlation	Coefficient
Set 1: Job Demands, Job Resources, Coping Strategies and Affect		
Lack of Resources	-0,25	-0,01
Job Demands	-0,22	-0,09
Inherent Emergency Worker Stressors	-0,27	-0,11
Positive Affect	0,88	-0,58
Negative Affect	-0,63	-0,23
Problem-focused Coping	0,69	0,38
Seeking Social Support	0,46	0,02
Passive Coping	-0,17	-0,05
Turning to Religion	0,38	0,04
Percent of variance	0,25	
Redundancy	0,06	
Set 2: Engagement		
Vigour	0,92	0,49
Dedication	0,90	0,39
Absorption	0,77	0,26
Percent of variance	0,75	
Redundancy	0,18	
Canonical correlation	0,49	

According to Table 5, only one statistically significant canonical variate could be found for the canonical correlation of Job Demands, Lack of Resources, Coping Strategies and Affect with Engagement. The first canonical correlation is 0,49 (24% overlapping variance) with a statistically significant $F(27, 908,92) = 3,90$ ($p < 0,01$). The data of the canonical analysis is provided in Table 5.

With regards to interpretation of the first canonical variate, variables above the cut-off point of 0,30 in the Occupational Stressors, Coping Strategies and Affect set are: Positive Affect (0,88), Negative Affect (-0,63), Problem-focused Coping (0,69), Seeking Social Support (0,46) and Turning to Religion (0,38). Variables in the Engagement set that correlate significantly are Vigour (0,92), Dedication (0,90) and Absorption (0,77). The canonical analysis shows that positive affect, low negative affect, problem-focused coping, seeking

social support and turning to religion are related to high scores on vigour, dedication and absorption.

Canonical correlation was also performed between the Burnout and Engagement sets. The results are given in Table 6.

Table 6

Results of the Canonical Analysis: Burnout and Engagement

	First Canonical Variate		Second Canonical Variate	
	Correlation	Coefficient	Correlation	Coefficient
Set 1: Burnout				
Emotional Exhaustion	-0,33	-0,12	0,73	0,42
Depersonalisation	-0,39	-0,19	0,84	0,69
Personal Accomplishment	0,96	0,92	0,27	0,42
Percent of variance	0,40		0,44	Total = 0,88
Redundancy	0,21		0,03	Total = 0,24
Set 2: Engagement				
Vigour	0,89	0,39	-0,11	-0,33
Dedication	0,94	0,53	-0,18	-0,70
Absorption	0,75	0,21	0,66	1,27
Percent of variance	0,74		0,16	Total = 0,90
Redundancy	0,39		0,01	Total = 0,40
Canonical correlation	0,72		0,24	

From Table 6 it is evident that two statistically significant canonical variates could be found in terms of the canonical correlation between Burnout and Engagement. The first canonical correlation is 0,72 (52% overlapping variance), while the second is 0,24 (6% overlapping variance). In terms of statistical significance an $F(9, 771,65) = 33,72$ ($p < 0,01$) is determined for the first canonical correlation, while the second correlation is determined at $F(4, 636) = 5,43$ ($p < 0,01$). However, given $r_i < 0,30$, the correlation interpretation of the second canonical variate is questionable (see Tabaschnick & Fidell, 2002). The data of the canonical correlations are indicated in Table 6.

With regards to interpretation of the first canonical variate, variables above the cut-off point of $r > 0,30$ include Emotional Exhaustion (-0,33), Depersonalisation (-0,39) and Personal Accomplishment (0,96) in the Burnout set, while significant correlations in the Engagement

set include Vigour (0,89), Dedication (0,94) and Absorption (0,75). The canonical correlation between the burnout and the engagement set indicate that low scores on emotional exhaustion and depersonalisation and high scores on personal accomplishment are related to high scores on vigour, dedication and absorption. In terms of the burnout set, Personal Accomplishment demonstrates the highest correlation.

Next a model based upon the results of the product-moment and canonical correlations, as well as consensus of findings based on a review of the burnout literature with specific bearing on the emergency work context was tested. The specific manner by which the constructs in the model were measured was established by combining multiple indicators of each construct (items) representative of each construct in a judiciously combined fashion. The items were grouped according to their content and factor loadings in order to equalise the measurement weightings across indicators or dimensions in the model. The following scales were used: Emotional Exhaustion (3 items, $\alpha = 0,74$); Depersonalisation (4 items, $\alpha = 0,68$); Personal Accomplishment (3 items, $\alpha = 0,74$); Job Demands (3 items, $\alpha = 0,70$); Lack of Resources (3 items, $\alpha = 0,70$); Turning to Religion (3 items, $\alpha = 0,80$); Passive Coping (3 items, $\alpha = 0,71$); Seeking Social Support (3 items, $\alpha = 0,78$); Problem-focused Coping (4 items, $\alpha = 0,76$); Negative Affect (3 items, $\alpha = 0,73$) and Positive Affect (3 items, $\alpha = 0,74$).

The fit of the hypothetical model was assessed by means of the following: (1) a quick overview of the overall χ^2 value, together with its degrees of freedom and probability value; (2) global assessments of model fit based on several goodness-of-fit statistics (GFI, AGFI, PGFI, NFI, TLI, CFI and RMSEA). In the case where an ill-fit with the initially hypothesised model was obtained, possible misspecifications as indicated by the modification indices were identified and subsequent adjustments made in order to fit a revised, re-specified model to the data.

The hypothesised model

The formulation of the hypothesised model is given in Figure 1. From the model it is evident that burnout is represented as a multi-dimensional construct with Emotional Exhaustion, Depersonalisation and Personal Accomplishment as conceptually distinct factors. The specified paths from job demands, lack of resources, coping strategies (Turning to Religion,

Passive Coping, Problem-focused Coping and Seeking Social Support), as well as Affect (Negative Affect and Positive Affect) to the three burnout dimensions reflect emergency worker literature findings, combined with the results of the product-moment and canonical correlations reported earlier.

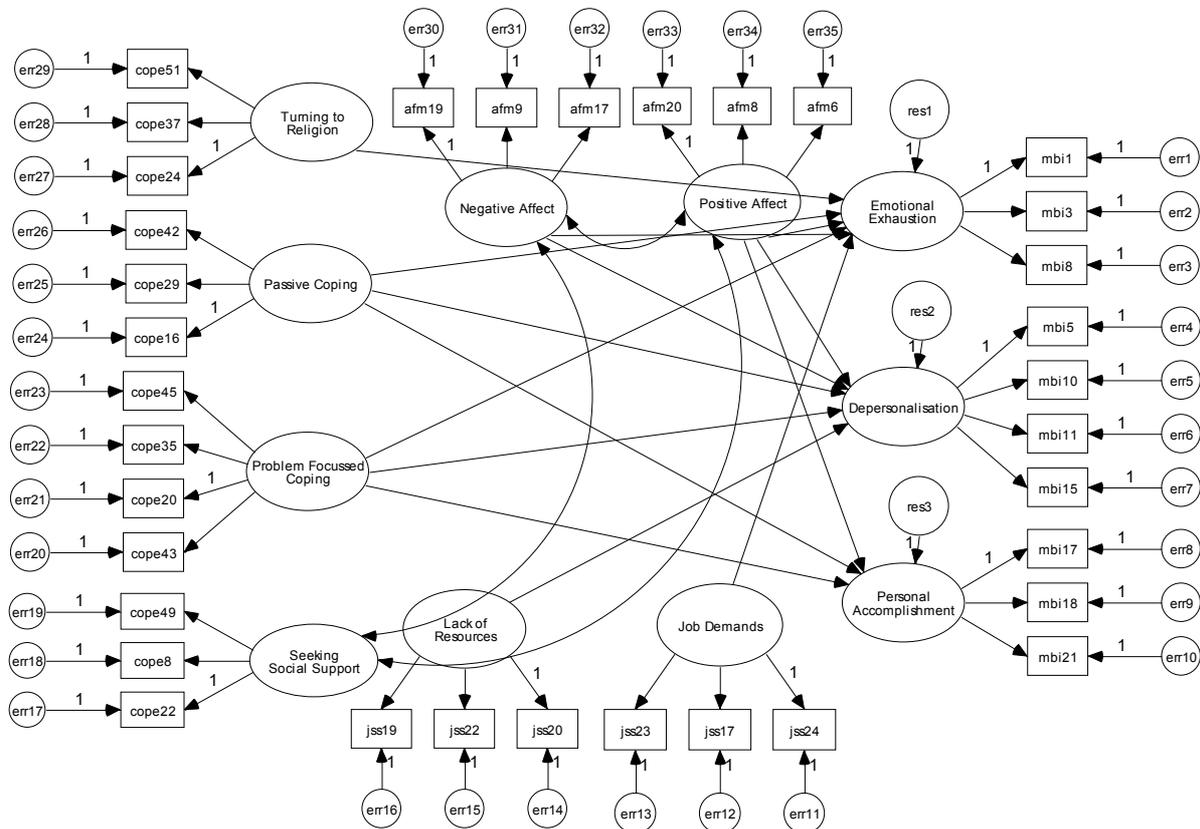


Figure 1. Hypothesised model of occupational stressors, coping strategies, affect and burnout

Selected goodness-of-fit statistics are provided in Table 7 for the hypothesised Model 1, the re-specified Model 2, as well as the final Model 3.

Table 7
Goodness-of-Fit Statistics for Model 1, 2 & 3

	χ^2	χ^2/df	GFI	AGFI	PGFI	NFI	TLI	CFI	RMSEA
Model 1	1075,96	1,98	0,84	0,81	0,72	0,72	0,82	0,84	0,06
Model 2	795,17	1,49	0,88	0,86	0,75	0,79	0,91	0,92	0,04
Model 3	819,27	1,50	0,87	0,85	0,76	0,79	0,91	0,92	0,04

The results in Table 7 show an obtained χ^2 value ($df = 543; p = 0,00$) of 1 075,96 for Model 1. Because this value tends to be inflated in cases where the model does not hold (Jöreskog & Sörbom, 1993), other goodness-of-fit statistics are consulted to guide decisions in terms of model-fit (Byrne, 2001). According to these indices provided in Table 7, it would appear that some specification of the model is necessary in order to improve model fit with the data. Values for the GFI, AGFI are not approaching accepted levels of 0,90. Similarly, the NFI, TLI and CFI could significantly be improved above the 0,90 level. Furthermore, the RMSEA is above the 0,05 level, indicating a need for possible improvement of the model (Hu & Bentler, 1999).

A review of the Modification Indices (MIs) in Model 1 revealed some evidence of misfit in the theoretical model. Parameters representing the structural paths, as well as the covariances between factors were the only MIs investigated. Taking the regression weights, meaningfulness and causal flow between constructs into account, Model 1 was re-estimated with additional paths between Emotional Exhaustion and Depersonalisation, and Lack of Resources and Emotional Exhaustion. Additionally, covariances were allowed between Lack of Resources and Job Demands, Turning to Religion and Seeking Social Support, Positive Affect and Passive Coping, Turning to Religion and Problem-focused Coping, Problem-focused Coping and Seeking Social Support, and Problem-focused Coping and Negative Affect.

According to Table 7, Model 2 yields a χ^2 value ($df = 535; p = 0,00$) of 795,17, which is a significant improvement from Model 1 ($\Delta\chi^2_{(10)} = 280,79$). Furthermore, the GFI and AGFI are approaching 0,90 and the TLI and CFI reached the 0,90 level. The RMSEA value is also below 0,05 which suggests an acceptable fit of the model to the data.

Model parsimony

To this point, only the addition of parameters to the model was considered. However, in terms of model-data fit it is also important to determine the extent to which certain initially hypothesised paths may be irrelevant to the model. One way in which this potential irrelevancy can be addressed is by examining the statistical significance of all the structural parameter estimates (Byrne, 2001). In reviewing the structural parameters for Model 2, 11

parameters were identified as non-significant. These parameters represent the paths from Passive Coping to Depersonalisation, Negative Affect to Depersonalisation, Problem-focused Coping to Emotional Exhaustion, Passive Coping to Emotional Exhaustion, Passive Coping to Personal Accomplishment, Turning to Religion to Emotional Exhaustion, Job Demands to Emotional Exhaustion, Positive Affect to Personal Accomplishment, Negative Affect to Emotional Exhaustion, Problem-focused Coping and Depersonalisation, and Positive Affect and Depersonalisation. Consequently, in the interest of model parsimony, a final model of burnout was estimated with these structural paths deleted from the model.

In Table 7, estimation of the final model (Model 3) resulted in an overall χ^2 value ($df = 546$; $p = 0,00$) of 819,27, which is marginally higher than Model 2 ($\Delta\chi^2_{(11)} = 24,10$). The other goodness-of-fit statistics are virtually similar to that of Model 2. An encouraging finding is the increase in model parsimony and goodness-of-fit in Model 3 as indicated by the PGFI. A schematic representation of this final model for burnout for emergency workers is given in Figure 2.

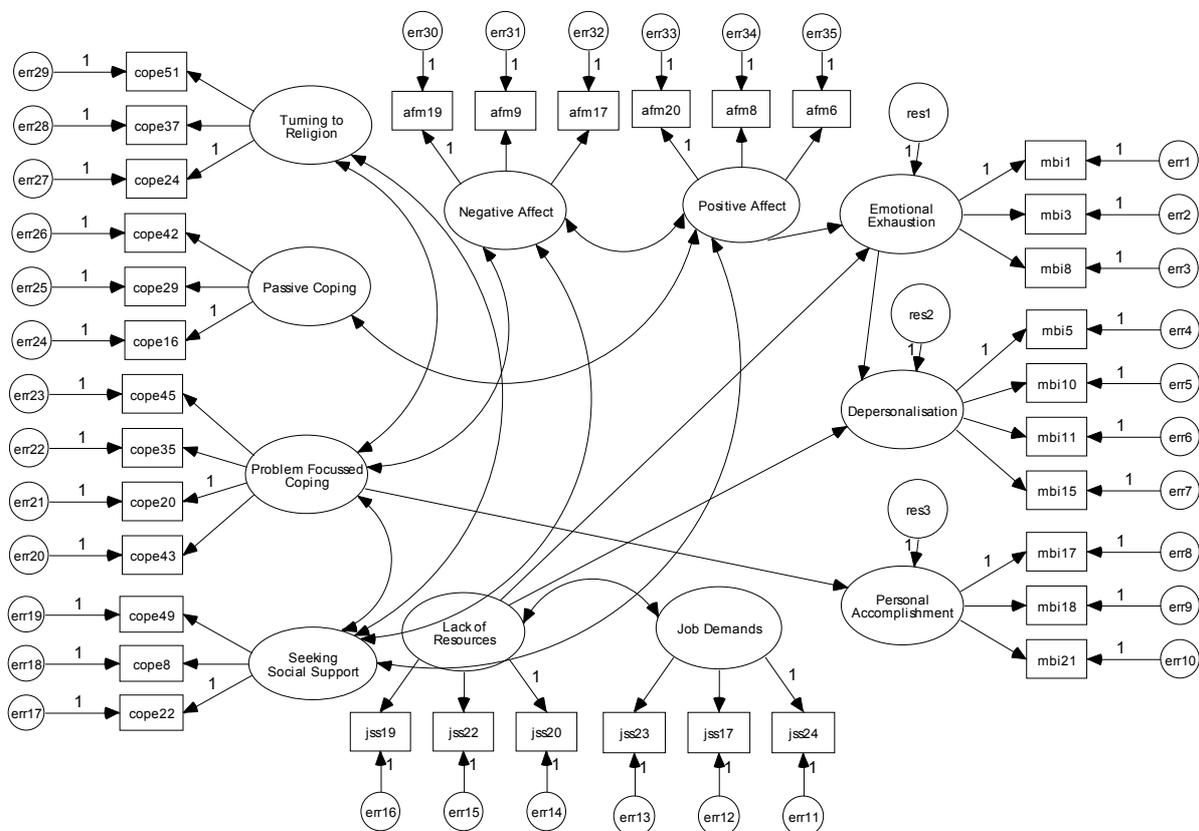


Figure 2. Final model of occupational stress, coping strategies, affect and burnout

SEM was also performed for work engagement, similar to the burnout construct in the previous analysis, but this analysis proved to be problematic in the sense that the covariance matrix did not prove to be definitively positive, resulting in an unidentified model. According to Byrne (2001), a model is unidentified when a unique solution could not be found for the parameters specified in the model; the structural model would then be arbitrary with other possibilities of fit with the data. The negative residual on the Dedication construct shows that Dedication could not be uniquely described in a predictive manner in the causal model. As a result, the subsequent structural solution was considered to be inadmissible.

Next, standard multiple regression analyses were conducted. Firstly, Emotional Exhaustion (as measured by the MBI-HSS) was taken as dependent variable and Lack of Resources (as measured by the EWSI), Passive Coping (as measured by the COPE) and Positive as well as Negative Affect (as measured by the AFM) as independent variables (see Table 8). Secondly, Depersonalisation (as measured by the MBI-HSS) was taken as dependent variable and Emotional Exhaustion (as measured by the MBI-HSS), Lack of Resources (as measured by the EWSI), Passive Coping (as measured by the COPE) as well as Positive and Negative Affect (as measured by the AFM) as independent variables (see Table 8). These analyses, which were conducted to assess the possible moderating effects of coping strategies and affect on stress because of lack of resources, were based on the results of the product-moment correlations, canonical analysis and structural equation modelling in this study. For this reason possible moderating effects of coping strategies and affect were analysed only for the impact of stress due to a lack of job resources on emotional exhaustion and depersonalisation.

Table 8

Regression-analysis of Emotional Exhaustion and Depersonalisation with Lack of Resources, Coping Strategies and Affect

Variable	Parameter	Std. Err.	<i>t</i>	<i>p</i>	sr_i^2
DV= Exhaustion; IV= Lack of Resources, Passive Coping and Affect $F = 32,61$ $R^2 = 0,2909$					
Intercept	5,66	5,66	1,44	0,1506	-
Lack of Resources	0,13	0,02	6,23	0,0001	0,0865
Passive Coping	0,29	0,10	2,80	0,0055	0,0174
Positive Affect	-0,15	0,08	-1,92	0,0001	0,0082
Negative Affect	0,37	0,09	4,17	0,0559	0,0387
DV= Depersonalisation; IV= Lack of Resources, Emotional Exhaustion, Coping Strategies and Affect $F = 29,58$ $R^2 = 0,3181$					
Intercept	1,17	2,29	0,51	0,6105	-
Emotional Exhaustion	0,24	0,03	7,36	0,0001	0,1164*
Lack of Resources	0,04	0,01	3,11	0,0021	0,0207
Passive Coping	0,12	0,06	2,00	0,0461	0,0086
Positive Affect	-0,05	0,05	-1,14	0,2551	0,0028
Negative Affect	0,03	0,05	0,65	0,5145	0,0009

* Practically significant contribution of independent variable where $f^2 \geq 0,15$ (medium effect)

According to Table 8, 29% of the variance in Emotional Exhaustion (as measured by the MBI-HSS) is predicted by stress due to a Lack of Resources (as measured by the EWSI), passive coping (as measured by the COPE) and affect (as measured by the AFM). Stress due to a lack of resources, passive coping, positive and negative affect contributed 8,65% ($sr_i^2=0,0865$), 1,74% ($sr_i^2= 0,0174$), 0,82% ($sr_i^2= 0,0082$) and 3,87% ($sr_i^2= 0,0387$) respectively to the variance in Emotional Exhaustion. Given that 29% of the variance in Emotional Exhaustion was explained in total by these independent variables ($R^2 = 0,29$), and that sr_i^2 adds up to 0,1508 (15,08%), it is clear that the remaining 13,92% of the variance can be attributed to interaction between the independent variables. Also, the unique variance in Emotional Exhaustion that is explained by the independent variable (stress because of a lack of resources) is not practically significant. This finding confirms that coping strategies and affect moderated the effect of a lack of resources on Emotional Exhaustion.

Table 8 also shows that 31% of the variance in Depersonalisation (as measured by the MBI-HSS) is predicted by Emotional Exhaustion (as measured by the MBI-HSS), stress due to a Lack of Resources (as measured by the EWSI), passive coping (as measured by the COPE)

and affect (as measured by the AFM). Emotional Exhaustion, stress due to a lack of resources, passive coping, positive and negative affect contributed 11,64% ($sr_i^2=0,1164$), 2,07% ($sr_i^2= 0,0207$), 0,86% ($sr_i^2= 0,0086$), 0,28% ($sr_i^2= 0,0028$) and 0,09% ($sr_i^2= 0,0009$) respectively to the variance in Depersonalisation. The unique variance in Depersonalisation that is explained by one independent variable (Emotional Exhaustion) is practically significant (medium effect). Given that 31% of the variance in Depersonalisation was explained in total by these independent variables ($R^2 = 0,31$), and that sr_i^2 adds up to 0,1494 (14,94%), it is clear that the remaining 16,06% of the variance can be attributed to interaction between the independent variables.

DISCUSSION

It was the objective of this study to develop and test a causal model of burnout and engagement of emergency workers, comprising of occupational stressors caused by demands of the job and resource availability, coping strategies and affect.

The results showed that the core of burnout (emotional exhaustion and depersonalisation) was predicted by occupational stressors due to a lack of resources. Contrary to findings in the literature where stressful job demands were related to the emotional exhaustion component, stress as a result of a lack of resources was found to predict emotional exhaustion and depersonalisation. Literature findings seem to support the notion that occupational stress due to a lack of job resources is related to depersonalisation (Demerouti et al., 2001). Therefore, the experience of a depletion in emotional resources and mental distancing of emergency workers were associated with stress due to a lack of organisational support, the experience of negative feelings and the negative evaluation of situations, as well as the utilisation of passive strategies to cope with experienced stress.

Canonical analyses showed two significant combinations between the independent variables (occupational stressors, coping strategies and affect). Firstly, emergency workers who experienced stress due to a lack of resources, low positive affect, high negative affect, low problem-focused coping, low seeking social support and passive coping experienced high emotional exhaustion and depersonalisation as well as low personal accomplishment. Secondly, a pattern emerged where emergency workers who experienced stress because of a

lack of resources, job demands and specific emergency work demands, combined with problem-focused coping, seeking social support and passive coping experienced emotional exhaustion and depersonalisation, but also personal accomplishment. Therefore, the experience of elevated occupational stress levels, the utilisation of active strategies and social support, as well as the use of passive coping strategies are associated with the prevalence of burnout for emergency workers, but also with a sense of positive evaluation of professional competence. Previous studies (e.g. by Lee & Ashforth, 1996) support the relationship between problem-focused coping and personal accomplishment. The use of a passive coping strategy in this context seems to be consistent with literature findings, where emergency workers have often been found to escape their reality mentally (Alexander & Klein, 2001; Cocotos & Ortlepp, 1999) and yet still find their work reality rewarding (Frank & Ovens, 2002).

Emotional exhaustion predicted depersonalisation, which means that emergency workers could develop cynical and detached attitudes towards the recipients of their service once their emotional resources have been depleted. Research findings regarding the process model of burnout support the notion that depersonalisation develops as an alternative to the experience of emotional exhaustion when other coping mechanisms are not available (Ashforth & Lee, 1990; Leiter, 1990).

Positive affect inversely predicted emotional exhaustion. Consequently, emergency workers would seem to experience a depletion of emotional resources when they demonstrate a rather weak positive evaluative perspective in terms of experiences and outcomes in recent experience. Consistent with this finding, an inverse relationship was found for the covariance path between positive affect and passive coping, which means that when a rather weak dispositional positive mind-frame and positive evaluation of outcomes in recent experience are demonstrated by emergency workers, passive strategies in terms of coping seem to prevail. According to the literature, passive coping strategies have been related to higher levels of burnout (Alsoofi et al., 2000).

Negative affect and problem-focused coping were inversely specified in the model, which means that when emergency workers are low on the utilisation of problem-focused strategies, a negative evaluative orientation in terms of outcomes and recent experience are adopted. In the literature, the adoption of problem-focused coping strategies are associated with positive

outcomes for the individual; information on how to deal with a specific environmental stressor is gained which leads to a decrease in experienced stress (Alexander & Klein, 2001; Burke, 1993). Furthermore, negative affect is associated with negative outcomes for the individual, such as increased susceptibility to the experience of stress, negative emotions and adversarial social relationships (Church, 1994).

In terms of engagement, the results suggest that no significant relationships exist between occupational stress and engagement. This is surprising in terms of reports in the literature that emergency work could be regarded as both demanding and challenging (Frank & Ovens, 2002). However, empirical studies revealed that engagement at work can prevail despite high job demands and long working hours (Schaufeli & Bakker, 2001). If one considers that statements regarding occupational stress were formulated in a negative way in the present study, the expected relationship with engagement would never be achieved due to the positive formulation of items measuring engagement. Furthermore, the measurement of job demands and lack of job resources was not done independently from experienced strain in the present study, which could also have influenced the findings.

The results of the canonical correlations show that engagement could be related to various levels of well-being of emergency workers, namely the affective, cognitive, behavioural and religious levels. Therefore, for emergency workers to experience work-related, fulfilling state of mind it seems necessary for them to demonstrate a positive evaluative disposition, to attempt to solve their problems in an active way, to utilise their social support structures and to evaluate their work-environment with the aid of their religious beliefs.

The findings also highlighted the relationship between burnout and engagement. Low levels of burnout were found to be related to high levels of engagement, confirming the findings of Schaufeli, Martinez, Pinto, Salanova and Bakker (2002) that burnout and engagement are related but distinct concepts. Furthermore, existing theoretical relationships regarding burnout and engagement were partially confirmed in the present study. The identification range from depersonalisation to dedication was confirmed, but significant relationships were not obtained for the activation range, consisting of emotional exhaustion and vigour. The personal accomplishment subscale of burnout was found to be a constituting element of engagement, which is in line with reports in the literature (Maslach & Leiter, 1997).

Interaction effects on emotional exhaustion were found in this study. The results showed interaction effects between stress caused by a lack of job resources, passive coping, positive affect and negative effect. This finding suggests that passive coping, negative affect and low positive affect might act as moderators of the stress-emotional exhaustion relationship.

Limitations of the present study include the use of a cross-sectional survey design, which makes it difficult to prove causal relationships. The use of advanced analytical procedures, such as structural equation modelling made the description of possible causal relationships possible, but only the use of other designs, such as longitudinal designs can aid in establishing causality. Another limitation is the exclusive use of self-report measures, a strategy often associated with method variance. A further limitation is sample size and sampling method. In the present study, only emergency workers in Gauteng were included and an availability sampling method was used. Consequently, generalising the results to the total population cannot be made.

The present study seems to highlight the use of objective measurement of job demands and job resources by measuring their objective qualities and strain separately. In terms of the phrasing of items, significant influence seems to be evident with regards to expected relationships that were not yielded in the present study, such as the relationship between job demands and exhaustion. The present study did not distinguish between objective experience of strain, such as physiological symptoms and objective demands of the job or the availability of resources. Furthermore, negative phrasings of occupational stress items seem to have influenced the expected relationship of job resources with engagement. Recently, research has demonstrated that the positive phrasing of objective job resource items could result in a significant relationship with engagement (Schaufeli & Bakker, 2002).

Another aspect deserving attention concerns the causality of relationships described in the present study. The current findings cannot serve to explain the sequential process of the experience of occupational stress, the utilisation of coping strategies and affect. Consequently, pressing issues about the place of these variables in the transaction between emergency workers and their environment are left unanswered. Transactional issues, however, add another dimension to the current research perspective. These variables should be studied and validated according to specific situations on the basis of their dispositional (stable, trait-like) nature; different situations will yield different responses and behavioural

patterns from emergency workers. This approach could lead to a better understanding of the emergency worker and their behaviour in a highly stressful environment. Furthermore, moderating effects could be determined when a dispositional approach is taken.

RECOMMENDATIONS

Lack of job resources should be managed carefully by the organisation to prevent burnout in emergency workers. The development of burnout seems to start with a gradual depletion of the emotional resources of the emergency worker, followed by the development of cynical attitudes towards recipients of their service and the treatment of recipients as impersonal objects. In terms of the depletion of emotional resources, it seems that a weak positive evaluative predisposition of emergency workers could contribute to the onset of burnout.

It is recommended that the organisation provides adequate resources and encourage the use of problem-focused strategies which in turn would result in the positive evaluation of professional competence and the prevention of the onset of burnout. Furthermore, demonstration of a positive evaluative orientation of emergency workers towards their work and recent experiences, to actively deal with their problems, to share experiences in a social support setting and to recognise the value of religious support in understanding their environment would lead to emergency workers experiencing prolonged fulfilment, dedication and intrinsic enjoyment in their work.

In terms of future research, the development of a causal model of burnout and engagement of emergency workers with the inclusion of stressors due to job demands and job resources, coping strategies and affect not only needs to be validated in future studies, but expanded to other high stress occupations in order to further refine and expand our understanding of the high-stress occupational context. Also, job demands, lack of resources and strain should be studied objectively to understand the relationships between these variables.

Future studies on the work-related attitudes of emergency workers should focus on positive, work-related attitudes and behaviours at work. Furthermore positive constructs such as engagement should be further investigated in other highly stressful occupations in South Africa and included in causal models. Consequently, information could be gleaned with regards to the experience of wellness in a positive paradigm of study, which could

significantly expand research with regards to emergency work and other highly stressful occupations, previously predominantly studied from a pathogenic framework. The findings pertaining to the extension of the engagement construct by the inclusion of Personal Accomplishment should also be investigated in future studies.

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CHAPTER 7

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

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

7.1 CONCLUSIONS

The first objective of this study was to determine the construct validity and internal consistency of the MBI-HSS for emergency workers in Gauteng. The results obtained by means of structural equation modelling confirmed the three-dimensional factor structure of the MBI-HSS. However, on both conceptual and empirical grounds, items 12 and 22 were deleted from the original version of the questionnaire. Whereas the omission of item 12 is consistent with reports in the literature (Byrne, 1993; Leiter & Durup, 1994; Schaufeli & Van Dierendonck, 1993), the omission of item 22 is not supported by the literature. This item relates to feelings of blame by the emergency worker for the problems that some recipients experience, possibly a tendency to become too involved in the issues that some of the recipients of emergency services have to face. It is possible that this item could be regarded as irrelevant to the experience of emergency workers and it would seem not to be related to the development of cynical and detached attitudes towards recipients. Furthermore, the influence of semantic differences cannot be ruled out; the meaning of the item was not necessarily equally understood by all members in the sample. Reliability analysis confirmed sufficient internal consistency of the subscales of the MBI-HSS.

The second objective was to determine the construct equivalence and item bias of the MBI-HSS for different language groups of emergency workers in Gauteng. The results confirmed the equivalence of the construct for the Afrikaans, English and Sotho groups, but not for the Nguni group. Furthermore, evidence of uniform bias was found for item 14, while non-uniform bias was found for items 4 and 7 for the Afrikaans, English and Sotho groups. Therefore, equal comparison of the burnout construct in the emergency services in Gauteng was not confirmed in the present study. This means that systematic differences in mean

scores of members of different language groups were obtained which is not reflective of valid differences between groups, but a function of differences due to language group membership. In other words, for these items, valid comparison across language groups cannot be made. With regards to the measurement of burnout in the multilingual setting, deletion of items 4, 7 and 14 is recommended, resulting in the standardisation of a 17-item MBI-HSS in the emergency services in Gauteng. Possible explanations of these findings include the influence of semantic differences in terms of the understanding of the meaning of the items by different language groups, as well as the limitations in terms of sample size. More specifically, subgroup sample sizes were not large enough to reach the $N = 50$ criterion for every scoring level of an item, which could have influenced the findings significantly on a statistical level.

The third objective of this study was to determine the construct validity and internal consistency of the UWES for emergency workers in Gauteng. The results confirmed the three-dimensional factor structure of the UWES by means of structural equation modelling, which is consistent with reported results in the literature (Schaufeli, Martinez, Pinto, Salanova, & Bakker, 2002; Schaufeli, Salanova, González-Romá, & Bakker, 2002). This is a promising finding, considering the inclusive evidence regarding the three-factor structure of the UWES in the South African Police Services (Storm & Rothmann, in press, b) and in line with their call for a robust and critical evaluation of the psychometric properties of the UWES in South Africa. However, results showed that item 15 should be deleted from the original version of the UWES, which is consistent with the results of Storm and Rothmann (in press, b) in the South African Police Services. Reliability analysis revealed that the internal consistency of the subscales was acceptable according to the guidelines proposed by Nunnally and Bernstein (1993). It is possible that these findings are reflective of semantic differences in terms of item conception. Consequently, translation of the questionnaire in other languages seems to be warranted. Furthermore, the fact that items are worded in one direction (positive) and burnout in another could influence the findings. These limitations could be alleviated by combining them in one questionnaire in cross-sectional studies where both burnout and engagement are investigated (Schaufeli & Bakker, 2002).

The fourth objective was to determine the construct equivalence and item bias of the UWES for different language groups of emergency workers in Gauteng. The results showed that equivalence was obtained in terms of the work engagement construct for the Afrikaans,

English and Sotho groups, but not for the Nguni group. With regards to item bias, item 16 was found to be non-uniformly biased for the Afrikaans, English and Sotho groups. This means that due to the effect of language group membership, substantially progressive (or declining) differences in mean scores of different language groups across all scoring possibilities of this item were found. Therefore, valid comparison for this item cannot be made across language groups. Consequently, in terms of multi-lingual comparison of engagement, this item should be deleted, resulting in the standardisation of a 15-item UWES for emergency workers in Gauteng. Possible explanations of the findings could be related to the influence of semantic differences, as well as the inadequate representation of language groups in the sample, more specifically the attainment of the critical level ($N = 50$) recommended for each scoring level of an item.

The fifth objective of this study was to develop a reliable and valid measuring instrument for the measurement of occupational stress which is both equivalent and unbiased. The Emergency Worker Stress Inventory (EWSI) was developed for this purpose, consisting of 78 items which give an indication of both the severity and frequency of a particular stressor. Subjection to principal component factor extraction produced three internally consistent factors, namely Lack of Resources ($\alpha = 0,88$), Job Demands ($\alpha = 0,82$) and Inherent Emergency Work Stressors ($\alpha = 0,83$). In a related study in the South African Police Services Pienaar and Rothmann (in press, b) reported the extraction of factors similar in terms of item content. With regards to construct equivalence and bias, the findings revealed inequivalence with regards to the Nguni group, while equivalence was obtained for the Afrikaans, English and Sotho group. Evidence of uniform bias was found for item 5, which relates to the stress caused by fellow workers not doing their job. This means that job stress could not be successfully measured for the Nguni group in an equal manner in comparison with the other language groups. Furthermore, the mean scores of the different groups differed in a systematic manner due to the influence of language group membership and not due to valid differences with regards to the construct of job stress. Subsequently, it is recommended that item 5 be omitted when used in the multilingual emergency worker setting.

The results also showed that the stressors most experienced by emergency workers in Gauteng could be related to a lack of organisational support, or stated differently, a lack of resources. These aspects included insufficient personnel to handle the workload, inadequate

remuneration, co-workers not doing their job, a lack of specialised personnel, poorly motivated co-workers, a lack of recognition and lack of opportunity for advancement. Furthermore, the results showed that the vast majority of stressors could be regarded as chronic (of average intensity and frequency) and were mainly associated with the demands placed on the emergency worker by their jobs. These aspects included dealing with crisis situations, the dependence of the work area on the emergency situation, security concerns of the emergency worker, the experience of negative attitudes and the experience of new or unfamiliar emergency situations.

Analysis of variance results showed significant differences in terms of perceived strain for different positions, but not for language groups. Emergency medical technicians experienced significantly more job demands in comparison with the support services group – a totally understandable finding if one considers that the type of stressors experienced by emergency medical technicians would in all likelihood be different from those experienced by the support services group.

In the next research objective, the construct validity, internal consistency, construct equivalence and item bias of the COPE for emergency workers in Gauteng was determined. Principal component factor extraction produced four internally consistent factors, namely Problem-focused Coping ($\alpha = 0,89$), Seeking Social Support ($\alpha = 0,85$), Passive Coping ($\alpha = 0,75$) and Turning to Religion ($\alpha = 0,83$). These findings reflect reports in the literature in terms of the clustering of coping strategies into the broad categories of approach/active strategies, avoidance strategies and reappraisal (Cox & Ferguson, 1992; Ferguson & Cox, 1997; Tobin et al., 1989), as well as factor-analytical studies in other occupational settings (Cook & Heppner, 1997; Finch et al., 1999; Ingledeew et al., 1996; Kalasmaa & Pulver, 2000; Laurent et al., 1997; Lyne & Roger, 2000; Phelps & Jarvis, 1994; Sica et al., 1997; Ward & Kennedy, 2001).

In terms of the comparability of the findings across different cultural groupings, the results showed inequivalence in terms of the coping construct for the Nguni group, but not for the Afrikaans, English and Sotho group. Furthermore, evidence of non-uniform bias was found for items 9 and 14 for the Afrikaans, English and Sotho language groups. These findings point to the fact that the coping construct cannot be compared across all language groups, due

to the unequal representation of the construct in the Nguni group. With regards to non-uniform bias, the results show that the Afrikaans, English and Sotho language groups cannot be validly compared in terms of items 9 and 14 due to the influence of language group membership. Consequently, it is recommended that items 9 and 14 be omitted in the multi-lingual emergency worker setting. A possible explanation of these findings could be attributed to the possible effects of semantic differences in understanding item content, as well as the influence of sampling procedure in terms of subgroup representation in the sample. Specifically, the critical level of $N = 50$ recommended for each scoring level of an item could not be reached, opening the possibility of ascribing these results to pure chance.

The results also showed differences in coping strategies for position and language group. Medical specialists obtained significantly higher scores than the management and support services group in terms of their utilisation of social support strategies. This could be due to the fact that medical specialists rely more on the utilisation of this strategy than management or support services. Alternatively, access to social support structures could be more readily available to the medical specialists. Higher levels of seeking social support as a coping strategy were found for the medical specialist group relative to the emergency medical technician group, though not statistically significant. Literature findings often report the social support mechanism in combating the consequences associated with stressful environments (Alexander & Klein, 2001; Beaton et al., 1997; Cocotos & Ortlepp, 1999; Young & Cooper, 1995). Emergency medical technicians reported significantly higher utilisation of passive coping strategies in comparison with the management group. This finding seems to be consistent with reports in the literature with regards to the tendency of emergency medical technicians to withdraw mentally from their work reality (Alexander & Klein, 2001; Cocotos & Ortlepp, 1999). Practically significant differences were also found in terms of the use of religion as a coping strategy. The management and emergency medical technician groups scored higher than the medical specialist group in this regard. It is possible that the medical specialist groups utilise problem-focused and social support strategies to a much larger extent relative to the use of religion as a coping strategy. Medical specialist scored consistently higher than the other groups in terms of social support and problem-focused strategies.

With regards to language group differences, interesting patterns emerged. The Sotho group were found to score significantly higher than the Afrikaans and English groups with regards to obtaining social support. Also, the Sotho group obtained significantly higher scores than the English group in terms of seeking the use of religion as a means of coping with work realities. In terms of support from social structures, these findings could possibly be related to the guiding principle of “ubuntu” often found in the traditional African cultures where group solidarity and the survival of the group is not only considered an important aspect of survival, but also more important than individual self-reliance. In the case of the use of religion, it would seem that the use of this strategy is more important for the Sotho group relative to the other groups.

The seventh objective of the current research was to develop and test a causal model of burnout for the emergency worker in Gauteng, inclusive of job demands, job resources, coping strategies and affect. The results showed that the core of burnout (emotional exhaustion and depersonalisation) was predicted by a lack of resources. Contrary to expectations, job demands did not predict emotional exhaustion. The association between lack of job resources and depersonalisation are consistent with reports in the literature (Åström et al., 1990; Dekker & Schaufeli, 1995; Jackson et al., 1987; Landsbergis, 1988; Leiter, 1989). Problem-focused coping predicted personal accomplishment, which is consistent with literature findings (e.g. Lee & Ashforth, 1996). Emotional exhaustion predicted depersonalisation, a finding consistent with the process model of the development of burnout where the development of depersonalisation is explained in reaction to the onset of emotional exhaustion when no other means of coping is perceived to be available (Ashforth & Lee, 1990; Leiter, 1990).

Positive affect inversely predicted emotional exhaustion. Therefore, emergency workers would seem to experience a depletion of emotional resources when a weak positive evaluative disposition, in terms of outcomes and recent experiences, is adopted. An inverse relationship was determined for the covariance path between positive affect and passive coping, which means that when emergency workers demonstrate a weak positive evaluative disposition, passive strategies in terms of coping seem to prevail. According to the literature, passive coping strategies have been related to higher levels of burnout (Alsoofi et al., 2000).

Another inverse covariant relationship was found for negative affect and problem-focused coping. Emergency workers low on the utilisation of problem-focused strategies seem to demonstrate a negative evaluative disposition in terms of recent experiences and outcomes. Literature findings confirm that the adoption of problem-focused coping strategies are associated with positive outcomes for the individual in terms of information on how to deal with a specific environmental stressor which leads to a decrease in experienced stress (Alexander & Klein, 2001; Burke, 1993). Furthermore, negative affect is associated with negative outcomes for the individual, such as increased susceptibility to the experience of stress, negative emotions and adversarial social relationships (Church, 1994).

The eighth objective of the current research was to develop and test a causal model of work engagement for the emergency worker in Gauteng which included job demands, job resources, coping strategies and affect. Disappointingly, the causal model specified for engagement was found not to be definitely positive. This finding is the result of an obtained negative residual on the Dedication construct in the model, which means that a unique solution could not be obtained for the specification of parameters associated with Dedication in the model. As a result, the causal model of engagement could not be uniquely defined and consequently the model was considered to be inadmissible. However, the results showed that the experience of a positive and fulfilling work-related state of mind can be made possible with positive evaluations of situations and outcomes in recent experience, as well as the utilisation of active, problem-oriented coping, the utilisation of social structures and the use of religion as a means of managing perceived strain for emergency workers in Gauteng.

The results showed that engagement and occupational stress are not related, despite reports in the literature where the demands of the job have been linked to engagement (Schaufeli & Bakker, 2001). This finding could be explained in terms of the negative phrasing of items in the measurement of occupational stress in the present study (in comparison with the positive phrasing of work engagement items), as well as the non-objective measurement of job demands, lack of job resources and strain in the present study.

Furthermore, in terms of the relationship between engagement and burnout, results showed that the experience of a work-related, fulfilling state of mind, characterised by energy, commitment and intrinsic enjoyment could be related to low levels of burnout in emergency

workers. Conceptually this finding makes sense in terms of reports in the literature that engagement and burnout are related, but distinct concepts (Schaufeli, Martinez, Pinto, Salanova & Bakker, 2002). Furthermore, existing theoretical relationships between engagement and burnout, consistent with the theoretical analysis of Schaufeli and Bakker (2001), were partially confirmed in the present study. The identification range from dedication to depersonalisation was confirmed, but significant relationships were not obtained for the activation range, consisting of vigour and emotional exhaustion. The engagement construct was also expanded to include the burnout subscale of personal accomplishment. The literature seems to support these findings (Maslach & Leiter, 1997).

The last objective was to make recommendations with regards to the possible moderating effects of coping strategies and affect on burnout and work engagement of emergency workers in Gauteng. On the basis of the results from the product-moment correlations, canonical analysis and structural equation modelling, it was decided to proceed only with the testing of possible moderating effects of coping strategies and affect for the impact of occupational stress because of lack of job resources on emotional exhaustion. The results showed interaction effects between occupational stress caused by a lack of job resources, passive coping, positive affect, and negative affect. Consequently, passive coping, negative affect and low positive affect seem to moderate the relationship between perceived occupational stress and emotional exhaustion. Moderating effects was not tested for with regards to engagement because the causal model could not be specified in the present study.

7.2 LIMITATIONS OF THIS RESEARCH

The first limitation was that the design used in the present study was cross-sectional. As a result, despite the use of advanced statistical techniques, such as structural equation modelling, no causal inferences could be made with regards to the relationships between the constructs used in the present study. At best, these relationships could only be analysed and described, not established. Therefore, the identification of relationships in the present study serves only to establish certain patterns consistent with previous theoretical research regarding the chronological relationships of the different variables under study. Strictly speaking the reference to causal relationships, as suggested in the present study, would be incorrect. It is therefore possible that the independent variables in the present study could be

classified as symptoms of burnout and work engagement, rather than their antecedents. However, longitudinal research seems to point to the fact that certain job characteristics such as job demands seem to demonstrate mainly a causal relationship in health outcomes with the associated outcomes appearing only after the appraisal process of the situation (Schaufeli & Buunk, in press).

Consequently, future longitudinal and quasi-experimental designs are needed not only to validate hypothesised causal relationships between antecedents and possible consequences of constructs such as burnout and engagement, but also to expand our knowledge in terms of the inclusion of other variables in the study of human well-being.

A second limitation of the present study is the sampling method adopted in the design of this research. An accidental sample was used due to the nature of emergency work, such as rotating work schedules and leave, which resulted in the under-representation of relevant sub-groupings in the sample. This aspect became especially pertinent in the bias analysis, where analysis of variance could not include significant representation of subgroups (language groups) in the different scoring groups of an item. Subsequently, statistical power was sacrificed and the possibility of ascribing the findings to pure chance cannot be overruled. Furthermore, the use of a probability sample does not allow for inferences to be made regarding the characteristics of the total population.

Limitations in this regard should be combated by the utilisation of a stratified randomised sampling method where adequate subgroup representation in the sample could be ensured, significantly increasing the likelihood of describing the characteristics of a valid sub-sample of the total population. In this way, meaningful inferences could be made with regards to the characteristics of the total population.

A third limitation of the current research is the reliance solely on self-report measures. Problems with this aspect are often associated with so-called “method variance” where the shared variance between measures could at least partly be attributed to the use of self-report measures (Schaufeli, Enzmann & Girault, 1993). However, a review of self-report measures regarding perceptions and affective reactions to jobs and work environments revealed little evidence of common method variance (Spector, 1987). Similarly, other researchers have

demonstrated that even if interactions between the constructs are found, it poses no real threat with regards to the findings obtained (Dollard & Winefield, 1998; Wall, Jackson, Mullarkey & Parker, 1996). Another dimension to this argument is the relatively small array of alternative methods available for the use of self-report measures. Research should, however, aim to develop more objective means of measuring job characteristics, environmental aspects and the perceptions around it. In this regard, Dolan (1995) proposes that a multivariate approach be taken in the study of burnout and engagement by including numerous associated variables inherent to the job, the environment and the individual (e.g. individual traits).

Fourthly, the current research was conducted in a relative homogenous sample of emergency workers. The unique characteristics of the emergency worker setting, such as organisational culture, could have played a significant role in the participants' responses to items. Implications are that the results of the current research could be unique to the emergency worker profession in Gauteng and generalisation to other contexts or professions could therefore not be made. Replication of this study in other occupational settings and heterogeneous samples are therefore a necessity.

Another limitation of this study was that there is a possibility that some participants in this research did not totally trust the confidentiality statement set out in the covering letter which accompanied the questionnaires. This could have had an influence on some of the results.

7.3 RECOMMENDATIONS

Next, recommendations for the organisation as well as suggestions for future research are made.

7.3.1 Recommendations for the organisation

For any intervention or individual, managerial or organisational practice to deal with burnout and its associated consequences depends on the extent to which the burnout phenomenon is quite clearly and accurately comprehended. Not only should awareness be stimulated at all levels in the organisation with regards to the causes and symptoms of burnout, skill levels should also be expanded to enable both management and employees to identify emotional

exhaustion, depersonalisation and personal accomplishment before the effects of serious burnout come into effect. This becomes especially relevant in light of the fact that burnout is contagious; it can be spread by those higher up in the organisational hierarchy to those in subordinate positions.

Given the pervasive nature of burnout, emergency services should design and implement planned interventions to combat the prevalence of burnout. According to Lee and Ashforth (1993), interventions should be designed for the long term in order to deal with the root cause rather than just the symptoms of burnout. It is recommended that individual-based interventions to reduce the effects of burnout be considered. Among these interventions, techniques such as self-monitoring, self-assessment, didactic stress management, promotion of a healthy life-style and relaxation techniques can be used (Schaufeli & Enzmann, 1998, pp. 146-168). Stress management programmes that use a cognitive-behavioural approach are also effective in reducing stress reactions, such as burnout. In order for these interventions to be effective in the long run, Schaufeli and Bakker (2002) recommend that these individual-based programmes be supported by organisation-based programmes. Organisation development interventions in general, but also interventions aimed at influencing the values and culture of the organisation could be considered. Furthermore, psycho-educational programmes should be developed to combat burnout and enhance engagement.

Demands of the job seem to play a central role in the developmental process of burnout and associated health problems and reduction thereof seems to be an avenue to pursue. Many organisational-based strategies exist that could aid in a preventative capacity, such as job redesign, flexible work schedules and goal setting. Research also showed that increasing the job resources (e.g. through participative management, increasing social support, and recognition structures) could lead to more work engagement, but the direct effect on burnout is small. Therefore, in terms of prevention, decreasing the job demands should be the preferred method of prevention rather than increase in resources because its effect on the reduction of burnout is greater. In this regard, Golembiewski, Hiles and Rick (1987) recommended an organisational development approach where participatory consensus for change could be facilitated by means of the strengthening of social networks, problem confrontation and group consolidation around problems. According to Karasek and Theorell

(1990), this approach essentially reduces job demands and increases employee control over outcomes affecting their lives.

Another salient aspect regarding interventions seems to be the utilisation of coping strategies. Many successful programmes integrated the assessment and development of coping strategies that work with their programmes. Coping strategies assessment could be integrated into the personnel selection procedures and a stress intervention programme inclusive of the development of individual coping strategies conducive to emergency worker well-being are recommended. However, considering the central role of job demands in burnout and engagement, the best way to address the issue of stress reduction seems to be the reduction of organisational and environmental stressors. An organisational intervention programme to reduce job demands should be implemented.

Emergency services management could also benefit by considering the following antidotes for burnout as identified by Cherniss (1995):

- **Meaningful work.** A meaningful job could help emergency workers to remain dedicated. A meaningful job has several characteristics. Firstly, it must make a significant impact, for example on other people's lives. This impact must, however, be recognised by the individual. Secondly, the job should provide an intellectual challenge. Thirdly, the job must provide scope for experiencing change in order to prevent boredom. Fourthly, the individual should be able to cultivate his or her special interests in the job.
- **Finding greater autonomy and support.** Individuals who recovered from burnout managed to avoid demoralising bureaucratic obstacles and organisational politics. In most cases they had to change jobs, but eventually they found work settings in which they had a high degree of autonomy. However, a supportive work setting is also necessary to recover from burnout. Emergency workers need both tangible and emotional support, including trust and confidence, recognition and feedback and active interest of the immediate manager or supervisor. Furthermore, support for continued learning and stimulating colleagues is also valuable.

- Individual factors which could enhance resilience. Developing career insight early in the career, development of organisational negotiation skills, realistic goals and expectations, actively pursuing personal development and striking a balance between work, family and leisure could contribute to the recovery from burnout.

7.3.2 Recommendations for future research

The findings of the present study might have important implications for future research and practice, despite the various limitations already mentioned. Firstly, burnout is a phenomenon now well established outside the human-service professions and could stimulate future research to a wide range of occupations (Schutte, Toppinen, Kalimo & Schaufeli, 2000). Future South African research needs to determine the relative prevalence of burnout in various occupational groups in order to make comparisons between standardised groups possible. Also, high risk occupational groups in terms of the development of burnout could be identified. Furthermore, norms regarding different occupations, professional groups, and even organisation and industry could be generated to enable meaningful comparisons within the South African context. Consequently, target groups could be identified to facilitate intervention research.

In terms of assessment, the lack of validated cut-off points with regards to the measurement of burnout and work engagement is lacking due to insufficient South African norms for the MBI and the UWES. This problem makes the early detection of burnout and engagement very difficult. Therefore, research in other occupational settings in South Africa is urgently needed to serve as norm-group reference groups in terms of measurement levels of both burnout and work engagement.

Another burning issue with regards to the MBI is the lack of clinically validated cut-off points which would make possible the distinction between burnout and clinical conditions, where continuation of normal functioning is severely influenced, possible. Future research in South Africa should focus on determining a clinical profile for burnout to determine validated cut-off points and distinguish burnout from other clinical conditions. Since burnout is not included in the DSM IV classification of clinical conditions, researchers have recommended the use of neurasthenia with the additive criteria of work-relatedness (Schaufeli et al., 2001).

Neurasthenia is a neurosis characterised by chronic emotional and physical exhaustion, physical complaints, lack of concentration and the ability to relax.

Further research is needed which would result in the standardisation of measuring instruments which could be used to measure burnout (including all versions of the MBI), as well as work engagement (including the UWES). Future studies should also focus on the psychometric properties of these instruments. In this regard, it is recommended that statistical analysis should take cognisance of the inherent problems of measurement in multicultural settings, such as South Africa. Therefore, internal consistency, test-retest reliability and construct validity should be expanded to include equivalence and bias, especially in the South African context. Research design selection significantly influences the robustness of findings and it is recommended that large, stratified, random samples should be considered as far as possible, facilitating the use of advanced statistical methods such as exploratory factor analyses with target rotations (equivalence), analysis of variance to detect bias, confirmatory factor analysis and structural equation modelling.

In terms of the operationalisation of the MBI (MBI-GS, MBI-HSS, MBI-ED), mounting criticism against the predominant use of negatively phrased items has been voiced in the literature. Recently, the psychometric properties of the MBI-GS was increased by the addition of the Disengagement subscale of the Oldenburg Burnout Inventory (OLBI) to the existing scales of the MBI-GS (Demerouti et al., 2003). In terms of future research, it is suggested that future studies should focus on the inclusion of positively phrased items to the existing subscales of the MBI (MBI-GS, MBI-HSS, MBI-ED). Furthermore, research is needed with regards to the conceptualisation and operationalisation of work engagement. Various problems are experienced with current items of the UWES, such as difficult item phrasing and the generation of positive response sets.

To date, little is known with regards to the prevalence and dynamics of work engagement in stark contrast to the development of negative work-related attitudes and behaviours such as burnout. It is recommended that causal models with longitudinal designs be utilised with the inclusion of various dispositional, situational and social variables. Furthermore, future research should also focus on possible causes, outcomes and underlying processes of burnout and work engagement. Existing theoretical models could assist in this process, such as the

Job Demand – Control Model (Karasek & Theorell, 1990) which could be used to predict if burnout could be related to the strain axis and work engagement to the active learning axis (Demerouti, Bakker, Janssen & Schaufleli, in press). Also, the Job Demand – Resources Model could be utilised to test the extent to which job demands could be related to the affective component of well-being (burnout) and job resources to the cognitive dimension (Demerouti, Bakker, Nachreiner & Schaufeli, 2001). Consequently, two types of processes can be proposed:

- High job demands lead to a negative evaluation of work, resulting in health complaints due to the fact that the employee is exhausted
- The availability of resources, both material and immaterial, lead to a stronger identification with work, as well as increased performance because the employee is motivated

In terms of the study of work engagement, it is recommended that researchers should rather consider the use of positively phrased rather than negatively phrased items to measure job resources. Furthermore, more research is needed to determine whether psychological strengths (e.g. locus of control, sense of coherence, hardiness and dispositional optimism) and work engagement can be related to organisational outcomes such as the taking of sick leave, productivity, job satisfaction, quality of goods and services, retention and turnover.

Further to the studying of factors that contribute to the development of burnout and the enhancement of engagement in emergency workers in South Africa, it is necessary to further explore the extent to which certain dispositional, situational or social aspects buffer or exacerbate the interaction between emergency workers and their highly stressful environment in future research. It is possible that the influence of these aspects could either predispose the emergency worker to the development of burnout or work engagement, or alternatively interact to buffer (or even exacerbate) the prevalence of burnout or work engagement. Future research should include various other dispositional, situational and social variables such as personality dispositions (e.g. locus of control, sense of coherence, hardiness, dispositional optimism, self-esteem and self-efficacy), social support and perceived control over job outcomes. Furthermore, more information would be gleaned to better understand the relationships between burnout and engagement of the emergency worker.

Future studies should also focus on the study of interventions in South Africa. The following aspects need to be considered in future research in this regard:

- Investigating the effects of individual and organisational interventions
- Use of appropriate research designs, such as probability sampling methods with acceptable sample sizes
- Computation of practical significance of findings in addition to statistical significance
- Using methods towards defining and determining the clinical significance of treatment effects (Jacobson, Roberts, Berns & McGlinchey, 1999).
- Use of intervention mapping in the planning, implementation and research of the effects of interventions (Bartholomew, Parcel & Kok, 1998)
- Incorporating different types of change (alpha, beta and gamma) in terms of the effectiveness of interventions (Vandenberg & Self, 1993).
- Conducting both etiological and prevention effectiveness studies (Skov & Kristensen, 1996).

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