

Job demands-resources theory, health and well-being in South Africa

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COMMENTS

The reader is reminded of the following:

- The editorial guidelines specified by the *South African Journal of Industrial Psychology* were used in this thesis.
- Where the former guidelines might deviate; the editorial style follows the format prescribed by the Publication Manual (5th edition) of the American Psychological Association (APA).
- The revised research proposal forms the first chapter of the thesis. Therefore, this chapter is presented in a different voice when compared to subsequent chapters that report on actual results.
- The thesis is submitted in the form of six chapters, which include four research articles.
- Each chapter of this thesis has its own reference list.

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SUMMARY

Topic: Job demands-resources theory, health and well-being in South Africa

Keywords: Job demands, job resources, burnout, engagement, dual process, exhaustion, cynicism, vigour, dedication, work-related well-being, work stress, occupational stress, structural equation modelling, mediation, logistic regression, self-reported health, objective outcomes, financial outcomes, South Africa

Work stress has a substantial impact on employees, organisations and economies; especially in the fragile economic environment since the ‘Great Recession’ of 2008; which has seen employment levels drop and employees willing to endure more stress at work to avoid retrenchment. These impacts include serious health and financial consequences. Attempts should therefore be made to effectively manage and address work stress to lessen these dire consequences. Many models have been developed and theorised to assist in explaining work stress, the pinnacle of these being the job demands-resources (JD-R) model. In JD-R theory, the dual process explains that work-related well-being follows the following processes: An energetic, also called the health impairment process, in which job demands leads to ill health outcomes through burnout; and then a motivational process which presents that job resources leads to positive organisational outcomes, e.g. organisational commitment, through engagement.

The main objectives of this research were 1) to investigate a JD-R model in a large South African sample with a categorical estimator; 2) to investigate the reversed causal hypotheses of burnout and engagement in job demands-resources theory over time; 3) to investigate the likelihood of reporting treatment for health conditions based on burnout and engagement, and 4) to investigate the link between burnout and objective financial outcomes, i.e. by medical aid provider expenditure.

To achieve the first objective a cross-sectional design was used ($n = 15\ 633$) covering numerous sectors in South Africa. A dual process model was specified with job demands (work overload) leading to ill health through burnout, and job resources (colleague and supervisor support,

communication, growth opportunities and role clarity) leading to organisational commitment through engagement. Results of structural equation modelling indicated that the proposed JD-R model was a good fit to the sample. Furthermore, burnout was found to mediate the relationship between job demands and ill health with a medium effect. Engagement was found to mediate the relationship between job resources and organisational commitment with a large effect.

The second objective, concerning reversed causality, was achieved with a longitudinal design ($n = 593$). The hypothesized model included burnout and engagement at time one, and at time two work overload as indicator of job demands, and colleague and supervisor support, communication, growth opportunities and role clarity as indicators of job resources. Results indicated that burnout had a significant negative reversed causal effect to supervisor support and colleague support. Engagement showed only one significant result, i.e. a small negative reversed causal relationship with supervisor support.

To achieve the third objective, a cross-sectional design was used ($n = 7\,895$). Results for logistic regression analyses showed that an increase in burnout was associated with a significant increase in the estimated odds for reporting an affirmative answer for receiving treatment for any of the health conditions, i.e. cardiovascular conditions, cholesterol, depression, diabetes, hypertension and irritable bowel syndrome. In contrast, an increase in engagement was associated with a decrease in affirmative reporting for cardiovascular conditions, cholesterol and depression; but not for diabetes, hypertension or irritable bowel syndrome.

Addressing the link between burnout and financial outcomes was the fourth objective; and met with a cross-sectional design ($n = 3\,182$). Participants were divided into a high and low burnout group based on the comorbidity of exhaustion and cynicism. Analysis of covariance (ANCOVA) was implemented, controlling for age and gender, to investigate the difference in medical aid provider expenditure of the two groups. Results revealed that expenditure in the high burnout group was consistently more in all cases, compared to the low burnout group.

By way of conclusion, the implications of the research were discussed and recommendations for managers and for future research were made.

OPSOMMING

Onderwerp: Werkseise-hulpbronne-teorie (“Job demands-resources theory”), gesondheid en welstand in Suid-Afrika

Sleutelwoorde: Werkseise, werkshulpbronne, uitbranding, begeestering, tweeledige proses, uitputting, sinisme, vitaliteit, toewyding, werkverwante welstand, werkstres, beroepstres, strukturele vergelykingsmodellering (“structural equation modelling”), mediasie, logistieke regressie, self-gemelde gesondheid, objektiewe gevolge, finansiële gevolge, Suid-Afrika

Beroepstres het ’n betekenisvolle uitwerking op werknemers, organisasies en ekonomieë, veral in die lig van die swak ekonomiese toestande sedert die ‘Groot Resessie’ van 2008, wat gelei het tot ’n afname in werkverskaffingsvlakke en werknemers wat meer stres by die werk verduur om te voorkom dat hulle afgedank word. Hierdie uitwerking sluit ernstige gesondheids- en finansiële gevolge in. Pogings moet sodoende aangewend word om beroepstres doeltreffend te bestuur en dit onder die loep te neem met die oog daarop om die negatiewe gevolge te verminder. Talle modelle is al ontwikkel en geteoretiseer om te help om beroepstres te omkryf, waarvan die toppunt die “job demands resources (JD-R)”-model is. In die JD-R teorie verduidelik in die tweeledige proses dat werkverwante welstand die volgende twee prosesse volg: ’n Energieke proses aan die een kant, ook bekend as die gesondheidsbenadelende proses, waar werkseise lei tot negatiewe gesondheidsgevolge deur uitbranding, en aan die ander kant ’n motiverende proses wat voorhou dat werkshulpbronne lei tot positiewe organisasie-gevolge, byvoorbeeld toegewytheid aan die organisasie, deur begeestering.

Die hoofdoelwitte van hierdie navorsing was: 1) om ’n JD-R-model met ’n groot Suid-Afrikaanse steekproef deur middel van ’n kategorieëse beramer te ondersoek; 2) om die omgekeerde kousale hipoteses ten opsigte van uitbranding en begeestering in die “job demands-resources”-teorie oor ’n sekere tydperk heen te ondersoek; 3) om die waarskynlikheid dat werknemers behandeling vir gesondheidstoestande, gebaseer op uitbranding en begeestering, sal aandui, te ondersoek, en 4) om die verband tussen uitbranding en mediesehulp-skema-uitgawe, ’n objektiewe finansiële gevolg, te ondersoek.

Om die eerste doelwit te bereik, word gebruik gemaak van 'n dwarsnee-opname-ontwerp ($n = 15\ 633$), wat talle sektore in Suid-Afrika dek. 'n Tweeledigeproses-model word gespesifiseer met werkseise (werkoorlading), wat lei tot swak gesondheid deur middle van uitbranding, en dan werks hulpsbronne (kollega- en toesighoudende ondersteuning, kommunikasie, ontwikkelingsgeleentheid en rolduidelikheid) wat lei tot toewyding aan die organisasie deur middle van begeestering. Resultate van strukturele vergelykingsmodellering (“structural equation modelling”), het daarop gedui dat die voorgestelde JD-R-model 'n goeie passing vir die steekproef was. Voorts is gevind dat uitbranding die verband tussen werkseise en swak gesondheid met medium effek medieer. Daar is ook gevind dat begeestering die verband tussen werks hulpsbronne en toewyding aan die organisasie met groot effek medieer.

Die tweede doelwit, met betrekking tot omgekeerde kousaliteit, word bereik aan die hand van 'n longitudinale ontwerp ($n = 593$). Die gehipotiseerde model het uitbranding en begeestering op tyd een, en op tyd twee werkoorlading as indikator van werkseise aangedui, asook kollega- en toesighouerondersteuning, kommunikasie, ontwikkelingsgeleentheid en rolduidelikheid as indikatore van werks hulpsbronne. Resultate dui daarop dat uitbranding 'n betekenisvolle negatiewe omgekeerde kousale verband op toesighouerondersteuning en kollegiale ondersteuning het. Begeestering het slegs een betekenisvolle resultaat, naamlik 'n klein negatiewe omgekeerde kousale verband met toesighouer-ondersteuning, getoon.

Om die derde doelwit te bereik, is 'n dwarsnee-opname-ontwerp aangewend ($n = 7\ 895$). Resultate vir logistiese regressie-analise, het getoon dat 'n toename in uitbranding in verband gebring kan word met 'n betekenisvolle toename in die beraamde kans op 'n bevestigende antwoord met betrekking tot die ontvangs van behandeling van enige van die gesondheidstoestande, naamlik: Kardiovaskulêre ongesteldhede, cholesterol, depressie, diabetes, hipertensie en prikkelbare dermsindroom. In teenstelling hiermee, word 'n toename in begeestering in verband gebring met 'n afname in bevestigende aanmelding van kardiovaskulêre ongesteldhede, cholesterol en depressie, maar nie vir diabetes, hipertensie of prikkelbare dermsindroom nie.

Om die verband tussen uitbranding en finansiële uitkomst te ondersoek, was die vierde doelwit aan die hand van 'n dwarsnee-opname-ontwerp ($n = 3\ 182$), gedoen. Deelnemers is in 'n hoë en 'n lae uitbrandingsgroep, gebaseer op die ko-morbiditeit van uitputting en sinisme, ingedeel. Analise vir kovariansie (Analysis of covariance – ANCOVA), wat vir ouderdom en geslag gekontroleer het, om die verskil in uitgawes aan mediesehulp-verskaffers van die twee groepe te ondersoek, is gebruik. Resultate het daarop gedui dat uitgawes vir die hoë uitbrandingsgroep in alle gevalle, meer was as wat dit die geval by die lae uitbrandingsgroep was.

Ten slotte is die implikasies van die navorsing bespreek en aanbevelings is gemaak vir bestuurders asook vir toekomstige navorsing.

CHAPTER 1

INTRODUCTION

This thesis focuses on job demands-resources (JD-R) theory, well-being and health within the South African context. This research is important in the context of the current economic conditions, and the effects of work stress and the consequences and outcomes it can lead to both subjectively and objectively (e.g. financial). Many studies of the theory within South African context have suffered from small sample sizes and a narrow focus on single enterprises or industries. To address these issues, firstly, a proposed generic JD-R model for various employment sectors in the South African context needs to be investigated with alternative, and also newly suggested, statistical methods. Reversed causality in JD-R theory, i.e. burnout and engagement's relationship to overload and job resources over time, also needs to be investigated. Other issues that need to be addressed to facilitate a holistic understanding relates to the relationship of burnout and engagement to self-reported health. Lastly, the link between burnout and objective financial outcomes, i.e. medical aid provider expenditure based on burnout, also needs to be established. The first issues relate to theoretical validation and clarification, while the latter aims at establishing external and predictive validity.

Chapter 1 contains the background to and motivation for the research, the problem statement, aims of the research, research method, and the division of chapters.

1.1 PROBLEM STATEMENT

Eustress, or “good stress”, is a term which was defined by Selye (1987). Conversely, distress represents “bad stress.” Employees’ quality of life is threatened by work stress (Danna & Griffin, 1999; Dyck, 2001). The cost of work stress has been investigated; specifically distress in this instance. For example, although difficult to estimate, in the United States it ranges from 200 to 300 billion dollars per fiscal year (Atkinson, 2000), and in the United Kingdom more than 60 per cent of all workplace absentees were due to stress (Cartwright & Boyes, 2000). More recent figures estimate stress (physical and mental) at \$30 billion per year in Australia (Safe Work Australia, 2008) and \$300 billion in the United States in 2010

(Barroux, 2011). The People Element (2012) reported that the cost of workplace stress in South Africa is around R3 billion per annum.

Given the afore-mentioned concerns regarding stress-based absenteeism and the potential cost to nations, it is important to investigate work stress and the effects it can have within the South African context; being a developing nation. Furthermore, the effect work stress can have on a person's general psychological and physical well-being is of tremendous importance for ethical, humanitarian, as well as economic reasons. Such research is important for contributing to the economic effectiveness and productivity of a workforce as well as identifying potential health risks due to occupational stress.

Health problems, impaired effectiveness and performance, industrial accidents, reduction in productivity, decreasing levels of customer service, turnover, absenteeism, substance abuse and purposefully destructive behaviours; have all been shown to be consequences of work stress (Happel, Pinikahana, & Martin, 2003; Quick, Quick, Nelson, & Hurrell, 1997; Wright, & Smye, 1996). Work stress has additionally been implicated in suicide (McGrath, Reid, & Boore, 2003), and is considered also to be the main causative factor of burnout (Cherniss, 1995).

Burnout is a state of physical, mental and emotional exhaustion caused by a depletion of the ability to cope with the work environment, resulting from the on-going demands of our daily lives (Maslach, 1982). Maslach, Jackson, and Leiter (1996) hypothesised that burnout, as a result of the presence of various demands and absence of resources, can lead to various undesirable outcomes such as physical illness, health impairment, staff turnover and absenteeism. Burnout comprises three main components named exhaustion, cynicism and reduced personal accomplishment. Of these, exhaustion and cynicism present the core dimensions (Schaufeli & Taris, 2005). Exhaustion refers to an employee's energy being depleted which incapacitates performance, while cynicism refers to an employee's distant and indifferent attitude towards his or her work in general (Schaufeli, 2003).

Work engagement is assumed to be the opposite of burnout and is defined as "a positive, fulfilling, work-related state of mind that is characterized by vigour, dedication, and absorption" (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002, p. 74). Engagement comprises vigour and dedication at its core; while absorption is seen as only resulting from

engagement (Schaufeli & Bakker, 2004). Vigour is characterised as a “willingness to invest effort, high levels of energy and mental resilience, while working”; and dedication by “a sense of significance, enthusiasm, inspiration, pride, and challenge” (Schaufeli & Bakker, 2004; p. 295). Engagement is connected to positive organisational outcomes such as reduced turnover intention and increased commitment (Bakker & Demerouti, 2007).

Work-related well-being of an employee can be explained with reference to the job demands-resources (JD-R) model proposed by Demerouti *et al.* (2001). According to this model, risk of burnout is at the highest level in work environments, where job demands are high while resources are low (Demerouti *et al.*, 2001). Schaufeli and Bakker (2004) expanded the JD-R model by including the construct of engagement, and by the addition of indicators for health impairment and organisational withdrawal.

Two job-related psychological processes collectively termed *the dual process*, comprises an energetic (health impairment) process and a motivational process, which are described in the JD-R model (see Figure 1). In the energetic process, job demands are linked to ill health due to burnout, while the motivational process connects job resources to organisational commitment due to work engagement. Job resources can promote employee growth (intrinsic motivational function) and also assist in achieving work goals (extrinsic motivational function). The JD-R model can therefore satisfy “the need for specificity by integrating various types of job demands and job resources, depending on the context under study” (cf. Bakker & Demerouti, 2007, p. 320). This model enables researchers to assess stress climate in the workplace, evaluate the balance between job demands and job resources. Moreover, the validity of the JD-R model is supported with longitudinal empirical data (Boyd *et al.*, 2011; Hakanen, Schaufeli, & Ahola, 2008).

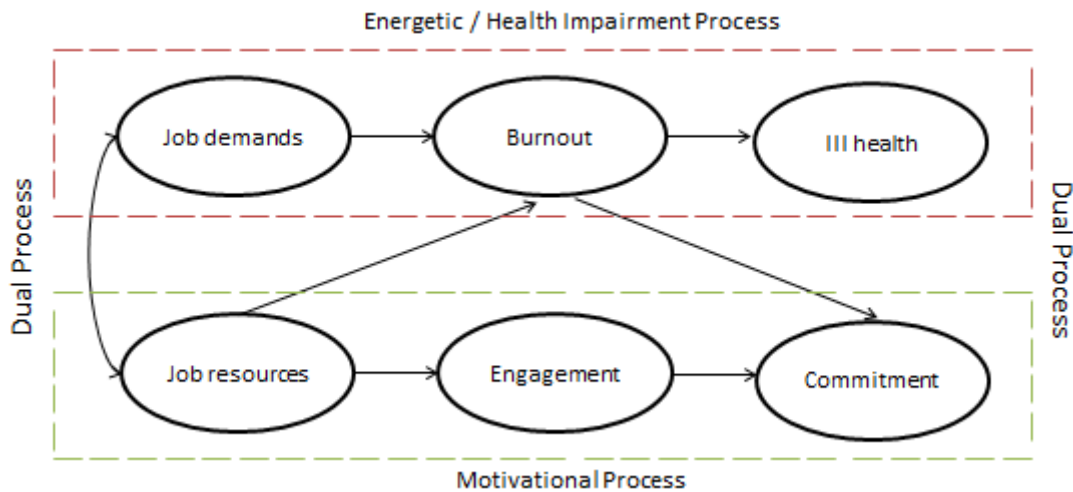


Figure 1. A JD-R model adapted from Hakanen, Bakker, and Schaufeli (2006).

According to Newsom (2012), there is growing consensus that categorical variables should be analysed with the weighted least squares (WLS) approach; which is the variance-adjusted weighted least-squares method, or abbreviated: WLSMV (Muthén & Muthén, 2010; Muthén, Du Toit, & Spisic, 1997). It appears that, to date, no study has investigated a JD-R model with this approach. Furthermore, previous JD-R studies allowed correlated errors between burnout and engagement, and all of these implemented the Maximum Likelihood (ML) estimator in model investigations. The problem with correlation of error terms between variables is that it increases model fit at the expense of the likelihood of model replication (cf. Smolkowski, 2007). Moreover, item parcelling methods, i.e. averaging or summing of item scores, were also implemented in some previous studies, and there has been controversy surrounding this practice's ability to increase model fit (Bandalos, 2002; Bandalos & Finney, 2001). Therefore, as part of this research, a generic JD-R model will be investigated with a categorical estimator, no errors will be allowed to correlate, and no item parcelling strategies will be used.

With regard to mediation analyses, alternative practices have also been suggested by Preacher and Kelley (2011), and Rucker *et al.* (2011), which indicate that the focus should be on indirect effects and that a value called kappa-squared (κ^2) could be calculated to describe mediating effect sizes. This also appears to be the first time such a comprehensive investigation will be conducted on a JD-R model within South African context.

Hakanen *et al.* (2008), in a longitudinal study of the health impairment/energetic and motivational processes, found support for both components of the dual process. Boyd *et al.* (2008) investigated job demands and job resources and their longitudinal relationship to eventual outcome variables, i.e. commitment and psychological strain, and found favourable results. Normal causality is a normal linear relationship over time, such as in cross-sectional or longitudinal research where job demands lead to burnout. Both the afore-mentioned studies also investigated reversed causality, but did not find any significant associations. Reversed causality is found where the endogenous variable has a causal relationship to the exogenous variable (Kenny, 2011). This type of research has been low in volume, and few studies explicitly test for these effects (De Lange *et al.*, 2004). An example of such an effect in JD-R theory would be burnout at time 1's relationship to overload and job resources at time 2. Therefore the reason for investigating this phenomenon is that the possibility that an outcome in a cross-sectional survey might actually be influencing the original cause longitudinally. Such research in JD-R theory has been lacking in South Africa. However, some studies in other contexts have found evidence for reversed effects in their investigations, e.g. a small positive effect from work engagement to social support over time (De Lange, De Witte, & Notelaers, 2008).

Self-reported health has been found to be a trustworthy indicator of overall health (Goldstein, Siegel, & Boyer, 1984; Idler & Benyamini, 1997; Manderbacka, Lahelma, & Martikainen, 1998). As in Toker, Shirom, Shapira, Berliner, and Melamed (2005, p. 344), burnout and one of its main components, exhaustion, have also been found to predict *inter alia* “cardiovascular disease (Appels, 1988; Appels & Schouten, 1991; Hallman, Thomsson, Burell, Lisspers, & Setterlind, 2003), type 2 diabetes (Melamed, Shirom, & Froom, 2003), and poor self-rated health (Gorter, Eijkman, & Hoogstraten, 2000; Halford, Anderzen, & Arnetz, 2003; Kahill, 1988).” Furthermore, cardiovascular conditions (Melamed *et al.*, 2006), cholesterol (Shirom *et al.*, 1997), diabetes (Melamed *et al.*, 2006), gastro-intestinal problems (Shirom *et al.*, 2006), hypertension (Cholongitas & Pipili, 2010), and atherosclerosis (Kitaoka-Higashiguchi *et al.*, 2009), have all been linked to burnout and work stress. Evidence exists that burnout therefore has an adverse effect on health and may be considered a risk factor for potentially serious health issues.

Some studies have found that engaged employees have better self-rated health (cf. Bakker & Leiter, 2010; Hakanen, 2002). Studies connecting engagement and physical health, abroad

and in South Africa, are limited. However, research has found that positive psychological attributes, such as optimism and well-being, are connected to superior cardiac outcomes (DuBois *et al.*, 2012). It is therefore important to investigate the links between subjective well-being states and the reporting of receiving treatment for conditions within South African context. This would start to illuminate the relationship between subjective well-being states and objective physical health.

It is clear from the above discussion that it is important to measure work stress and work-related well-being in organisations and to ascertain the impacts thereof, specifically pertaining to health and financial outcomes. Bakker and Demerouti (2007) suggest that future research regarding JD-R theory should also focus on linking it to objective outcomes, i.e. linking self-reports with objective business indicators such as profitability, turnover and safety. As work stress and burnout have been estimated to have serious cost-implications to employers and organisations, it was decided to investigate the impact burnout can have on the expenditure by a medical aid provider on employees, i.e. to ascertain whether a significant difference exists between claim expenditure for employees based on their burnout scores. If such a difference is found, the financial ramifications for medical aid companies as well as individuals themselves with regard to co-payments and similar costs will be elucidated.

From the above problem statement the following research questions emerged:

- How is job demands-resources theory, including general work-related well-being (burnout and engagement), job stress, work stress, the dual process, and health outcomes, conceptualised in the literature?
- Can a generic baseline JD-R model for the South African context be established?
- Can evidence for any significant reversed causal relationships in JD-R theory be found in South Africa?
- Can burnout and engagement be connected to self-reported objective health outcomes?
- What is the association of burnout with objective financial expenditure data, as indicated by medical aid provider expenditure?
- Can recommendations be made for future research?

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

- Current conceptualisation and measurement issues regarding JD-R models will be addressed.
- The weighted least squares (WLS) approach in structural equation modelling and mediation analyses will be implemented for a JD-R model as consensus has grown that it is more fitting for categorical data analyses.
- This research will result in a generic baseline JD-R model that is valid across various sectors in South Africa.
- Descriptive labels for mediation effect sizes of burnout and engagement in the dual process will be established for the first time.
- Reversed causality of burnout and engagement on job demands and job resources in South African mining context will be elucidated.
- Burnout and engagement's association with self-reported treatment for objective health conditions will be established. This would provide evidence for the link between subjective well-being states and health, i.e. at least in self-reporting health conditions.
- Burnout, as a subjective work-related well-being state, will be connected to an objective financial outcome, i.e. medical aid provider expenditure. This would indicate the ramifications burnout can have on financial outcomes.

1.2 AIMS OF THE RESEARCH

1.2.1 General objective

The general objective of this study was to investigate JD-R theory and its relation to health and well-being within South African context.

1.2.2 Specific objectives

- To conduct a literature review on general work-related well-being, job stress, the job demands-resources model, work stress, the dual process, and health outcomes.
- To investigate a JD-R model in a large South African sample with a categorical estimator.
- To investigate the reversed causal hypotheses of burnout and engagement in job demands-resources theory over time.

- To investigate the likelihood of reporting receiving treatment for health conditions based on burnout and engagement.
- To investigate the link between burnout and objective health by means of medical aid claims data.
- To present and discuss conclusions, limitations and recommendations on the findings of the present study.

1.3 PARADIGM PERSPECTIVE OF THE RESEARCH

This research is conducted in context of the *Post-positivistic* philosophy, specifically *critical realism*. Critical realists believe that an independent reality exists external to an individual's own thinking that can be investigated with scientific method. Classic positivist researchers were also realists. However, the difference is that post-positivists accept the premise that all data is fallible and that all theory is revisable. Therefore, a critical realist is critical of the ability to know reality perfectly, and also accepts the possibility of biases. Post-positivists therefore believe that they will never achieve perfect objectivity, but that this objectivity can be approached (cf. Trochim, 2006), i.e. post-positivism does not accept relativism but pursues objective truth. As discussed in Toll (2012), scientific theories are formulated that have prediction which can be falsified (Popper, 1963), and therefore rests on what are called: conjectures and refutations. This is achieved by formulating hypotheses that are investigated with scientific methodology the research studies.

According to Toll (2012) quantitative methods are “logically consistent with post-positivist epistemology, and moreover when appropriate the ability to formulate empirical hypotheses with statistically tuned predictions allows for a more faithful application of the principle of falsification” (para. 6). Furthermore, Durbin (1978) argues that the researcher can only be in a position to deduce truthful and logical conclusions, about the operation and/or propositions of the model, once the basic characteristics of a theoretical model have been established. Every theoretical construct should be substitutable for empirical units, e.g. a self-report measure measuring latent variables; this substitution enables the researcher to empirically investigate hypotheses that either supports or falsifies theory (cf. Lobato, 2008).

The ontology of post-positivism is that reality is objective and apart from the researcher. Furthermore, the epistemology of post-positivism is that the researcher is independent of that which is being researched. Thus, no knowledge is absolutely certain but only conjectural and is open to the possibility for future refutation.

1.4 RESEARCH METHOD

1.4.1 Research design

A quantitative approach will be followed in this research. More specifically, a survey design will be used (Huysamen, 2001). The measuring instruments will be applied according to the prescribed administration procedures, as well as within the context of professional ethics that is expected from a researcher at this level. Models and theories will be identified selectively and presented in a standardised method from the available literature.

1.4.2 Participants

Participants will be employed individuals from various organisations and sectors in South Africa. All participants will remain anonymous. All organisations will also remain anonymous, only giving reference to the sector or industry. The second objective will be researched with a sample combined from the various industries ($n = 15\ 633$). The third objective will have longitudinal data ($n = 593$) from the mining industry. The fourth objective will have another sample collected from various sectors ($n = 7\ 895$). The fifth objective's sample will have medical aid claims data connected to it from the financial sector ($n = 3\ 182$).

The data will be collected, at random, from employees ranging from lower to higher level jobs and positions in different organisations and sectors. Furthermore, the data will be collected over a period of over three years as part of different consultation projects involving the research unit of which the author forms part. Participation will be voluntary at all times throughout the collection stages and anonymity of all participants and organisations is guaranteed.

1.4.3 Measuring instruments

The *South African Employee Health and Wellness Survey* (SAEHWS; Rothmann & Rothmann, 2007) was developed as a web-based, or paper-and-pencil, self-administered survey to be applied in employee health and well-being assessments by the WorkWell Research Unit of which the researcher forms part. The SAEHWS consists of different sections collecting additional wellness, work, financial and health information from the respondents.

The SAEHWS fuses organisational climate assessment with other important variables influencing the climate, in order to achieve maximum management information while implementing one measurement/assessment only (Rothmann & Rothmann, 2007). The internal consistency of all the subscales of the SAEHWS is acceptable compared to the generally accepted guideline ($\alpha \geq 0.70$; Nunnally & Bernstein, 1994). Rothmann and Rothmann (2007) reported the following alpha coefficients for the 13 subscales: Exhaustion: 0.83; Mental distance: 0.70; Vitality: 0.71; Work devotion: 0.85; Overload: 0.76; Sense of coherence: 0.80; Organisational support: 0.91; Growth opportunities: 0.85; Psychological ill health 0.88; Physical ill health: 0.85; Affective commitment: 0.83; and Behavioural commitment: 0.71.

1.4.4 Research procedure

Participants will be sourced via the human resource function of the various organisations. The researcher forms part of the consultants that will be working on several of the projects. Participation, i.e. completing a survey, is entirely voluntary for all participants. The vast majority of surveys will be completed by participants online through web-based implementation. Each participant was sent a unique link via e-mail. The data will be stored in a secure data warehouse and all connections were encrypted with high-grade American Encryption Standard (AES) algorithms to ensure the integrity of data transfer and privacy of all participants. All ethical guidelines in the treatment of human subjects in research will be observed during all the phases of this study, and this study was approved by a Faculty Research Ethics Committee.

1.4.5 Statistical analyses

For the second and third objectives, structural equation modelling (SEM) methods, as implemented by Mplus 6.1 (Muthén & Muthén, 2008-2010), will be used for analyses. Mplus is chosen because of its unique ability to specify continuous and/or categorical latent variables in model investigations. This presents a significant advantage over traditional approaches in the behavioural sciences, where response variables are often non-continuous because psychological constructs are measured on Likert scales. Therefore a *categorical estimator* will be used in the SEM investigation based on the research model. The default estimator for models that contain *categorical data* is the mean and variance-adjusted weighted least-squares method, or abbreviated: WLSMV (Muthén & Muthén, 2010; Muthén, Du Toit, & Spisic, 1997), and will be applied in this investigation.

The following three fit indices will be considered: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). For the CFI and TLI, acceptable fit is considered at a value of 0.90 and above (Hoyle, 1995). According to Cudeck and Browne (1993), for the RMSEA, a value of 0.05 or less indicates a good fit, but values of 0.08 and less are also to be considered an acceptable model fit. However, the above cut-off points should only be considered to be rough guidelines – see Marsh (2007) and Marsh *et al.* (2005) for more concerning the latter.

In addition, for the second objective, newly suggested mediation methodology will be implemented. According to Rucker *et al.* (2011, p. 359), attention in mediation analyses “should be shifted towards the magnitude and significance of indirect effects”. To investigate the significance of indirect effects, the model indirect function of Mplus will be used with the bootstrapping re-sampling option enabled. Bootstrapping was chosen as it is statistically valid and the more powerful option (Williams & MacKinnon, 2008; MacKinnon, Lockwood, & Williams, 2004), as opposed to the more frequently used methods, i.e. Baron and Kenny (1986) or the Sobel test (Sobel, 1982). See Hayes (2009) for an in-depth discussion of the afore-mentioned matters. Additionally, in line with suggestions from Preacher and Kelley (2011), κ^2 (kappa-squared) values will be calculated to assist in establishing a basis to help communicate the magnitude of the mediating effect sizes, i.e. small, medium or large effects.

For the fourth objective, binary logistic regression analyses will be performed with the SPSS 19 (SPSS, 2011) programme. The predictor variables would be burnout and engagement as continuous variables. Control variables in the analyses will be age and gender. The outcome variables will be various health conditions: Cardiovascular condition, cholesterol, depression, diabetes, hypertension and irritable bowel syndrome.

For the fifth objective, the SPSS 19 (SPSS, 2011) programme will also be used. To test all of the hypotheses, analysis of covariance (ANCOVA) will be performed, controlling for age and gender, to investigate the significance and differences between the means of the expenditures for two extracted burnout groups based on the comorbidity of both high exhaustion and cynicism. Levene's test (Levene, 1960) will be applied to ascertain the homogeneity of the variances. The Bonferroni correction will also be selected to limit the occurrence of Type I errors; as it is also valid for equal and unequal sample sizes.

Correlation coefficients will also be used to describe relationships between the variables for all empirical objectives. Statistical significance is set at $p \leq 0.05$. A cut-off point of 0.30 (medium effect) is set for the practical significance of correlation coefficients (Cohen, 1988; Steyn, 1999).

1.5 CHAPTER LAYOUT

- Chapter 1: Introduction
- Chapter 2: A confirmatory investigation of a JD-R model using a categorical estimator.
- Chapter 3: Investigating the reversed causality of burnout and engagement in job-demands resources theory.
- Chapter 4: Burnout, work engagement and self-reported employee health in South Africa.
- Chapter 5: The high cost of living (and work): Linking employee burnout to medical aid expenditure.
- Chapter 6: Conclusions, limitations and recommendations.

1.6 CHAPTER SUMMARY

This chapter discussed the problem statement and contribution of this research. Moreover, the research design used in the empirical studies was explained, followed by the layout of the chapters that will follow.

REFERENCES

- Appels, A. (1988). Vital exhaustion as a precursor of myocardial infarction. In S. Maes, C. D. Spielberger, P. B. Defaves, & I. G. Sarason (Eds.), *Topics in health psychology* (pp. 31–35). New York, NY: Wiley.
- Appels, A., & Schouten, E. G. W. (1991). Burnout as a risk factor for coronary heart disease. *Behavioral Medicine, 17*, 53–59.
- Atkinson, W. (2000). When stress won't go away. *HR Magazine, 45*(12), 104-110.
- Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: state of the art. *Journal of Managerial Psychology, 22*(3), 309-328.
- Bakker, A. B., & Leiter, M. P. (2010). *Work engagement: A handbook of essential theory and research*. New York, NY: Psychology Press.
- Bandalos, D. L. (2002). *The effects of item parceling on goodness-of-fit and parameter estimate bias in structural equation modeling. Educational Psychology Papers and Publications*. Retrieved from <http://digitalcommons.unl.edu/edpsychpapers/65>
- Bandalos, D. L., & Finney, S. J. (2001). Item parceling issues in structural equation modeling. In G.A. Marcoulides & R.E. Schumacker (Eds.), *Advanced structural equation modeling: New developments and techniques*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.
- Barroux, R. (2011). *Workplace stress: Western social ill spreads to developing world*. Retrieved from <http://www.worldcrunch.com/workplace-stress-western-social-ill-spreads-developing-world/2915>
- Boyd, C. M., Bakker, A. B., Pignata, S., Winefield, A.H., Gillespie, N., & Stough, C. (2011). A longitudinal test of the Job Demands–Resources model among Australian University academics. *Applied Psychology: An International Review, 60*, 112-140.
- Cartwright, S., & Boyes, R. F. (2000). Taking the pulse of executive health in the UK. *The Academy of Management Executive, 14*(2), 16-24.
- Cherniss, C. (1995). *Beyond burnout*. New York, NY: Routledge.

- Cholongitas, E., & Pipili, C. (2010). Impact of burnout syndrome on gastroesophageal reflux disease and irritable bowel syndrome in health care workers. *Journal of Clinical Psychiatry, 71*(2), 209-210.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (Rev.ed.). Orlando, FL: Academic Press.
- Cudeck, R., & Browne, M. W. (1993). Alternative ways of assessing model fit. In K.A. Bollen, & J. Scott Long (Eds.), *Testing structural equation models* (pp. 136-162). Newbury Park, CA: Sage.
- Danna, K. & Griffin, R. W. (1999). Health and wellbeing in the workplace: A review and synthesis of the literature. *Journal of Management, 25*, 357.
- De Lange, A. H., De Witte, H. & Notelaers, G. (2008). Should I stay or should I go? Examining longitudinal relations among job resources and work engagement for stayers versus movers. *Work & Stress, 22*(3), 201-223.
- De Lange, A. H., Taris, T. W., Kompier, M. J., Houtman, I.L.D., & Bongers, P. M. (2004). The relationships between work characteristics and mental health: Examining normal, reversed and reciprocal relationships in a 4-wave study. *Work & Stress, 18*(2), 149-166.
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The Job Demands-Resources model of burnout. *Journal of Applied Psychology, 86*, 499-512.
- Dubin, R. (1978). *Theory building*. New York: Free Press.
- DuBois, C. M., Beach, S. R., Kashdan, T. B., Nyer, M. B., Park, E. R., Celano, C. M., & Huffman, J. C. (2012). Positive psychological attributes and cardiac outcomes: Associations, mechanisms, and interventions. *Psychosomatics, 53*(4), 303-318.
- Dyck, D. (2001). The toxic workplace. *Benefits Canada, 25*(3), 52-53.
- Goldstein, M. S., Siegel, J. M., & Boyer, R. (1984). Predicting changes in perceived self-reported health status. *American Journal of Public Health, 74*, 611-614.
- Gorter, R. C., Eijkman, M. A. J., & Hoogstraten, J. (2000). Burnout and health among Dutch dentists. *European Journal of Oral Sciences, 108*, 261-267.
- Hakanen, J. J. (2002). Työuupumuksesta työn imuun—Positiivisen työhyvinvointikä sitteen ja—Menetelmän suomalaisen version validointi opetusalan organisaatioissa [From burnout to job engagement—Validation of the Finnish version of an instrument for measuring job engagement (UWES) in an educational organization]. *Työ ja ihminen, 16*, 42-58.

- Hakanen, J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *The Journal of School Psychology, 43*, 495–513.
- Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The job demands-resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress, 22*, 224–241.
- Halford, C., Anderzen, I., & Arnetz, B. (2003). Endocrine measures of stress and self-rated health: A longitudinal study. *Journal of Psychosomatic Research, 55*, 317–320.
- Hallman, T., Thomsson, H., Burell, G., Lisspers, J., & Setterlind, S. (2003). Stress, burnout and coping: Differences between women with coronary heart disease and healthy matched women. *Journal of Health Psychology, 8*, 433–445.
- Happel, B., Pinikahana, J., & Martin, T. (2003). Stress and burnout in forensic psychiatric nursing. *Stress and Health, 19*, 63–68.
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*(4), 408–420.
- Hoyle, R. H. (1995). The structural equation modeling approach: Basic concepts and fundamental issues. In R. H. Hoyle (Ed.), *Structural equation modeling, concepts, issues, and applications* (pp. 158–176). Thousand Oaks, CA: Sage.
- Huysamen, G. K. (2001). *Methodology for the social and behavioural sciences*. Cape Town, ZA: Oxford University Press.
- Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behaviour, 38*, 21–37.
- Kahill, S. (1988). Symptoms of professional burnout: A review of the empirical evidence. *Canadian Psychology, 29*, 284–297.
- Kenny, D.A. (2011). *SEM: Path Analysis*. Retrieved from <http://davidakenny.net/cm/pathanal.htm>
- Kitaoka-Higashiguchi, K., Morikawa, Y., Miura, K., Sakurai, M., Ishizaki, M., Kido, T., Naruse, Y., & Nakagawa, H. (2009). Burnout and risk factors for arteriosclerotic disease: Follow-up study. *Journal of Occupational Health, 51*, 123–131.
- Levene, H. (1960). Robust testes for equality of variances. In *Contributions to Probability and Statistics* (I. Olkin, ed.) 278–292. Palo Alto, CA: Stanford University Press.
- Lobato, D. (2008). *Post-Positivist Perspectives on Theory Development*. Retrieved from <http://davidlobato.wordpress.com/2008/09/14/chapter-3-post-positivist-perspectives-on-theory-development/>

- MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research*, *39*, 99–128.
- Marsh, H. W. (2007). Application of confirmatory factor analysis and structural equation modeling in sport/exercise psychology. In G. Tenenbaum & R.C. Eklund (Eds.), *Handbook of sport psychology* (3rd ed., pp. 774-798). New York, NY: Wiley.
- Marsh, H. W., Hau, K. T., & Grayson, D. (2005). Goodness of fit evaluation in structural equation modeling. In A. Maydeu-Olivares & J. McCardle (Eds.), *Psychometrics. A Festschrift to Roderick P. McDonald* (pp. 225-340). Mahwah, NJ: Lawrence Erlbaum Associates.
- Maslach, C. (1982). *Burnout-The cost of caring*. Englewood Cliffs, NJ: Spectrum.
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *Maslach Burnout Inventory manual*. Third edition. Palo Alto: CA Consulting Psychologists Press.
- McGrath, A., Reid, N., & Boore, J. (2003). Occupational stress in nursing. *International Journal of Nursing Studies*, *40*, 555-565.
- Melamed, S., Shirom, A., & Froom, P. (2003, March). *Burnout and risk of type 2 diabetes mellitus (DM) in Israeli workers*. Paper presented at the Work, Stress and Health Conference. Toronto, Ontario, Canada.
- Melamed, S., Shirom, A., Toker, S., & Shapira, I. (2006). Burnout and risk of type 2 diabetes: A prospective study of apparently healthy employed persons. *Psychosomatic Medicine*, *68*, 863-869.
- Muthén, B., du Toit, S. H. C., & Spisic, D. (1997). *Robust inference using weighted least squares and quadratic estimating equations in latent variable modeling with categorical and continuous outcomes*. Accepted for publication in *Psychometrika*.
- Muthén, L. K., & Muthén, B. O. (1998-2010). *Mplus User's Guide* (6th ed.). Muthén & Muthén, Los Angeles, CA.
- Newsom, J. (2012). *Practical approaches to dealing with nonnormal and categorical variables*. Retrieved from <http://www.upa.pdx.edu/IOA/newsom/semclass/>
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.
- Popper, K. (1963). *Conjectures and Refutations: The Growth of Scientific Knowledge*. London, UK: Routledge.

- Preacher, K. J., & Kelley, K. (2011). Effect sizes measures for mediation models: Quantitative strategies for communicating indirect effects. *Psychological Methods*, *16*(2), 93-115.
- Quick, J. C., Quick, J. D., Nelson, D. L., & Hurrell, J. J. J. (1997). Organizational Consequences of Stress. In *Preventive Stress Management in Organizations* (pp. 89-109). Washington, DC: American Psychological Association.
- Rothmann, S. & Rothmann, J. C. (2007). *The South African Employee Health and Wellness Survey (SAEHWS)*. User manual (4th ed.). Potchefstroom, ZA: Afriforté (Pty) Ltd.
- Rucker, D. D., Preacher, K. J., Tormala, Z. L. & Petty, R. E. (2011). Mediation analysis in social psychology: Current practices and new recommendations. *Social and Personality Psychology Compass*, *5*/6, 359-371.
- Safe Work Australia (2012). *The cost of work-related injury and illness for Australian employers, workers and the community*. Retrieved from <http://www.safeworkaustralia.gov.au/AboutSafeWorkAustralia/WhatWeDo/Statistics/Pages/Statistics.aspx>
- Schaufeli, W. B. (2003). Past Performance and Future Perspectives of Burnout Research. *South African Journal of Industrial Psychology*, *29*, 4, 1–15.
- Schaufeli, W. B. & Bakker, A. B. (2004). Job demands, job resources and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behaviour*, *25*, 293-315.
- Schaufeli, W. B. & Enzmann, D. (1998). *The burnout companion to study and practice: a critical analysis*. London, UK: Taylor & Francis.
- Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytical approach. *Journal of Happiness Studies*, *3*, 71-92.
- Schaufeli, W. B., & Taris, T. W. (2005). The conceptualization and measurement of burnout: Common ground and worlds apart. *Work and Stress*, *19*(3), 256–262.
- Selye, H. (1987). *Stress without Distress*. London, UK: Transworld.
- Shirom, A., Westman, M., Shamai, O., & Carel, R. F. (1997). Effects of work overload and burnout on cholesterol and triglycerides levels: The moderating effects of emotional reactivity among male and female employees. *Journal of Occupational Health Psychology*, *2*(4), 275-288.
- Smolkowski, K. (2007). *Correlated Errors in CFA and SEM Models*. Retrieved from http://homes.ori.org/~keiths/Files/Tips/Stats_SEMErrorCorrs.html

- Sobel, M. E. (1982). Asymptotic intervals for indirect effects in structural equations models. In S. Leinhardt (Ed.), *Sociological methodology* (pp. 290-312). San Francisco, CA: Jossey-Bass.
- SPSS Inc. (2011). *SPSS 19.0 for Windows*. Chicago, IL: SPSS Inc.
- Steyn, H. S. (1999). *Praktiese betekenisvolheid: Die gebruik van effekgroottes*. Wetenskaplike bydraes – Reeks B: Natuurwetenskappe Nr. 117. Potchefstroom: PU vir CHO.
- The People Element (2012). *R3bn lost to workplace stress in South Africa*. Retrieved from <http://www.thepeopleelement.co.za/component/weblinks/50-press/22-press-release-2>
- Toker, S., Shirom, A., Shapira, I., Berliner, S., & Melamed, S. (2005). The association between burnout, depression, anxiety, and inflammation biomarkers: C-reactive protein and fibrinogen in men and women. *Journal of Occupational health psychology, 10*(4), 344.
- Toll, M. (2012). *Post-Positivism and Social Science*. Retrieved from <http://dostoevskiansmiles.blogspot.com/2012/05/normal-0-false-false-false-en-au-x-none.html>
- Trochim, W. M. K. (2006). *Positivism & Post-Positivism*. Retrieved from <http://www.socialresearchmethods.net/kb/positvsm.php>
- Williams, J., & MacKinnon, D. P. (2008). Resampling and distribution of the product methods for testing indirect effects in complex models. *Structural Equation Modeling, 15*, 23–51.
- Wright, L. A. & Smye, M. D. (1996). *Corporate abuse: how lean and mean robs people and profits*. New York, NY: Macmillan.

CHAPTER 2

RESEARCH ARTICLE 1

A CONFIRMATORY INVESTIGATION OF A JD-R MODEL USING A CATEGORICAL ESTIMATOR¹

ABSTRACT

Orientation: The robustness of the JD-R model has been established, but mostly within a European context. However, no generically specified model has been tested in South Africa with data from a variety of economic sectors. Other studies allowed errors between burnout and engagement to correlate to improve model fit – a practice which elicits criticism.

Research purpose: To investigate a generic JD-R model in South African context, with alternative statistical methods and without correlating errors between burnout and engagement, in line with theoretical assumptions.

Research design, approach and method: A cross-sectional design was used. The dataset comprised of 15 633 participants aggregated from various sectors in South Africa. Structural equation modelling (SEM) analyses were implemented with a categorical estimator (WLSMV), and errors were also not allowed to correlate to increase model fit. Mediation analyses included bootstrapped indirect effects, and kappa-squared values were calculated to apply descriptive labels to mediation effect sizes.

Main motivation for the study: To establish a generic JD-R model for South African organisations that can be used in research and consulting. Researchers should also be made aware and use alternative methods and advancements in SEM and mediation analyses.

Main findings: The proposed model was a good fit to the sample. Burnout was found to mediate the relationship between job demands and ill health with a medium effect. Engagement was found to mediate the relationship between job resources and organisational commitment with a large effect.

Practical/managerial implications: A generic model is made available for researchers and organisations to consider as a basis for application in organisational work stress climate diagnoses.

Contribution/value added by this study: This study establishes a generic JD-R model with alternative methodology and provides descriptive mediation effect sizes for the dual process within South African context.

Keywords: job demands; job resources; job demands-resources model; dual process; structural equation modelling; categorical estimator; mediation

¹ A modified version of this article meeting the journal's editorial guidelines has been accepted for publication in *Psychological Reports*

INTRODUCTION

We are living in challenging times. Governments and businesses are dealing with recovering from the worst economic downturn the world has seen since the days of ‘The Great Depression’. It is therefore logical to assume, with the staggering amount of job losses and financial implications, that the toll on employees has been immense. It is as, if not more, important to focus on the health and work-related well-being of employees and businesses than ever before.

Toward work-related well-being models

Numerous models have been formulated in attempts to investigate and explain occupational stress, namely the Effort-Reward-Imbalance (ERI) model (Siegrist, 1996; Van Vegchel, de Jonge, Bosma, & Schaufeli, 2005), the Person-Environment Fit model (French, Kaplan, & Harrison, 1982) and the Demand-Control model (DCM) (Karasek, 1979).

The pinnacle of work-related well-being models in recent years is most probably the job demands-resources (JD-R) model of Demerouti, Bakker, Nachreiner, and Schaufeli (2001). The JD-R model proposes that the development of burnout due to work follows two processes: The first being the demanding aspects of work, i.e. high job demands, which lead to exhaustion; and the second that a lack of job resources leads to withdrawal behaviour or disengagement through the erosion of motivation.

Demerouti *et al.* (2001, p. 501), and Schaufeli and Bakker (2004, p. 296) refer to job demands as “those physical, psychological, social, or organisational aspects of the job that require sustained physical and psychological effort and are therefore associated with certain physiological and psychological costs”. Examples of job demands are *inter alia*: Workload, role conflict and role ambiguity (Wright & Hobfoll, 2004).

Demerouti *et al.* (2001) describe job resources as the organisational aspects of a job that are instrumental in achieving work goals and may also reduce job demands. Job resources include, *inter alia*, social support (supervisory and collegial), job enhancement opportunities (namely, increased power and autonomy), participation in decision-making processes, reinforcement contingencies (Burke & Richardsen, 1993), recognition of individual

contribution, opportunities for advancement and career growth, and financial/non-financial rewards (Rothmann, 2002). Specific job demands and job resources may differ among occupational groups (Bakker & Demerouti, 2007).

Bakker and Demerouti (2007) confirm that the JD-R model fits the tradition of the DCM and the ERI-models, as well as satisfying the demand for particularity by the inclusion of several types of job resources and demands, depending upon the work context under investigation. As a result, the JD-R model covers and extends both models and is considerably more rigorous and flexible. The JD-R model therefore has the capability to integrate a wide array of possible job demands and job resources (Demerouti *et al.*, 2001).

The Demand Induced Strain Compensation (DISC) model is another expansion of the JD-R model that is worth mentioning; the model suggests that the interactional effect of demands and resources should be noted when there is a match between the type of demands, resources and outcomes (De Jonge & Dormann, 2003). In other words, if there are high emotional demands, there should be sufficient emotional resources; inversely, if there are high emotional demands, but low emotional resources, poor well-being will result.

However, in the prediction of well-being job demands and job resources do not need to match to show moderating effects as has been argued by Bakker, Demerouti, Hakanen, and Xanthopoulou (2007). According to their findings, matching is not a precondition for buffering effects: “For example, their findings showed that emotional demands interacted with professional development (i.e. a cognitive type of resource) in predicting cynicism (i.e. a behavioural outcome)” (p. 781). This is also in line with other research (Bakker, Demerouti, & Euwema, 2005), and affirms theory of the JD-R model that by definition job resources can work as a buffer for any type of demand and outcome.

Burnout, work engagement and the dual process

Schaufeli and Enzmann (1998, p. 36) define burnout as “a persistent, negative, work-related state of mind in ‘normal individuals’ that is primarily characterised by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work.”

Burnout as a work-related phenomenon can be seen as comprised by two main components that form its core: Exhaustion and cynicism (Schaufeli, 2003; Schaufeli & Taris 2005). The former develops as a result of an imbalance in job demands and resources, which leads to feelings of exhaustion, and then cynicism develops – a set of negative, indifferent or overly detached attitudes (Schaufeli & Enzmann, 1998).

Schaufeli and Bakker (2004, p. 296) define work engagement as “a positive, fulfilling work-related state of mind that is characterised by vigour, dedication and absorption – that is strongly influenced by job resources”. Work engagement is said to develop as a result of vigour and dedication; and that absorption is a resultant effect of the former in ones work.

Previous research findings support two distinct psychological processes at work in the JD-R model, i.e. through job demands (related to burnout) and job resources (related to engagement), respectively, which eventually affect organisational outcomes such as health and turnover intention (Bakker & Demerouti, 2007; Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003; Schaufeli & Bakker, 2004). Bakker and Demerouti (2007, p. 315) subsequently presented what they coined the “dual process”.

The dual process assumes that there are two fundamental psychological processes whose influences are felt in job strain and motivation. These two theoretical processes can be respectively titled the “energetic process” and the “motivational process” (Schaufeli & Bakker, 2004, p. 296). In the energetic process, which is also called the health impairment process, job demands are associated with health problems through burnout. Moreover, the motivational process connects job resources with organisational outcomes through work engagement (Jackson, Rothmann, & Van de Vijver, 2006; Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008).

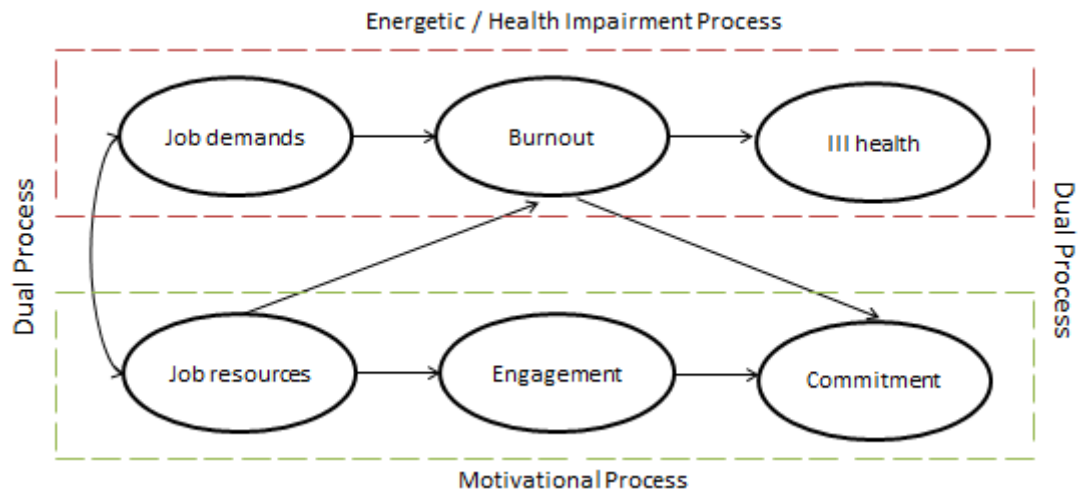


Figure 1. A JD-R model adapted from Hakanen, Bakker, and Schaufeli (2006).

Furthermore, the energetic process assumes that high job demands (without sufficient job resource buffering) could lead to fatigue and eventual burnout in workers. On the other hand, the motivational process assumes that job resources include a motivational potential. Therefore, it asserts that a lack of job resources will have an adverse effect on motivation, which could ultimately result in disengagement.

In a study by Xanthopoulou *et al.* (2007), job demands were indicated as the strongest predictors of burnout, and that the first concern of organisations should therefore be to avoid overwhelming job demands to prevent negative employee health outcomes. Also, as previously theorised and investigated, job resources have a negative relationship with burnout, and burnout is negatively related to commitment (cf. Hakanen, Bakker, & Schaufeli, 2006).

South African context

Work-related well-being research studies within the South African context have been limited to specific industries and sectors. These studies have included educators in the North West Province (Montgomery, Mostert, & Jackson, 2005; Jackson, Rothmann, & Van de Vijver, 2006), non-professional counsellors in South African banks (Fourie, Rothmann, & Van de Vijver, 2008), and police members in the North West Province (Mostert, Cronje, & Pienaar, 2006; Mostert & Joubert, 2005; Rothmann & Jorgensen, 2007). All of the afore-mentioned

studies found an adequate fit for a proposed model of employee well-being in their specific investigations.

Rothmann, Mostert, and Strydom (2006) performed a psychometric investigation into the job demands-resources scale (JD-RS, Rothmann & Jackson, 2005) within the South African context. In the study, five reliable factors were identified, namely overload, organisational support, job insecurity, advancement and growth opportunities. With the exception of organisational support, the other factors demonstrated satisfactory levels of equivalence for different organisations. In addition, statistically significant differences were established between the alleged resources and demands in diverse organisations (Rothmann *et al.*, 2006), also endorsing the idea that different organisations have different types of relevant job resources and demands (Bakker & Demerouti, 2007).

The present study

The research model that forms the basis of this study follows the basic premise of the dual process as in Hakanen *et al.* (2006), and Schaufeli and Bakker (2004). However, the job resources and job demands investigated differ as well as the items measuring the variables, as a different survey tool was used. The error terms between dependent variables were not forced to correlate as in previous studies of the JD-R model. According to Smolkowski (2007), some methodologies indicate that errors should never be allowed to correlate and that these methodologies hold that correlation of errors could cause problems with model interpretation and could reduce the likelihood of replication.

The proposed model of the current investigation is illustrated below (Figure 2).

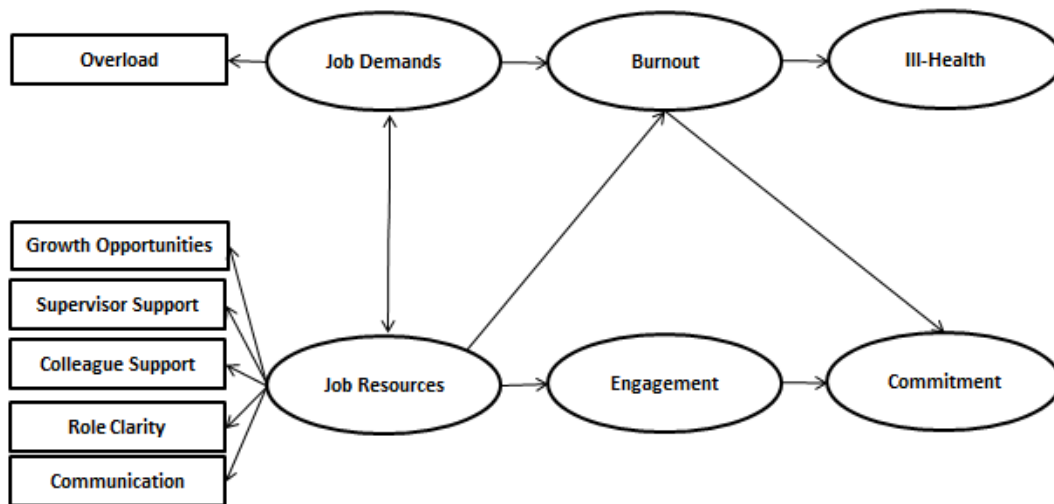


Figure 2. The research model of the current study.

The JD-R model is capable of including in itself various demands and resources (Demerouti *et al.*, 2001); it could therefore be adapted by researchers to fit the context under investigation, i.e. to specify any applicable demands and resources desired (Llorens, Bakker, Schaufeli, & Salanova, 2006). The current research aim was to investigate some demands and resources that could apply, generically, to most, if not all, organisations. Therefore, it was decided to only include ‘overload’ in the job demands variable. Emotional load was not included in job demands as it has been shown to be more prevalent in specific occupations, such as the teaching, nursing and healthcare sectors, but basically absent in others (cf. Bakker & Demerouti, 2007).

As to which job resources to include in JD-R research models, these decisions seem to be arbitrary; there appear to be no official rule sets. However, Bakker and Demerouti (2007) specify that job resources are located at the level of the *organisation at large*, the level of *interpersonal and social relations*, the level of *organisation of work*, and at the *task level*. Keeping in mind that any number of job resources could be specified in a model, this research included five resources – at least one resource from each of the aforementioned levels could be matched to these descriptions – which could apply to the generic organisation, namely supervisor support, colleague support (interpersonal and social relations), role clarity (organisation of work), growth opportunities (task level) and communication (organisation at large).

The broad aim of this study was therefore to investigate if a generic JD-R model, following the dual process theory, measured by a single self-report survey, could be found to fit a large South African sample and whether the various known paths can be confirmed and found to be significant within this context. This study investigated these questions and performed SEM analysis of the sample data collected and aggregated from the following sectors: Academic, call centre, government, manufacturing, mining and financial.

Therefore, this study tests the following hypotheses:

Hypothesis 1: A job demands-resources model adequately fits a large aggregated South African sample.

Hypothesis 2: The following paths are to be confirmed in the model:

- a) Job resources and job demands (i.e. work overload) are negatively related.
- b) Job resources are negatively related to burnout.
- c) Burnout is negatively related to organisational commitment.

Hypothesis 3: Burnout mediates the energetic process, i.e. the relationship between job demands and ill health.

Hypothesis 4: Work engagement mediates the motivational process, i.e. the relationship between job resources and commitment.

Potential value add of this study

Previous JD-R studies all implemented the maximum likelihood estimator which assumes continuous distributions and in psychological research most surveys gather categorical data. Item parcelling methods are also not used in this study as in previous studies. Additionally, errors are not forced to correlate between burnout and engagement (the dependent variables) as has been done in other JD-R studies. This study will therefore provide information on the suitability of a proposed generic job demands-resources model in a dataset that comprising various sectors within South African context. New methodologies are also applied which have not previous been applied in previous JD-R research, i.e. statistical categorical data analysis and mediation analyses. If successful, this study will establish a generic JD-R model that organisations and professionals could implement in investigations, which include job resources from all four levels as theorised by Bakker and Demerouti (2007). Finally, this study will establish mediation effect-sizes, with kappa-squared, for burnout and engagement.

RESEARCH DESIGN

Research approach

A survey design was used to achieve the research objective (Shaughnessy, Zechmeister, & Zechmeister, 2003). Several thousand individual cross-sectional surveys were conducted in various projects in different sectors and organisations between January 2008 and November 2010. Data from these surveys were aggregated to present the current sample ($n = 15\ 633$).

Research method

Participants

Individuals from various South African organisations were used. Employees of all ages and occupational levels, with the exception of the academic sector, where respondents were academic lecturers from different faculties, were sampled over a period of approximately three years as part of different employee health and well-being surveys.

Table 1

Characteristics of the participants (n = 15 663)

Item	Category	Frequency	Percentage (%)
Gender	Male	9697	61.90
	Female	5966	38.10
Age	<20	82	0.50
	20-29	4064	25.90
	30-39	4414	28.20
	40-49	4341	27.70
	50-59	2324	14.80
	>60	200	1.30
Race	African	4334	27.70
	White	5638	36.00
	Coloured	609	3.90
	Indian	395	2.50
	Other	12	0.10
Marital status	Single	4497	28.70
	Engaged	289	1.80
	Married	9761	62.30
	Divorced	955	6.10
	Widow	111	0.70

	Widower	50	0.30	
Home language	Afrikaans	5982	38.20	
	English	4652	29.70	
	Sepedi	504	3.20	
	Sesotho	1200	7.70	
	Setswana	849	5.40	
	Siswati	181	1.20	
	Tshivenda	112	0.70	
	isiZulu	1018	6.50	
	isiNdebele	100	0.60	
	isiXhosa	741	4.70	
	Xitsonga	202	1.30	
	Other	121	0.80	
	Highest qualification	Grade 8	2003	12.80
		Grade 9	119	0.80
Grade 10		679	4.30	
Grade 11		299	1.90	
Grade 12		7914	50.50	
3-year degree/diploma		2842	18.10	
4-year degree/diploma		1075	6.90	
Master's Degree		659	4.20	
Doctoral Degree		70	0.40	
Province	Gauteng	7390	47.20	
	Mpumalanga	2293	14.60	
	North West Province	3171	20.20	
	Limpopo	143	0.90	
	Free State	887	5.70	
	Northern Cape	74	0.50	
	Western Cape	691	4.40	
	Eastern Cape	343	2.20	
	KwaZulu-Natal	630	4.00	
Sector	Academic	94	0.60	
	Call centres	150	1.00	
	Financial	6371	40.70	
	Government	263	1.70	
	Manufacturing	3466	22.10	
	Mining	5197	33.20	
	Other	122	0.80	

This study was conducted among 15 663 employees, where 9 697 were male (62%) and 5 966 (38%) were female. Ages of participants varied from younger than 20 years up to older than 60, where the stratified levels between ages 20 and 49 were quite similar, i.e. ages 20 to 29 included 4 064 participants, 30 to 39 included 4 414 individuals, and 40 to 49 included 4 341 participants. There were 80 individuals (0.5%) younger than 20, and 200 (1.3%)

individuals whom were older than 60. The participants were mostly married (62%). Concerning education, all levels were captured, but Grade 12 (a formal high school education) was the most prevalent at 7 914 (50.5%), and those participants with a three-year degree/diploma numbered 2 842 (18.1%). The sector that made out the majority of the sample was the financial sector with 6 371 (41%) participants, followed by the mining (33%) and manufacturing (22%) sectors, respectively. The Gauteng province had the most respondents with a total of 7 390 (47.2%), which is to be expected as the Gauteng province is the economic heart of the country. Second to the Gauteng province was the North West Province with 3 171 respondents and the most under-represented province was the Northern Cape with 74 individuals (0.5%).

Measuring instrument

The *South African Employee Health and Wellness Survey* (SAEHWS) was developed as a web-based, or paper-and-pencil, self-administered survey to be applied in employee health and well-being assessments by the Research Unit of which the researchers form part. The SAEHWS consists of different sections collecting additional wellness, work, financial and health information from the respondents.

The SAEHWS fuses organisational climate assessment with other important variables influencing the climate, in order to achieve maximum management information while implementing one measurement/assessment only (Rothmann & Rothmann, 2007). The internal consistency of all the subscales of the SAEHWS is acceptable compared to the generally accepted guideline (i.e. $\alpha \geq 0.70$; Nunnally & Bernstein, 1994).

In line with Schaufeli and Taris (2005), *Burnout* was measured by two core components: exhaustion and mental distance (cynicism). Subsequently, the following subscales were measured for this study: *Exhaustion*: ($\alpha = 0.83$) by four items, e.g. ‘I feel tired before I arrive at work’; *Mental distance* (Cynicism): ($\alpha = 0.79$) by four items, e.g. ‘I have become less interested in my work’; *Overload as job demands*: ($\alpha = 0.79$) by four items, e.g. ‘Do you have too much work to do?’; *Supervisor support*: ($\alpha = 0.84$) by three items e.g. ‘Can you count on your direct supervisor when you come across difficulties in your work?’; *Colleague support*: ($\alpha = 0.74$) by three items, e.g. ‘Can you count on your colleagues when you come across difficulties in your work?’; *Role clarity*: ($\alpha = 0.70$) by three items, e.g. ‘Do you know

exactly what your responsibilities are?'; *Communication*: ($\alpha = 0.81$) by three items, e.g. 'Is it clear to you whom you should address within the department/organisation for specific problems?'; *Growth opportunities*: ($\alpha = 0.75$) by three items, e.g. 'Does your job offer you opportunities for personal growth and development?'; *Ill health*: ($\alpha = 0.90$) by eight items, e.g. 'Over the last three months how often have you experienced any of the following symptoms or changes in behaviour: Constant irritability'; *Commitment*: ($\alpha = 0.91$) by five items, e.g. 'I feel a strong sense of belonging to my organisation'; *Work engagement*: ($\alpha = 0.89$) by seven items (three vigour & four dedication items), e.g. 'I am full of energy in my work' (Vigour) and 'I find my work full of meaning and purpose' (Dedication).

Research procedure

This research was undertaken in collaboration with Afriforte (Pty) Ltd., the commercial arm of the WorkWell Research Unit, North-West University. Data was collected from 2008 to 2010 in various projects in the following sectors: Academic, call centres, financial, government, manufacturing, mining and other. The survey was mostly web-based and all participants received hyperlinks via e-mail. All the participants received a link to the survey via e-mail. Informed consent was obtained from all the participants. The system and connection was secured with the American Encryption Standard (AES) so that data could not be compromised even if illegally obtained. A booklet (pen and paper) version of the survey was also made available to participants who were not computer literate. The booklet version had exactly the same questions and scales as the online version. Data from the booklets were then captured and added to the database. Anonymity of all participants was guaranteed.

Statistical analyses

Structural equation modelling (SEM) methods, as implemented by Mplus 6.1 (Muthén & Muthén, 2008-2010), were used for data analyses. Mplus was chosen because of its unique ability to specify continuous and/or categorical latent variables in model investigations.

The maximum likelihood (ML) estimator assumes that observed variables are measured on a continuous scale. However, in the behavioural sciences, response variables are often non-continuous and psychological constructs are frequently measured on Likert scales. To test H1, we therefore used a *categorical estimator* in the SEM investigation based on the research

model (see Figure 2 above). The default estimator for models that contain *categorical data* is the mean and variance-adjusted weighted least-squares method, or abbreviated: WLSMV (Muthén, Du Toit, & Spisic, 1997; Muthén & Muthén, 2010). The input type was the covariance matrix. Item parcelling methods were also not used (Bandalos & Finney, 2001). The items were used to create latent variables in the measurement model and higher order latent variables were then created, e.g. job resources.

As mentioned previously, the correlation of error terms between dependent variables *would not be allowed* in this investigation to improve model fit. Subsequently, the following fit indices were considered: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). For the CFI and TLI, acceptable fit is considered at a value of 0.90 and above (Hoyle, 1995). According to Cudeck and Browne (1993), for the RMSEA, a value of 0.05 or less indicates a good fit, but values of 0.08 and less are also to be considered as acceptable model fit. However, the above cut-off points should only be considered as rough guidelines – see Marsh (2007), and Marsh, Hau, and Grayson (2005) for more concerning the latter. To investigate the paths of H2, results from the SEM analysis of H1 were used. Furthermore, the standardised path coefficient sizes and their significance were considered and reported.

Rucker, Preacher, Tormala, and Petty (2011, p. 359) advocate that attention in mediation analysis ‘should be shifted towards the magnitude and significance of indirect effects’. Therefore, to investigate the significance of H3 and H4’s indirect effects, the *model indirect* function of Mplus was used with the Bootstrapping re-sampling option enabled and set to 2000 draws; typically this value is set to at least 1000 draws (Hayes, 2009); bias-corrected 95% confidence intervals were also reported (Shrout & Bolger, 2002). Bootstrapping was chosen as it is the more statistically valid and powerful option (MacKinnon, Lockwood, & Williams, 2004; Williams & MacKinnon, 2008), as opposed to the more frequently used methods (i.e. ‘Baron and Kenny’; ‘Sobel test’). See Hayes (2009) for an in-depth discussion of the afore-mentioned matters.

Furthermore, in line with suggestions from Preacher and Kelley (2011), κ^2 (kappa-squared) values were calculated to assist in establishing a basis to help communicate the magnitude of the mediating effect sizes. Preacher and Kelley (2011) suggested and developed easy-to-use R-functions to assist in calculating effect sizes, with the MBESS (Kelley & Lai, 2010;

Kelley, 2007a, 2007b) R-package (R Development Core Team, 2010). However, calculations with latent variables were not yet possible. Due to this specific limitation and current limitations of other statistical software packages in this regard, our κ^2 values had to be calculated ‘by hand’. Subsequently, it was decided to use a newly created public online calculator to calculate κ^2 values – see Rothmann, Jr. (2011) for more information.

RESULTS

To test the hypotheses, a strictly confirmatory scenario of the proposed JD-R model was investigated. The research model was specified, as well as all variables, as *categorical* in Mplus, and the model was found to fit the data acceptably. The CFI (0.92) and TLI (0.92) surpassed the rule of thumb of 0.90 for an indication of good model fit (Hoyle, 1995). Furthermore, the RMSEA value of 0.06 is below the guideline of 0.08, which confirms an acceptable model fit (Cudeck & Browne, 1993). H1 is therefore supported (see Table 2).

Table 2

Results of the SEM analysis (n = 15 633)

Description	χ^2	df	CFI	TLI	RMSEA	p-Value
Measurement model	40942.96	1012	0.95	0.94	0.05	0.00
Structural (research) model	61721.99	1020	0.92	0.92	0.06	0.00

Notes: χ^2 = Chi-square; df = Degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; $p < .001$

As mentioned previously, no errors were allowed to correlate between dependent variables in an attempt to increase model fit, as has been done in past studies. Table 3 shows the correlation statistics of the latent variables in the total sample.

Table 3

Correlation matrix (r) of the latent variables (n = 15 633)

Variable name	r											
	1	2	3	4	5	6	7	8	9	10	11	
1. Job demands	-											
2. Growth opportunity	-0.13	-										
3. Supervisor support	-0.12	0.56	-									
4. Colleague support	-0.10	0.47	0.46	-								
5. Role clarity	-0.13	0.58	0.57	0.48	-							

Table 3 continued.

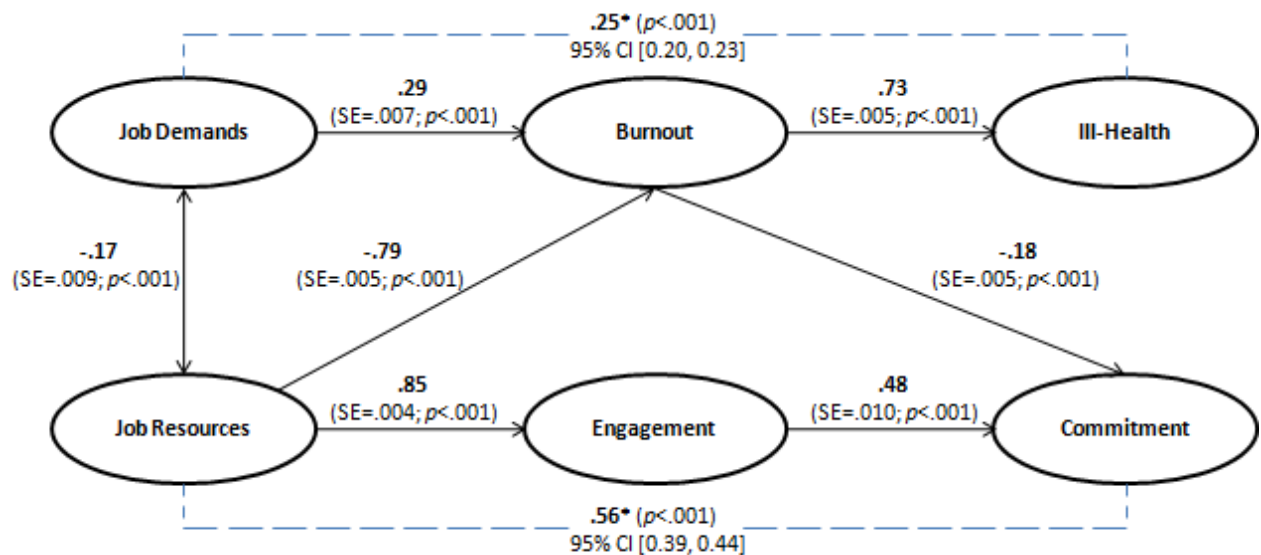
Correlation matrix (*r*) of the latent variables (*n* = 15 633)

6. Communication	-0.12	0.55	0.54	0.45	0.56	-					
7. Job resources	-0.17	0.76	0.75	0.62	0.77	0.72	-				
8. Burnout	0.42	-0.63	-0.62	-0.52	-0.64	-0.60	-0.83	-			
9. Engagement	-0.14	0.65	0.64	0.53	0.66	0.62	0.85	-0.71	-		
10. Ill-health	0.31	-0.46	-0.45	-0.38	-0.47	-0.44	-0.61	0.73	-0.52	-	
11. Commitment	-0.14	0.42	0.42	0.35	0.43	0.40	0.56	-0.52	0.61	-0.38	-

Note: $p < 0.01$ for all values

As seen in the correlation table, there is a negative correlation between all the measured job resources (growth opportunities, supervisor and colleague support, role clarity and communication) and the indicator of job demands (overload). Moreover, job demands correlated positively with both burnout and ill health. Also, engagement and commitment correlated negatively with demands.

The path diagram for the research model is illustrated below in Figure 3.



Notes: $\chi^2 = 61721.99$; CFI = .92; TLI = .92; RMSEA = .06; * = Indirect effect with bootstrapped 95% Confidence intervals.

Figure 3. The research model with standardised path coefficients and indirect effects.

The results indicated the following regarding the paths investigated in H2 (see Figure 3). Hypothesis 2a showed that a negative relationship exists between job demands and job resources ($\beta = -0.17$), which is statistically significant ($p < .001$). Hypothesis 2b was supported, i.e. the negative relationship between job resources and burnout was significant ($\beta = -0.79$; $p < .001$). Furthermore, the negative relationship between burnout and organisational

commitment (Hypothesis 2c) was also supported ($\beta = -0.18$; $p < .001$). Other significant considerations were the energetic and motivational processes. For the energetic process: job demands to burnout ($\beta = 0.29$; $p < .001$) and burnout to ill health ($\beta = 0.73$; $p < .001$). Then, the motivational process: job resources to engagement ($\beta = 0.85$; $p < .001$) and engagement to commitment ($\beta = 0.48$; $p < .001$).

H3 was supported: Burnout was confirmed to be a mediator between the relationship of job demands and ill health with an indirect effect of 0.25 ($p < .001$; 95% CI [0.20, 0.23]). Similarly, H4 was supported, i.e. engagement mediates the relationship between job resources and commitment with an indirect effect of 0.56 ($p < .001$; 95% CI [0.39, 0.44]).

Although hesitant to attach qualitative labels to quantitative values, Preacher and Kelley (2011) suggest that it makes sense to interpret κ^2 values in the same light as squared correlation coefficients, i.e. with the guidelines of Cohen (1988), where small, medium and large effect sizes are stated as 0.01, 0.09 and 0.25, respectively (pp. 79–81). The κ^2 value for the mediating effect of engagement between job resources and commitment was calculated to be $\kappa^2 = 0.26$ (a large effect), and a value of $\kappa^2 = 0.23$ (a medium effect, bordering large) was calculated for the mediating effect of burnout between job demands and ill health.

DISCUSSION

The current study investigated a strictly confirmatory scenario of a job demands-resources (JD-R) model (Bakker *et al.*, 2003; Demerouti *et al.*, 2001; Hakanen *et al.* 2006; Schaufeli & Bakker, 2004), specifically following the premise of the dual process theory; whether it can be found to apply to the South African context by fitting a large sample aggregated from different sectors. The results of the categorical SEM analysis confirmed hypothesis (H1); the research model showed a good fit. To our knowledge, this was the first study to use Mplus and/or a categorical estimator (i.e. WLSMV) in research investigating a JD-R model. This presents a unique contribution to the existing literature, in that it also establishes a JD-R model with this estimator, which is used in categorical data investigations. Previous studies have implemented only the maximum likelihood (ML) estimator.

The various path relationships were all confirmed, as expected, and found to be similar to paths in other research on the JD-R model (cf. Bakker & Demerouti, 2007; Demerouti *et al.*

2001; Hakanen *et al.*, 2006; Schaufeli & Bakker, 2004). However, path coefficient sizes varied from these other studies, which is to be expected. The clearest of the relationships to emerge from *this* study were the negative relationship between job resources and burnout, and the positive relationship between job resources and engagement. The relationship between burnout and ill health is also confirmed here. As in Schaufeli and Bakker (2004) and Hakanen *et al.* (2006), the buffering effect between job resources and job demands was confirmed; however, in this study, the effect was smaller.

Furthermore, in line with suggestions from Rucker *et al.* (2011) and Preacher and Kelley (2011), the mediating effects of both burnout and engagement were confirmed, and their respective effect sizes from *this* study can be qualitatively reported as: a ‘medium effect’ (burnout) and a ‘large effect’ (engagement). Other studies have also found evidence for these mediating effects (cf. Hakanen *et al.*, 2006; Llorens *et al.*, 2006; Schaufeli & Bakker, 2004). This, taken in consideration with the former, provides evidence for the dual process within the South African context.

Consequently, an interesting finding of this study is that the motivational process is more pronounced than the energetic process. This is contrary to the findings of other studies (Hakanen *et al.*, 2006; Schaufeli & Bakker, 2004) where the energetic process was more pronounced. There are many reasons that could be postulated for this, one being that of different contexts under investigation. In European context job demands, i.e. overload, might be more of a concern than the availability of job resources, whereas within the South African context, there might be more of a focus on job resources. A focus on job resources could therefore lead to enhanced engagement and reduced burnout levels, resulting in more favourable health and organisational outcomes. This should, however, not detract from the suggestion of Xanthopoulou *et al.* (2007) that reducing overwhelming levels of job demands to obviate health impairment should also be a focus.

Limitations and recommendations for future research

The most apparent limitation of this study is its cross-sectional design; it is therefore generally advised that causality should not be inferred. However, some research studies have tested the JD-R model longitudinally and found favourable results; see Hakanen, Schaufeli, and Ahola (2008) and Boyd *et al.* (2011). Such a longitudinal investigation should also be

performed within the South African context. The afore-mentioned longitudinal investigation should also be attempted with a categorical estimator.

A further limitation of this study is that it made use of self-reports that were conducted either by pen-and-paper or computerised design, which evokes the possibility of common method variance or systematic bias. It is advised that future studies aim to gather objective data in conjunction with the self-report survey, such as: absenteeism, leave days, work performance and information on physical health status or medical aid claim or expenditure data. Therefore, prospective studies could also investigate the predictive ability of this model with regard to objective physical ill health conditions or self-reported stress-related symptoms.

Future studies should also focus on equivalence testing of this model; specifically pertaining to factors such as gender, sector and language group.

Recommendations for management

Management can investigate the job demands-resources model in their work contexts via well-designed surveys or questionnaires, and then ascertain the work stress climate in their organisations. The results would indicate the state of employee well-being, namely which demands and which resources (or lack thereof) play the major roles. Industrial and organisational psychologists or similar professionals within the organisation could devise interventions based on the results to rectify any imbalances and as such address the job demands and resources in attempts to increase engagement and decrease burnout in order to avoid psychological and physical ill health outcomes. Furthermore, management could build on the positives in the organisational climate, i.e., those job resources that are working well, and optimize those to reduce strain and promote engagement and eventual positive organisational outcomes such as commitment.

REFERENCES

- Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology*, 22, 309–328.
- Bakker, A. B., Demerouti, E., & Euwema, M. C. (2005). Job resources buffer the impact of job demands on burnout. *Journal of Occupational Health Psychology*, 10(2), 170–180.
- Bakker, A. B., Demerouti, E., Taris, T., Schaufeli, W. B., & Schreurs, P. (2003). A multi-group analysis of the job demands-resources model in four home care organizations. *International Journal of Stress Management*, 10, 16–38.
- Bakker, A. B., Hakanen, J. J., Demerouti, E., & Xanthopoulou, D. (2007). Job resources boost work engagement particularly when job demands are high. *Journal of Educational Psychology*, 99, 274–284.
- Bandalos, D. L., & Finney, S. J. (2001). Item parceling issues in structural equation modeling. In G. A. Marcoulides & R. E. Schumacker (Eds.), *Advanced structural equation modeling: New developments and techniques*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Boyd, C. M., Bakker, A. B., Pignata, S., Winefield, A. H., Gillespie, N., & Stough, C. (2011). A longitudinal test of the job demands-resources model among Australian university academics. *Applied Psychology: An International Review*, 60, 112–140.
- Burke, R. J., & Richardsen, A. M. (1993) *Psychological burnout in organizations. Handbook of organizational behaviour* (pp. 263–299). New York, NY: Marcel Dekker.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New York, NY: Academic Press.
- Cudeck, R., & Browne, M. W. (1993). Alternative ways of assessing model fit. In K.A. Bollen, & J. Scott Long (Eds.), *Testing structural equation models* (pp. 136-162). Newbury Park, CA: Sage.
- De Jonge, J., & Dormann, C. (2003). The DISC Model: Demand-Induced Strain Compensation Mechanisms in Job Stress. In: M.F. Dollard, A.H. Winefield, & H.R. Winefield (Eds.), *Occupational Stress in the Service Professions* (pp. 43–74). London: Taylor & Francis.
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86, 499–512.

- French, J. R. P., Jr., Kaplan, R. D., & Harrison, R. V. (1982). *The mechanisms of job stress and strain*. Chichester, UK: Wiley.
- Fourie, L., Rothmann, S., & Van de Vijver, A. J. R. (2008). A model of work wellness for non-professional counsellors in South Africa. *Stress and Health, 24*(1), 35–47.
- Hakanen, J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *The Journal of School Psychology, 43*, 495–513.
- Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The job demands-resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress, 22*, 224–241.
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*(4), 408–420.
- Hoyle, R. H. (1995). The structural equation modeling approach: Basic concepts and fundamental issues. In R.H. Hoyle (Ed.), *Structural equation modeling, concepts, issues, and applications* (pp. 158-176). Thousand Oaks, CA: Sage.
- Jackson, L. T. B., Rothmann, S., & Van De Vijver, A. J. R. (2006). A model of work-related well-being for educators in South Africa. *Stress and Health, 22*, 263–274.
- Jackson, L. T. B., & Rothmann, S. (2005). Work-related well-being of teachers in a district of the North West Province. *Perspectives in Education, 23*(3), 107–122.
- Karasek, R. A. (1979). Job demand, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24*(2), 285–308.
- Karasek, R. A., & Theorell, T. (1990). *Healthy work: Stress, productivity, and the reconstruction of working life*. New York, NY: Basic Books.
- Kelley, K. (2007a). Confidence intervals for standardized effect sizes: Theory, application, and implementation. *Journal of Statistical Software, 20*, 1–24.
- Kelley, K. (2007b). Methods for the behavioral, educational, and social sciences: An R package. *Behavior Research Methods, 39*, 979–984.
- Kelley, K., & Lai, K. (2010). MBESS (Version 3.2.0) [Computer software and manual]. Retrieved from <http://www.cran.r-project.org/>
- Llorens, S., Bakker, A. B., Schaufeli, W., & Salanova, M. (2006). Testing the robustness of the job demands-resources model. *International Journal of Stress Management, 13*, 378–391.
- MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research, 39*, 99–128.

- Manderbacka, K., Lahelma, E., & Martikainen, P. (1998). Examining the continuity of self-rated health. *International Journal of Epidemiology*, 27, 208–213.
- Marsh, H. W. (2007). Application of confirmatory factor analysis and structural equation modeling in sport/exercise psychology. In G. Tenenbaum & R.C. Eklund (Eds.), *Handbook of sport psychology* (3rd ed., pp. 774–798). New York, NY: Wiley.
- Marsh, H. W., Hau, K. T., & Grayson, D. (2005). Goodness of Fit Evaluation in Structural Equation Modeling. In A. Maydeu-Olivares & J. McCardle (Eds.), *Psychometrics* (pp. 225-340). A Festschrift to Roderick P. McDonald. Hillsdale, NJ: Erlbaum.
- Maslach, C. (1982). *Burnout-The cost of caring*. Englewood Cliffs, NJ: Spectrum.
- Montgomery, A., Mostert, K., & Jackson, L. (2005). Burnout and health of primary school educators in the North West Province. *South African Journal of Education*, 25(4), 266–272.
- Mostert, K., Cronje, S., & Pienaar, J. (2006). Job resources, work engagement and the mediating role of positive work-home interaction of police officers in the North West Province. *Acta Criminologica*, 19(3), 64–87.
- Mostert, K., & Joubert, A. F. (2005). Job stress, burnout and coping strategies in the South African Police Service. *South African Journal of Economic and Management Sciences*, 8(1), 39–53.
- Muthén, B., du Toit, S. H. C., & Spisic, D. (1997). *Robust inference using weighted least squares and quadratic estimating equations in latent variable modeling with categorical and continuous outcomes*. Accepted for publication in *Psychometrika*.
- Muthén, L. K., & Muthén, B. O. (2010). *Mplus User's Guide* (6th ed.). Los Angeles, CA: Muthén & Muthén.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.
- Preacher, K. J., & Kelley, K. (2011). Effect sizes measures for mediation models: Quantitative strategies for communicating indirect effects. *Psychological Methods*, 16(2), 93–115.
- R Development Core Team. (2010). *R: A language and environment for statistical computing*. Vienna, Austria: Author.
- Rothmann, S. (2002). *Burnout and engagement: A fortigenic perspective*. Inaugural lecture presented at the North-West University, Potchefstroom.
- Rothmann, S., Jr. (2011). *Kappa-squared: Mediation effect size*. Retrieved from <http://stats.myresearchsurvey.com/kappasquared/>

- Rothmann, S., & Jorgensen, L. (2007). A model of work-related well-being for police members in the North West Province. *Acta Criminologia*, 20(4), 73–84.
- Rothmann, S., Mostert, K., & Strydom, M. (2006). A psychometric evaluation of the job demands-resources scale in South Africa. *South African Journal of Industrial Psychology*, 2006, 32(4), 76–86.
- Rothmann, S., & Rothmann, J. C. (2007). *The South African Employee Health and Wellness Survey (SAEHWS)*. User manual (4th ed.). Potchefstroom, ZA: Afriforte.
- Rucker, D. D., Preacher, K. J., Tormala, Z. L., & Petty, R. E. (2011). Mediation analysis in social psychology: Current practices and new recommendations. *Social and Personality Psychology Compass*, 5/6, 359–371.
- Schaufeli, W. B. (2003). Past performance and future perspectives of burnout research. *South African Journal of Industrial Psychology*, 29(4), 1–15.
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behaviour*, 25, 293–315.
- Schaufeli, W. B., & Enzmann, D. (1998). *The burnout companion to study and practice: a critical analysis*. London, UK: Taylor & Francis.
- Schaufeli, W. B., & Taris, T. W. (2005). The conceptualization and measurement of burnout: Common ground and worlds apart. *Work and Stress*, 19(3), 256–262.
- Shaughnessy, J. J., Zechmeister, E. B., & Zechmeister, J. S. (2003). *Research methods in psychology*. (6th ed.). New York, NY: McGraw-Hill.
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, 7, 422–445.
- Siegrist, J. (1996). Adverse health effects of high effort - low reward conditions at work. *Journal of Occupational Health Psychology*, 1, 27–43.
- Smolkowski, K. (2007). *Correlated errors in CFA and SEM models*. Retrieved from http://homes.ori.org/~keiths/Files/Tips/Stats_SEMErrorCorrs.html
- Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationship between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & Stress*, 22(3), 277–294.
- Van Vegchel, N., de Jonge, J., Bosma, H., & Schaufeli, W. B. (2005). Reviewing the effort-reward imbalance model: Drawing up the balance of 45 empirical studies. *Social Science and Medicine*, 60(5), 1117–1131.

- Williams, J., & MacKinnon, D. P. (2008). Resampling and distribution of the product methods for testing indirect effects in complex models. *Structural Equation Modeling, 15*, 23–51.
- Xanthopoulou, D., Bakker, A. B., Dollard, M. F., Demerouti, E., Schaufeli, W. B., Taris, T. W., & Schreurs, P. J. G. (2007). When do job demands particularly predict burnout? The moderating role of job resources. *Journal of Managerial Psychology, 22*(8), 766–786.

CHAPTER 3

RESEARCH ARTICLE 2

INVESTIGATING THE REVERSED CAUSALITY OF ENGAGEMENT AND BURNOUT IN JOB DEMANDS-RESOURCES THEORY²

ABSTRACT

Orientation: Reversed causality is an area that has not commanded major attention within South African context, specifically pertaining to engagement, burnout and job demands-resources. Therefore, an investigation is necessitated to elucidate the potential effects.

Research purpose: To investigate the reversed causal relationships of burnout and engagement in job demands-resources theory over time.

Motivation for the study: Organisations and researchers should be made aware of the effects that burnout and engagement could have over time on resources and demands.

Research design, approach and method: A longitudinal design was employed. The availability sample ($n = 593$) included participants from different demographic backgrounds. A survey was used to measure all constructs at both points in time. Structural equation modelling techniques were implemented with a categorical estimator to investigate the proposed hypotheses.

Main findings: Burnout was found to have a significant negative longitudinal relationship with colleague support and supervisor support, while the negative relationship with supervisor support over time was more prominent. Engagement showed only one significant, but small, negative relationship with supervisor support over time. All other relationships were statistically non-significant.

Practical/managerial implications: This study makes organisations aware of the relationship between burnout and relationships at work over time. Proactive measures to promote relationships at work, specifically supervisor support, should be considered in addition to combatting burnout itself, and also promoting engagement.

Contribution/value added by this study: This study provides insights and information on reversed causality, i.e. the effects that engagement and burnout can have over time.

Keywords: work engagement, burnout, reversed causality, job resources, overload.

² This article has been accepted for publication in *South African Journal of Industrial Psychology*

INTRODUCTION

The job demands-resources (JD-R) model is supported over various occupations by empirical studies (Bakker, Demerouti, De Boer, & Schaufeli, 2003; Bakker, Demerouti, & Schaufeli, 2003; Bakker & Geurts, 2004; Lewig, Xanthopoulou, Bakker, Dollard, & Metzger, 2007). The dual process underlying the JD-R model consists of two main parts: The *energetic process*, also known as the *health impairment process*, indicates that chronic job demands (i.e. work overload) lead to burnout and eventual ill health; and the *motivational process* indicates that job resources lead to work engagement and that in turn leads to organisational commitment (Bakker, Demerouti, & Schaufeli, 2003; Schaufeli & Bakker, 2004). De Beer (2012) has also confirmed a JD-R model in a sample aggregated from a variety of sectors in South Africa, which included the mediating effects of burnout and work engagement in their respective roles in the dual process. Moreover, recent research studies have also tested the JD-R model longitudinally and found favourable results (cf. Boyd *et al.*, 2011; Hakanen, Schaufeli, & Ahola, 2008; Schaufeli, Bakker, & Van Rhenen, 2009).

In the past, work-related well-being research has mainly focused on normal causal relationships, i.e. hypotheses that investigate the relationship of variable A with variable B, in both cross-sectional and longitudinal studies. For example, in JD-R theory, a normal causal relationship would include job demands and its direct path to burnout; therefore, high job demands lead to burnout (Bakker & Demerouti, 2007; Hakanen, Bakker, & Schaufeli, 2006; Schaufeli & Bakker, 2004). On the other hand, studies that investigate reversed effects or reversed hypotheses have been more limited, i.e. research involving the endogenous variable causing, either directly or indirectly, one of its causes (Kenny, 2011). Drawing again from JD-R theory, an example of a reversed causal longitudinal investigation or reversed causal hypothesis would be investigating initial burnout (the original outcome of high job demands) having a causal relationship with subsequent job demands (the original hypothesised cause of burnout).

Defining engagement and burnout

Work *engagement* is defined as a “positive, work-related state of mind in employees characterised by *vigour*, *dedication*, and *absorption*” (Schaufeli, Salanova, Gonzalez-Roma,

& Bakker, 2002, p. 74). The core components of engagement are considered to be vigour and dedication (Schaufeli & Bakker, 2004). But absorption, which is more related to the concept of 'flow' (Csikszentmihalyi, 1990), can be seen as resultant of being engaged at work (cf. Langelan, 2007).

Recent research has found that engaged employees care for their own engagement by shaping their work environments, thereby not only making full use of their job resources, but also *creating* their own resources to remain engaged (Bakker, Demerouti, & Xanthopoulou, 2011). Furthermore, engagement has been shown to mediate the effect between job resources and organisational commitment (Bakker & Demerouti, 2007), and in South African data, with a large effect (De Beer, 2012). Therefore, engagement leads to more productive and committed employees in the organisation, given sufficient job resources.

In contrast, Schaufeli and Enzmann (1998, p. 36) define *burnout* as “a persistent, negative, work-related state of mind in ‘normal individuals’ that is primarily characterized by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work”. As discussed in Schaufeli and Taris (2005), and Schaufeli (2003), burnout as a work-related phenomenon can be seen as comprised of two main components that form its core: *Exhaustion* and *cynicism*. The first, exhaustion, can be characterised by a lack of energy (mental and emotional) and therefore inability. Exhaustion represents an energy-depleting process (Moore, 2000a; 2000b), and occurs when employees feel that they no longer have the resources required to deal with their work demands. Furthermore, exhaustion has been connected with; *inter alia*, the following symptoms: low energy, feelings of restlessness and difficulty to concentrate (Weiss, 1983). The second component of burnout, cynicism, can be characterised by a lack of motivation, unwillingness and mental distancing. The Maslach Burnout Inventory manual (Maslach, Jackson, & Leiter, 1996) explains cynicism as characteristic of having a distant or indifferent attitude towards one's work. Moreover, it has also been argued that cynicism develops in *response* to exhaustion (Leiter, 1993; Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008).

Work-related stressful experiences may contribute to depression and may also contribute to psychological disorders, but differ from occupation to occupation (Tennant, 2001). Distress, without sufficient coping mechanisms or buffers, leads to burnout (Alsoofi, Al-Heeti, &

Alwashli, 2000). It is therefore reasonable to assume that burnout can predict decreases in perceived health status as it reflects a process of degenerating energetic resources (Shirom, 2009).

Moreover, research has also found evidence for links between burnout and various objective health conditions, such as cholesterol (Shirom, Westman, Shamai, & Carel, 1997), cardiovascular diseases (Melamed, Shirom, Toker, Berliner, & Shapira, 2006), diabetes (Melamed, Shirom, Toker, & Shapira, 2006), musculoskeletal problems (Armon, Melamed, Shirom, Berliner, & Shapira, 2010) and also insomnia (Armon, 2009).

Job demands and job resources

Job demands are strongly associated with burnout and eventual ill health outcomes through what has been coined the health impairment process (Bakker & Demerouti, 2008; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2005; Schaufeli & Salanova, 2007).

In contrast, job resources are strongly associated with engagement and are defined as “those physical, psychological, social, or organisational aspects of the work context that (1) can reduce the health-impairment effect of job demands, (2) are functional in achieving work goals, and (3) stimulate personal growth, development and learning” (Schaufeli & Bakker, 2004, p. 296). “Engaged employees have a sense of energetic and effective connection with their work activities and they see themselves as capable of dealing with the demands of their job” (Schaufeli, Bakker, & Salanova, 2006, p. 702). De Beer (2012) found that engagement was positively associated with organisational commitment.

In a study of primary school educators in the North West Province of South Africa, it was found that if high job demands are experienced without sufficient job resources to cope with these demands, burnout will develop, which in turn could result in physical and/or psychological ill health (Montgomery, Mostert, & Jackson, 2005). This finding, of course, is again a description of the health impairment process in the JD-R model and Hakanen, Bakker, and Schaufeli (2006) also substantiates this finding.

Reversed causal research

According to Kenny (2011), reversed causation can be explained where the endogenous variable causes, either directly or indirectly, the exogenous variable. An example of this would be burnout (endogenous) having a causal relationship with job demands (exogenous), as opposed to the normal causation that is theorised: chronic job demands leading to burnout (Hakanen, Bakker, & Schaufeli, 2006; Schaufeli & Bakker, 2004).

Most of the studies concerning the JD-R model have been one-directional in their assumptions concerning the relationship between burnout, engagement, job demands and job resources. However, within the context of the complex psychosocial work environment, an increasing amount of research suggests that the one-directionality of models alone may be inadequate to explain the dynamics of work stress and mental well-being (Bakker & Demerouti, 2007; De Lange, Taris, Kompier, Houtman, & Bongers, 2005; Frese, Garst, & Fay, 2007; Hakanen, Schaufeli, & Ahola, 2008), suggesting an investigation into the reversed causal hypotheses is necessary.

Two hypotheses have been set forth to explain the occurrence of reversed causation processes. The first is the *perceptual* hypothesis, which holds that an individual's perception of job conditions may be changed, over time, due to increasing strain or commitment; even though working conditions themselves have not changed. In the dual process commitment is a positive outcome of engagement, and burnout is negatively related to commitment. Therefore, due to the presence of resources, committed employees could perceive their job conditions more favourably (the motivational process). On the other hand, the *selection or drift* hypothesis argues that the opposite or reverse of the perceptual hypothesis can also occur, i.e. increased levels of strain might cause employees to perform worse as a result of the impairment and therefore drift into jobs and situations with more demands and fewer resources (cf. De Lange, 2004).

Bakker and Schaufeli (2007) hypothesised that job stress and motivation can both be predictors and outcomes of job demands and job resources. Furthermore, their explanation for why this could occur coincides with the above-mentioned drift and perceptual hypotheses. De Lange, De Witte, and Notelaers (2008) investigated longitudinal relationships among job resources and work engagement that included reversed causal hypotheses and found that

work engagement had a small positive reversed causal relationship with social support (colleague and supervisory).

The present study

In the current study, the aim was to investigate, longitudinally, the hypothesised reversed relationship of burnout and work engagement, with job demands and job resources over time.

The JD-R model does not require a matching of the job demands with the job resources in its specification as is needed in the Demand Induced Strain Compensation (DISC) model (cf. Bakker, Hakanen, Demerouti, & Xanthopoulou, 2007; De Jonge & Dormann, 2003). Demerouti *et al.* (2001, p. 21) describe the *chronic job demands* of the energetic/health impairment process in the JD-R model as *work overload*. In the present study also, the indicator used for job demands was work overload – containing quantitative (mental) load, and pace and amount of work items. Emotional load was not included as it has been shown to be more prevalent in specific occupations, such as teaching, nursing and healthcare sectors, but basically absent in others (cf. Bakker & Demerouti, 2007). Furthermore, work overload is used in conformity with the results of De Beer (2012), who successfully tested and confirmed a JD-R model with the same survey used in this study applied to a large and diverse South African sample aggregated from various sectors; including the one under investigation in the present study, i.e. the mining sector.

Bakker and Demerouti (2007) specify that job resources are located at the level of the organisation at large, the level of interpersonal and social relations, the level of organisation of work, and at the task level. This research included at least one of the resources from each of the formerly indicated levels – namely supervisor support and colleague support (interpersonal and social relations), role clarity (organisation of work), growth opportunities (task level) and communication (organisation at large).

This study did not investigate a reversed causal relationship of engagement to overload as there is no direct normal causal path in JD-R theory from overload to engagement. Therefore, investigating such a path would not be investigating a reversed causal hypothesis. This study therefore proposes the following reversed causal hypotheses:

Hypothesis 1: Burnout will be negatively related to job resources over time, i.e.:

- a) Colleague support
- b) Communication
- c) Growth opportunities
- d) Role clarity
- e) Supervisor support

Hypothesis 2: Engagement will be positively related to job resources over time, i.e.:

- a) Colleague support
- b) Communication
- c) Growth opportunities
- d) Role clarity
- e) Supervisor support

Hypothesis 3: Burnout T1 will have a positive relationship to overload T2.

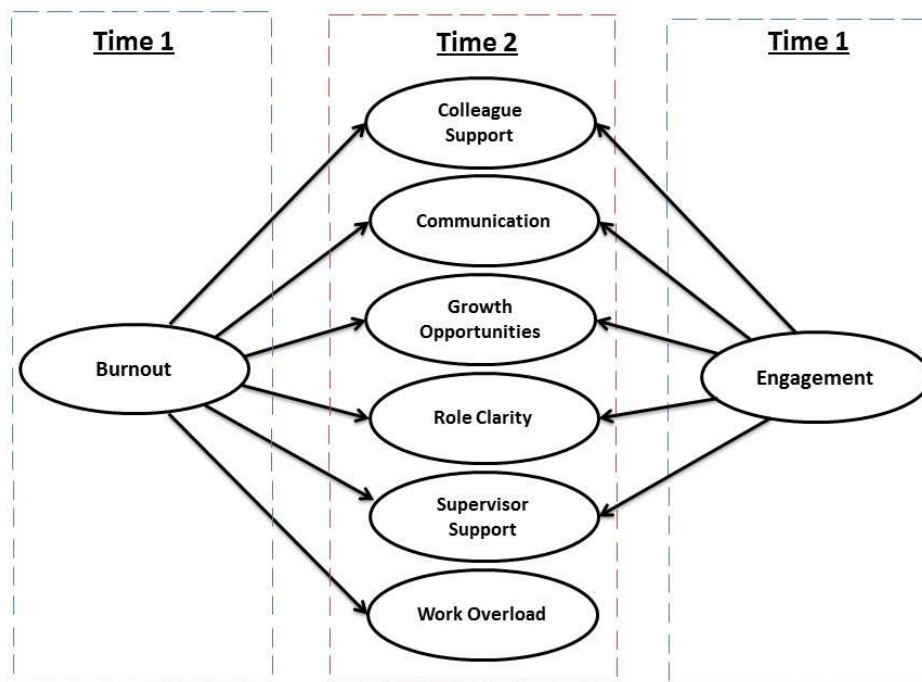


Figure 1. Illustration of reversed causal hypotheses under investigation.

Potential value add of this study

This study will provide information on the reversed causal relationships in JD-R theory within South African context. Research usually focusses on normal causal relationships in

investigations; therefore such research is important. Engagement and burnout's relationships to their original causes, i.e. job resources and job demands respectively will be elucidated, over time. This will provide organisations and researchers with valuable insights into how engagement and burnout in individuals will affect their perceptions over time.

RESEARCH DESIGN

Research approach

To help achieve the research aims, a survey design was used (Shaughnessy, Zechmeister, & Zechmeister, 2003), and to investigate the changes due to a passage of time, a longitudinal approach was taken. The same survey was therefore implemented twice and completed by the respondents with a mean time lag of 12 months ($SD = 2$).

Research method

Participants

A random sample of individuals ($n = 593$) from a South African mining organisation was collected and used. Employees of all ages and occupational levels were sampled and participation was entirely voluntary. The anonymity for all participants and the organisation was assured. All ethical guidelines in the treatment of human subjects in research were observed during this study.

Table 1

Characteristics of the participants (n = 593)

Item	Category	Frequency	Percentage (%)
Gender	Male	501	84.50
	Female	92	15.50
Age	20-29	58	9.80
	30-39	163	27.50
	40-49	228	38.50
	50-59	131	22.00
	>60	13	2.20
Race	African	203	34.23
	White	270	45.53
	Coloured	5	0.84

	Indian	2	0.34	
	Unanswered	113	19.06	
Marital status	Single	99	16.70	
	Engaged	10	1.70	
	Married	450	75.90	
	Divorced	29	4.90	
	Widow	3	0.50	
	Widower	2	0.30	
	Home language	Afrikaans	255	43.00
English		170	28.70	
Sepedi		19	3.20	
Sesotho		56	9.40	
Setswana		31	5.20	
SiSwati		9	1.50	
isiZulu		8	1.40	
isiNdebele		1	0.20	
isiXhosa		37	6.20	
Xitsonga		6	1.00	
Other		1	0.20	
Highest qualification		Grade 8	179	30.20
		Grade 9	1	0.20
	Grade 10	5	0.80	
	Grade 11	7	1.20	
	Grade 12	323	54.50	
	3-year degree/diploma	60	10.10	
	4-year degree/diploma	13	2.20	
	Master's degree	5	0.80	
Years in job	2 to 5 years	170	28.70	
	6 to 10 years	115	19.40	
	11 to 15 years	69	11.60	
	16 to 20 years	80	13.50	
	21 to 25 years	83	14.00	
	26 to 30 years	53	8.90	
	31 to 35 years	16	2.70	
	36 and more years	4	0.70	
	Unanswered	3	0.50	

The vast majority of participants were male (501; 84.5%), and 92 (15.5%) were female participants. The most prevalent home languages were Afrikaans, with 255 (43%) participants, and English, with 170 (28.7%) participants. Employees who were married numbered 450 or 76%, and those who were single 99 (16.7 %). The majority of participants, 323 (54.5%), had a general high school education (Grade 12). Furthermore, 179 (30.2%) participants only had Grade 8, and 78 people had at least a university degree. In terms of experience or years in the job, data was stratified relatively closely, but the biggest strata of participants (28.7%) had been in the job for two to five years.

Measuring instrument

The *South African Employee Health and Wellness Survey* (SAEHWS, Rothmann & Rothmann, 2007) was developed as a web-based, or paper-and-pencil, self-administered survey to be applied in employee health and wellness assessments by the Research Unit of which the researcher forms part. The SAEHWS comprises different sections collecting wellness, work and health information from the respondents; it fuses organisational climate assessment with other important variables influencing the climate, in order to achieve maximum management information while implementing one measurement/assessment only. The internal consistency of all the subscales of the SAEHWS is satisfactory compared to the generally accepted guideline (i.e. $\alpha \geq 0.70$; Nunnally & Bernstein, 1994).

In line with Schaufeli and Taris (2005), *burnout* was measured and constructed by two core components: exhaustion and mental distance (cynicism). Subsequently, the following subscales were measured for this study: *Exhaustion*: ($\alpha = 0.83$) by means of four items, e.g. 'I feel tired before I arrive at work'; *Mental distance* (Cynicism): ($\alpha = 0.79$) by means of four items, e.g. 'I have become less interested in my work'; *Overload*: ($\alpha = 0.79$) by means of four items, e.g. 'Do you have too much work to do?'; *Supervisor support*: ($\alpha = 0.84$) by means of three items, e.g. 'Can you count on your direct supervisor when you come across difficulties in your work?'; *Colleague support*: ($\alpha = 0.74$) by means of three items, e.g. 'Can you count on your colleagues when you come across difficulties in your work?'; *Role clarity*: ($\alpha = 0.70$) by means of three items, e.g. 'Do you know exactly what your responsibilities are?'; *Communication*: ($\alpha = 0.81$) by means of three items, e.g. 'Is it clear whom you should address within the department/organisation for specific problems?'; *Growth opportunities*: ($\alpha = 0.75$) by means of three items, e.g. 'Does your job offer you opportunities for personal growth and development?'; *Work engagement*: ($\alpha = 0.89$) by means of seven items (three vigour & four dedication items), e.g. 'I am full of energy in my work' (Vigour) and 'I find my work full of meaning and purpose' (Dedication).

Research procedure

Data was collected at two points in time (2009-2010) over a 12 month mean ($SD = 2$), in the mining sector, and was used for this longitudinal study. The survey was web-based and all participants received hyperlinks via e-mail. Informed consent was obtained from all the

participants and all the participants received a link to the computer-based survey via e-mail. The system was then set to e-mail all previous participants reminders to complete another survey after the specified period by providing another special hyperlink. The system and connection was secured with the American Encryption Standard (AES) so that data could not be compromised even if illegally obtained. The response rate for year one was 84%, and for year two 82%.

Statistical analyses

Structural equation modelling (SEM) methods as implemented by Mplus 6.1 (Muthén & Muthén, 2008-2010) were used to investigate the hypotheses. Mplus was chosen because of its unique ability to specify continuous and/or categorical latent variables in analyses.

In the behavioural sciences, response variables are often non-continuous and therefore psychological constructs are measured on Likert scales. To test the hypotheses, a cross-lagged model was investigated using a *categorical estimator*. According to Newsom (2012), there is growing consensus that categorical variables should be analysed with the weighted least squares; the default estimator for models that contain *categorical data* in Mplus is the mean and variance-adjusted weighted least-squares method, or abbreviated: WLSMV (Muthén, Du Toit, & Spisic, 1997; Muthén & Muthén, 2010), and was used in the analyses. In the cross-lagged modelling approach, each variable in the model is regressed on all of the variables that precede it in time to control for effects; this was also applied in the analysis of this research; but not drawn in the figure (see Figure 1) to keep the representation of the hypotheses simple to the reader. A table will be provided in the results section with control path variable results.

The following fit indices were considered: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). For the CFI and TLI, acceptable fit is considered at a value of 0.90 and above (Hoyle, 1995). According to Cudeck and Browne (1993), for the RMSEA, a value of 0.05 or less indicates a good fit, but values of 0.08 or less are also to be considered an acceptable model fit. However, the above cut-off points should only be considered as rough guidelines (Marsh, 2007; Marsh, Hau, & Grayson, 2005).

Furthermore, a correlation matrix from Mplus for the latent variables was also included for analyses and discussion.

RESULTS

The hypothesised model was specified based on the hypotheses, as well as all variables set as *categorical* in Mplus, and the model was found to fit the data acceptably (see Table 2).

Table 2

Results of the SEM analysis (n = 593)

Description	χ^2	<i>df</i>	CFI	TLI	RMSEA	<i>p</i> -Value
Research model	4687.24	2695	.94	.93	.04	.00

Notes. χ^2 = Chi-square; *df* = Degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; *p* < .001

The chi-square statistic was relatively high ($\chi^2 = 4687.24$), but there are severe limitations in its use, e.g. sensitivity to sample size in that the statistic almost always rejects a model if a large sample is used. It also assumes multivariate normality and severe deviations could lead to model rejection even when correctly specified (cf. Hooper, Coughlan, & Mullen, 2008). However, the CFI (0.94) and TLI (0.93) both surpassed the rule of thumb of 0.90 for indication of good model fit (Hoyle, 1995). Furthermore, the RMSEA value of 0.04 is below the guideline of 0.08, which confirms a good model fit (Cudeck & Browne, 1993).

Table 3 provides a summary of the various control paths in the model over time. Table 3

Summary of control paths with relevant statistics reported.

Latent variable	<i>B</i>	S.E.	<i>p</i>	Result
Burnout (T1) → Burnout (T2)	0.66	0.06	.001	Significant
Engagement (T1) → Engagement (T2)	0.69	0.04	.001	Significant
Job demands (T1) → Job demands (T2)	0.61	0.07	.001	Significant
Colleague support (T1) → Colleague support (T2)	0.49	0.06	.001	Significant
Communication (T1) → Communication (T2)	0.40	0.05	.001	Significant
Growth opportunities (T1) → Growth opportunities (T2)	0.63	0.07	.001	Significant
Role clarity (T1) → Role clarity (T2)	0.50	0.07	.001	Significant
Supervisor support (T1) → Supervisor support (T2)	0.38	0.06	.001	Significant

Notes: β = Path coefficient; S.E. = Standard error; T1 = Time one; T2 = Time two; *p* = Statistical significance

As the results for the control paths of the research model show, all variables had a statistically significant effect with themselves over time. Furthermore, all these relations were positive. The largest effect was Burnout (T1) on Burnout (T2), which indicated a path coefficient of 0.68 ($p < .001$). The smallest effect was for Supervisor support over time, which showed a path coefficient of 0.38 ($p < .001$).

Table 4 below reports the results for the investigated hypotheses for the study.

Table 4

Hypotheses summary with relevant statistics and results reported.

Hypothesis	Reversed relationship	<i>B</i>	S.E.	<i>p</i>	Result
1a	Burnout (T1) → Colleague support (T2)	-0.27	0.13	0.033	Supported
1b	Burnout (T1) → Communication (T2)	-0.27	0.14	0.053	Not significant
1c	Burnout (T1) → Growth opportunities (T2)	-0.10	0.07	0.467	Not significant
1d	Burnout (T1) → Role clarity (T2)	-0.23	0.12	0.057	Not significant
1e	Burnout (T1) → Supervisor support (T2)	-0.56	0.15	0.000	Supported
2a	Engagement (T1) → Colleague support (T2)	-0.04	0.10	0.688	Not significant
2b	Engagement (T1) → Communication (T2)	-0.06	0.11	0.550	Not significant
2c	Engagement (T1) → Growth opportunities (T2)	-0.08	0.11	0.463	Not significant
2d	Engagement (T1) → Role clarity (T2)	-0.18	0.10	0.084	Not significant
2e	Engagement (T1) → Supervisor support (T2)	-0.29	0.11	0.009	Significant
3	Burnout (T1) → Overload (T2)	-0.02	0.07	0.722	Not significant

Notes: β = Path coefficient; S.E. = Standard error; T1 = Time one; T2 = Time two; p = Statistical significance

The results supported hypotheses 1a and 1e. Interestingly, hypothesis 2e was found to be significant, but the result was opposite to the direction expected. Subsequently, all other hypotheses were rejected due to statistical non-significance at the 0.05 level (though, 1b and 1d approached significance at the 0.05 level). The strongest longitudinal effect was the negative relationship between burnout (T1) and supervisor support (T2).

Table 5 reports on the results of the correlations for all of the variables at T1 and all the variables at T2, respectively. Furthermore, all correlations were statistically significant at the 99% level of significance.

Table 5

Correlation matrix (r) of the latent variables (n = 593)

Variable name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Burnout (1)	-															
2. Engagement (1)	-0.81 ⁺	-														
3. Overload (1)	0.55 ⁺	-0.23	-													
4. Colleague support (1)	-0.45 [*]	0.24	-0.23	-												
5. Communication (1)	-0.47 [*]	0.47 [*]	-0.15	0.30 [*]	-											
6. Growth opportunity (1)	-0.60 ⁺	0.58 ⁺	-0.24	0.43 [*]	0.63 ⁺	-										
7. Role clarity (1)	-0.53 ⁺	0.54 ⁺	-0.18	0.50 ⁺	0.67 ⁺	0.62 ⁺	-									
8. Supervisor support (1)	-0.53 ⁺	0.32 [*]	-0.14	0.57 ⁺	0.71 ⁺	0.63 ⁺	0.72 ⁺	-								
9. Burnout (2)	0.68 ⁺	-0.55 ⁺	0.38 [*]	-0.30 [*]	-0.32 [*]	-0.41 [*]	-0.36 [*]	-0.36 [*]	-							
10. Engagement (2)	-0.52 ⁺	0.64 ⁺	-0.15	0.27	0.30 [*]	0.37 [*]	0.54 ⁺	0.34 [*]	-0.84 ⁺	-						
11. Overload (2)	0.35 [*]	-0.16	0.62 ⁺	-0.15	-0.10	-0.16	-0.12	-0.09	0.55 ⁺	-0.27	-					
12. Colleague support (2)	-0.39 [*]	0.33 [*]	-0.21	0.57 ⁺	0.30 [*]	0.31 [*]	0.34 [*]	0.37 [*]	-0.54 ⁺	0.52 ⁺	-0.25	-				
13. Communication (2)	-0.35 [*]	0.31 [*]	-0.16	0.25	0.50 ⁺	0.36 [*]	0.25	0.38 [*]	-0.59 ⁺	0.56 ⁺	-0.24	0.59 ⁺	-			
14. Growth opportunity (2)	-0.37 [*]	0.33 [*]	-0.17	0.26	0.38 [*]	0.60 ⁺	0.37 [*]	0.26	-0.60 ⁺	0.58 ⁺	-0.24	0.56 ⁺	0.68 ⁺	-		
15. Role clarity (2)	-0.37 [*]	0.30 [*]	-0.18	0.30 [*]	0.39 [*]	0.37 [*]	0.57 ⁺	0.41 [*]	-0.63 ⁺	0.57 ⁺	-0.23	0.64 ⁺	0.78 ⁺	0.69 ⁺	-	
16. Supervisor support (2)	-0.41 [*]	0.28	-0.22	0.31 [*]	0.36 [*]	0.35 [*]	0.37 [*]	0.49 [*]	-0.63 ⁺	0.57 ⁺	-0.25	0.68 ⁺	0.79 ⁺	0.64 ⁺	0.80 ⁺	-

Notes: $p < 0.01$ for all values; (1) = Time 1; (2) = Time 2; * = Medium practical significance; + = Large practical significance

Burnout (T1 & T2) had a negative correlation with all the T1 and T2 resources and a positive correlation with overload. The highest correlations were the negative correlations between burnout and engagement at time 1 and 2 (-0.81; -0.84). The lowest negative correlation at time 1 was between overload and supervisor support (-0.14) at time 1. The lowest correlation at time 2 was between overload and role clarity (-0.23). As for the positive correlations, the lowest was between engagement and colleague support (0.24) at time 1. The highest positive correlation was between supervisor support and role clarity (0.80) at time 2.

DISCUSSION

The current study set out to investigate the reversed causal hypotheses of burnout and engagement on overload and job resources (colleague support, communication, growth opportunities, role clarity and supervisor support), over time. The results would elucidate the possible consequences that burnout could have on subsequent experiences of overload and job resources and the possible effects of engagement on resources, over time. The hypotheses were investigated by means of SEM analysis and the resulting model was found to be a good fit to the sample data. Control variable paths were also specified and all of the variables had a significant relationship with their counterparts over time.

Burnout had significant negative relationships with colleague support and supervisor support, over time. However, no significant paths were found for communication, role clarity and growth opportunities. The former findings indicate that burnout leads to a deterioration of relationships at work; specifically supervisor support, which had the larger effect. Therefore, burnout has a negative reversed causal relationship on the interpersonal and social relations level of job demands. Leiter and Durup (1996) also found a reversed relationship between work overload and supervisor support. The affected individual might feel that he/she does not receive the necessary support from colleagues or supervisors and that this leads to a general degradation of perception of these relationships for the employee. This is in line with the argument presented by De Lange, Taris, Kompier, Houtman, and Bongers (2004) that fatigued workers experience their work environment more negatively and as a result the affected employees report lower levels of supervisor support over time.

Interestingly, there was no significant path from burnout to overload over time; as it might be expected that an already burned-out individual would perceive his/her future workload as more demanding. Therefore, this result shows that there is no reversed causal effect from burnout to overload over time. A possible explanation for this result could be found in the literature on *presenteeism*. Presenteeism can be defined as ‘being at work when you should be at home either because you are ill or because you are working such long hours that you are no longer effective’ (Cooper, 1996, p. 15). Therefore, employees are present at work, but are not being productive; investing the minimum effort and thereby avoiding general demands and any additional demands by applying a conservation of resources strategy to adapt to the environment and protect themselves (Hobfoll, 2001). Another interpretation may be that the burnt-out individual is already experiencing such high levels of perceived overload that any additional future demands cannot be perceived as significantly more demanding within the context of his/her current demands. In other words, the health impairment process has *already* done major damage. Of course, it could also be that demands with regard to overload remained relatively constant over the period of the study. However, the control path of overload upon itself over time indicated that there was a significant effect. Employees who do not have the necessary work place support (supervisor and colleague) may feel more overworked. Additionally, overworked employees are more likely to make bad decisions (Galinsky, Kim, & Bond, 2001), which might very well include taking on more duties when they should be saying ‘no’.

Engagement showed only one significant reversed causal effect and that was the negative relation to supervisor support. This result is the opposite effect to what was hypothesised. One would think that if such a reversed causal relationship existed, at all, that engagement would lead to positive perceptions of supervisor support over time. However, it should be borne in mind that this effect is small and that it may only be a sample-specific phenomenon. Furthermore, De Lange, De Witte, and Notelaers (2008) found a small, but positive, reversed effect for work engagement in predicting social support of supervisors and colleagues in their study, which is more in line of what was expected. According to Macey, Schneider, Barbera, and Young (2009), social support does not always have a positive effect; this negative impact of social support occurs when employees receive support they do not want or think that they should not need it if they were more competent, i.e. actual received support can be a negative experience when it

comes at the cost of lost self-esteem. Moreover, a case could also be made that an engaged employee ‘*evolves*’ into a more independent employee, over time, whom the supervisor now sees as needing less *managing* than non-engaged employees. Therefore, the respondents could have indicated a lower rating for supervisor support on the survey than the year before, even though levels of supervisor support are acceptable to the engaged employee.

Limitations and recommendations for future research

The strength of this study was its longitudinal design. However, it is recommended for future studies that researchers allow for a third wave of longitudinal investigation, spanning another year; therefore, having more data points separated by a reasonable amount of time to investigate reversed causal effects to draw conclusions from. Researchers could also consider shortening the time span between data collection, for example three samples spanning three-month intervals each. Furthermore, future researchers should also investigate the negative longitudinal relationship between engagement and supervisor support over time to confirm if this was a sample-specific occurrence, or if it also occurs in other work contexts.

Mention should be made of the correlations (see Table 5). Burnout time 1 and all the time 1 variables were correlated with a medium effect. However, burnout time 2 and all the time 2 variables were correlated with a large effect. This could be due to participants having become aware of the variables due to factors such as the survey itself over time – thus a sensitisation effect.

Attention should also be drawn to the fact, again, that the majority of participants of this study were male. A possible reason for this is that the participation of the sample was entirely voluntary on all occupational levels. Furthermore, the mining industry has traditionally been perceived as a more male dominant environment. Future researchers should therefore consider a stratified approach to collect a more gender representative sample.

Despite these limitations the findings of this study has important implications and illuminates the reversed causality of burnout and engagement in South African context. Specifically, the results

show that burnout leads to a deterioration of relationships at work, i.e. supervisor and colleague support, over time. Furthermore, engagement had no significant effects on job resources but one, i.e. a small negative effect to supervisor support which was opposite to the hypothesised direction.

Recommendations for management

Based on the results of this study, it is recommended that researchers, managers and psychologists in the workplace take note of the evidence for reversed causality and the negative effect of burnout on supervisor and colleague support (relationships at work), over time. Importantly, the effect on supervisor support has previously been found in other contexts (De Lange, De Witte, & Notelaers, 2008; Leiter & Durup, 1996). Strategies should be considered to equip supervisors with the necessary skills by providing adequate training to offset possible implications for employees. This could be achieved by making supervisors aware of the important role that their support plays in their subordinates' well-being; as well as coaching and training those superiors who feel they lack the skills to provide the necessary support needed to subordinates.

REFERENCES

- Alsoofi, M. A., Al-Heeti, K. N., & Alwashli, A. (2000). *Burnout and its relationship with job stress and coping with stress for Yemeni teachers*. Paper presented at the 28th International Congress of Psychology, Stockholm, Sweden.
- Armon, G. (2009). Do burnout and insomnia predict each other's levels of change over time independently of the job demand control-support (JDC-S) model? *Stress and Health, 25*, 333–342.
- Armon, G., Melamed, S., Shirom, A., Berliner, S., & Shapira, I. (2010). Elevated burnout predicts the onset of musculoskeletal pain among apparently healthy employees. *Journal of Occupational Health Psychology, 15*(4), 399–409.
- Armon, G., Shirom, A., Berliner, S., Shapira, I., & Melamed, S. (2008). A prospective study of the association between obesity and burnout among apparently healthy men and women. *Journal of Occupational Health Psychology, 13*(1), 43–57.
- Bakker, A., Demerouti, E., Taris, T., Schaufeli, W., & Schreurs, P. (2003). A multigroup analysis of the job demands-resources model in four home care organizations. *International Journal of Stress Management, 10*(1), 16–38.
- Bakker, A. B., Demerouti, E., & Xanthopoulou, D. (2011). How do engaged employees stay engaged? *Ciencia & Trabajo, 13*, 135–142.
- Bakker, A. B., Hakanen, J. J., Demerouti, E., & Xanthopoulou, D. (2007). Job resources boost work engagement particularly when job demands are high. *Journal of Educational Psychology, 99*, 274–284.
- Bakker, A. B., Schaufeli, W. B., Leiter, M. P., & Taris, T. W. (2008). Work engagement: An emerging concept in occupational health psychology. *Work & Stress, 22*, 187–200.
- Boyd, C. M., Bakker, A. B., Pignata, S., Winefield, A. H., Gillespie, N., & Stough, C. (2011). A longitudinal test of the job demands-resources model among Australian university academics. *Applied Psychology: An International Review, 60*, 112–140.
- Cooper, C. (1996). *Hot under the collar*. Times Higher Education Supplement.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York, NY: Harper and Row.

- Crossley, T. F., & Kennedy, S. (2002). The reliability of self-assessed health status. *Journal of Health Economics*, *21*, 643–658.
- Cudeck, R., & Browne, M. W. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & J. Scott Long (Eds.), *Testing structural equation models* (pp. 136-162). Newbury Park, CA: Sage.
- De Beer, L. T. (2012). *Job demands-resources theory, health and well-being in South Africa*. Doctoral dissertation, North-West University, Potchefstroom, South Africa.
- De Jonge, J., & Dormann, C. (2003). The DISC Model: Demand-induced strain compensation mechanisms in job stress. In: M. F. Dollard, A. H. Winefield, & H. R. Winefield (Eds.), *Occupational Stress in the Service Professions* (pp. 43–74). London, UK: Taylor & Francis.
- De Lange, A. H., De Witte, H., & Notelaers, G. (2008). Should I stay or should I go? Examining longitudinal relations among job resources and work engagement for stayers versus movers. *Work & Stress*, *22*(3), 201–223.
- De Lange, A. H., Taris, T. W., Kompier, M. A. J., Houtman, I. L. D., & Bongers, P. M. (2005). Different mechanisms to explain the reversed effects of mental health on work characteristics. *Scandinavian Journal of Work, Environment and Health*, *31*, 3–14.
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, *86*, 499–512.
- Everest College (2011). *Survey reveals 77% of Americans stressed about something at work*. Retrieved from <http://news.everest.edu/post/2011/03/survey-reveals-77-of-americans-stressed-about-something-at-work>
- Frese, M., Garst, H., & Fay, D. (2007). Making things happen: Reciprocal relationships between work characteristics and personal initiative in a four-wave longitudinal structural equation model. *Journal of Applied Psychology*, *92*, 1084–1102.
- Galinsky, E., Kim, S. S., Bond, J. T. (2001). *Feeling overworked: When work becomes too much*. New York, NY: Family Work Institute.
- Glass, D. C., & McKnight, J. D. (1996). Perceived control, depressive symptomatology, and professional burnout: a review of the evidence. *Psychology and Health*, *11*, 23–48.
- Goldstein, M. S., Siegel, J. M., & Boyer, R. (1984). Predicting changes in perceived self-reported health status. *American Journal of Public Health*, *74*, 611–614.

- Grant, M. D., Piotrowski, Z. H., & Chappell, R. (1995). Self-reported health and survival in the longitudinal study of aging. *Journal of Clinical Epidemiology*, *48*(3), 375–387.
- Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The Job-Demands-Resources Model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress*, *22*, 224–241.
- Hobfoll, S. E. (2001). The Influence of culture, community, and the nested-self in the stress process: Advancing conservation of resources theory, *Applied Psychology*, *50*, 337–370.
- Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, *6*(1), 53–60.
- Hoyle, R. H. (1995). The structural equation modeling approach: Basic concepts and fundamental issues. In R. H. Hoyle (Ed.), *Structural equation modeling, concepts, issues, and applications* (pp. 158-176). Thousand Oaks, CA: Sage.
- Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behaviour*, *38*, 21–37.
- International Labour Office ILO (2000). *Mental health in the Workplace*. International Labour Organization, Geneva.
- Karasek, R. A. (1979). Job demand, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly*, *24*(2), 285–308.
- Kenny, D. A. (2011). *SEM: Path Analysis*. Retrieved from <http://davidakenny.net/cm/pathanal.htm>
- Kitaoka-Higashiguchi, K., Morikawa, Y., Miura, K., Sakurai, M., Ishizaki, M., Kido, T., Naruse, Y., & Nakagawa, H. (2009). Burnout and risk factors for arteriosclerotic disease: Follow-up study. *Journal of Occupational Health*, *51*, 123–131.
- Langelaan, S. (2007). *Burnout and work engagement: Exploring individual and psychophysiological differences*. Doctoral dissertation, Utrecht University, The Netherlands.
- Landis, R. S., Edwards, B. D., & Cortina, J. M. (2008, April). *On allowing correlated residuals in structural equation modeling*. In C. E. Lance (Chair) and R. J. Vandenberg (Discussant), *Statistical/Methodological myths and urban legends III: The saga continues*. Symposium at the 23rd Annual Conference of the Society for Industrial and Organizational Psychology, San Francisco, California.

- Leiter, M. P. (1993). Burnout as a developmental process: Consideration of models. In W. B. Schaufeli, C. Maslach, & T. Marek (Eds.), *Professional burnout: Recent developments in theory and research* (pp. 237–250). Washington, DC: Taylor and Francis.
- Leiter, M. P., & Durup, M. J. (1996). Work, home and in-between: A longitudinal study of spillover. *Journal of Applied Behavioural Science, 32*, 29–47.
- Macey, W. H., Schneider, B., Barbera, K. M., & Young, S. A. (2009). *Employee engagement: Tools for analysis, practice, and competitive advantage*. Malden, MA: Wiley-Blackwell.
- Manderbacka, K., Lahelma, E., & Martikainen, P. (1998). Examining the continuity of self-rated health. *International Journal of Epidemiology, 27*, 208–213.
- Marsh, H. W. (2007). Application of confirmatory factor analysis and structural equation modeling in sport/exercise psychology. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of sport psychology* (3rd ed., pp. 774–798). New York, NY: Wiley.
- Marsh, H. W., Hau, K. T., & Grayson, D. (2005). Goodness of fit evaluation in structural equation modeling. In A. Maydeu-Olivares & J. McCordle (Eds.), *Psychometrics. A Festschrift to Roderick P. McDonald*. Hillsdale, NJ: Erlbaum.
- Maslach, C. (2001). What have we learned about burnout and health? *Psychology and Health, 16*, 607–611.
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *Maslach Burnout Inventory manual*. (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.
- Melamed, S., Shirom, A., Toker, S., Berliner, S., & Shapira, I. (2006). Burnout and risk of cardiovascular disease: Evidence, possible causal paths, and promising research directions. *Psychological Bulletin, 132*(3), 327–353.
- Melamed, S., Shirom, A., Toker, S., & Shapira, I. (2006). Burnout and risk of type 2 diabetes: A prospective study of apparently healthy employed persons. *Psychosomatic Medicine, 68*, 863–869.
- Melamed, S., Ugarten, U., Shirom, A., Kahana, L., Lerman, Y., & Froom, P. (1999). Chronic burnout, somatic arousal and elevated salivary cortisol levels. *Journal of Psychosomatic Research, 46*(6), 591–598.
- Menec, V. H., Chipperfield, J. G., & Perry, R. P. (1999). Self-perceptions of health: A prospective analysis of mortality, control, and health. *Journals of Gerontology: Biological Sciences & Medical Sciences, 54B*, 85–93.

- Miilunpalo, S., Vuori, I., Oja, P., Pasanen, M., & Urponen, H. (1997). Self-rated health status as a health measure: The predictive value of self-reported health status on the use of physician services and on mortality in the working-age population. *Journal of Clinical Epidemiology*, 5(5), 517–528.
- Montgomery, A., Mostert, K., & Jackson, L. (2005). Burnout and health of primary school educators in the North West Province. *South African Journal of Education*, 25(4), 266–272.
- Moore, J. E. (2000a). One road to turnover: An examination of work exhaustion in technology professionals. *Management Information Systems Quarterly*, 21(1), 141–168.
- Moore, J. E. (2000b). Why is this happening? A causal attribution approach to work exhaustion consequences. *Academy of Management Review*, 25(2), 335–349.
- Mossey, J. M., & Shapiro, E. (1982). Self-rated health: A predictor of mortality among the elderly. *American Journal of Public Health*, 72, 800–808.
- Muthén, L. K., & Muthén, B. O. (1998-2010). Mplus User's Guide (6th ed.). Los Angeles, CA: Muthén & Muthén.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.
- Reuben, D. B., Siu, A. L., & Kimpau, S. (1992). The predictive validity of self-report and performance-based measures of function and health. *Journal of Gerontology*, 47, 106–110.
- Rothmann, S., & Rothmann, J.C. (2007). *The South African Employee Health and Wellness Survey (SAEHWS)*. User manual (4th ed.). Potchefstroom, ZA: Afriforte.
- Schaufeli, W. B. (2003). Past performance and future perspectives of burnout research. *South African Journal of Industrial Psychology*, 29(4), 1–15.
- Schaufeli, W. B., Bakker, A. B., & Van Rhenen, W. (2009). How changes in job demands and resources predict burnout, work engagement, and sickness absenteeism. *Journal of Organizational Behaviour*. doi: 10.1002/job.595
- Schaufeli, W. B., & Enzmann, D. (1998). *The burnout companion to study and practice: a critical analysis*. Washington, DC: Taylor & Francis.
- Schaufeli, W. B. & Salanova, M. (2007). Work engagement: An emerging psychological concept and its implications for organizations. In S. W. Gilliland, D.D. Steiner & D. P. Skarlicki

- (Eds.), *Managing social and ethical issues in organizations*. Research in Social Issues in Management.
- Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A.B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytical approach. *Journal of Happiness Studies*, 3, 71–92.
- Schaufeli, W. B. & Taris, T.W. (2005). The conceptualization and measurement of burnout: Common ground and worlds apart. *Work & Stress*, 19(3), 256–262.
- Selye, H. (1987). *Stress without Distress*. London, UK: Transworld.
- Shirom, A. (2009). Editorial; Burnout and health: Expanding our knowledge. *Stress and Health*, 25(5), 281–285.
- Shirom, A., Melamed, S., Toker, S., Berliner, S., & Shapira, I. (2006) Burnout and health review: Current knowledge and future research directions. In *International Review of Industrial and Organizational Psychology 2005, Volume 20* (eds. G. P. Hodgkinson and J. K. Ford), Chichester, UK: Wiley. doi:10.1002/0470029307.ch7
- Shirom, A., Westman, M., Shamai, O., & Carel, R. F. (1997). Effects of work overload and burnout on cholesterol and triglycerides levels: The moderating effects of emotional reactivity among male and female employees. *Journal of Occupational Health Psychology*, 2(4), 275–288.
- Stansfeld, S. A., Fuhrer, R., Shipley, M. J., & Marmot, M. G. (2002). Psychological distress as a risk factor for coronary heart disease in Whitehall II Study. *International Journal of Epidemiology*, 31(1), 248–255.
- Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationship between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & Stress*, 3, 277–294.
- Virtanen, M., Honkonen, T., Kivimaki, M., Ahola, K., Vahtera, J., Aromaa, A., & Lonnqvist, J. (2007). Work stress, mental health and antidepressant medication findings from Health 2000 Study. *Journal of Affective Disorders*, 98, 189–197.
- Weiss, M. (1983). Effects of work stress and social support on Information Systems Managers. *MIS Quarterly*, 7, 29–43.

CHAPTER 4

RESEARCH ARTICLE 3

BURNOUT, WORK ENGAGEMENT AND SELF-REPORTED EMPLOYEE HEALTH IN SOUTH AFRICA

ABSTRACT

Orientation: The relationship between self-reported health conditions, specifically in terms of reporting receiving treatment for a condition, and burnout and engagement have been limited in South African context. Therefore this study will investigate these relationships.

Research purpose: The purpose of this study was to investigate the connection of burnout and work engagement with self-reported health conditions (cardiovascular, cholesterol, depression, diabetes, hypertension and irritable bowel syndrome) in a sample of 7 895 employees from a broad range of sectors in South Africa.

Motivation for the study: To empirically link the subjective states of burnout and engagement with self-reported receipt of active treatment for six health conditions.

Research design, approach and method: Descriptive statistics were employed to investigate the incidence of the health conditions in the research sample. Furthermore, binomial logistic regression analyses were implemented to calculate the odds ratios for the variables involved. Age and gender were variables controlled for in the analyses.

Main findings: An increase in burnout was found to be associated with an increase in the estimated odds of reporting receiving treatment for all of the conditions under investigation. An increase in engagement was shown to be associated with a decrease in the estimated odds of reporting cardiovascular condition, cholesterol and depression. However, engagement showed no significant association with diabetes, hypertension or IBS. Age- and gender-based differences were also reported.

Practical/managerial implications: This study makes stakeholders aware of the associations between burnout, engagement and self-reported health. Consequently attempts should be made to battle burnout, and enhance engagement in an effort to promote personal health.

Contribution/value added by this study: This study elucidates the links between burnout and engagement with self-reported treatment for the health conditions involved. Evidence exists of enhanced reporting of ill health in association with greater levels of burnout.

INTRODUCTION

Self-reported health is an area that has been extensively researched in the past. Self-reported health, or perceived health, has been found to be significantly related to chronic diseases (Goldstein, Siegel, & Boyer, 1984). According to Miilunpalo *et al.* (1997, p. 157), “subjective health assessments are valid health status indicators in middle-aged working populations and they can be used in cohort studies and population health monitoring projects.” Moreover, self-rated health is not only correlated with psychological and somatic complaints, but also proves to be a relatively accurate predictor of objective health status and even mortality (Idler & Benyamini, 1997; Manderbacka, Lahelma, & Martikainen, 1998). However, some studies have found limitations to self-assessed health measures, indicating that individual responses to self-reported health questions depends on both the nature of the survey and the sequence of the preceding questions (Crossley & Kennedy, 2002).

From a literature review, it appears that studies have focussed more on elderly group samples and the changes and/or accuracy of the reported data in terms of health and mortality (Grant, Piotrowski, & Chappell, 1995; Menec, Chipperfield, & Perry, 1999; Mossey & Shapiro, 1982; Reuben, Siu, & Kimpau, 1992). In Menec *et al.* (1999) it was found that older adults were more than twice as likely to pass away within a period of three to three-and-a-half years if they reported their health negatively or just as ‘fair’, as opposed to those individuals who perceived their health to be ‘excellent’. Hence, self-reported symptoms can be seen as a good indicator of overall health.

Recently, the American Psychological Association (2011) found that 36 percent of American workers report experiencing *chronic* work stress. The affected parties cited factors such as low salary, lack of growth opportunities, lack of advancement, and high job demands (hours of work and unrealistic expectations, i.e. *overload*) as the causes. Similarly, work stress survey results of Everest College (2011) found that 77% of employees in the United States are experiencing stress as a result of *at least* one factor relating to their work, with low pay cited as the most common reason (14%).

Work stress, burnout, and engagement

Work stress results in untoward effects on psychological as well as physical health (McGrath *et al.*, 1989). An effective method for explaining this phenomenon is with job demands-resources theory (Bakker & Demerouti, 2007; Demerouti *et al.*, 2001; Schaufeli & Bakker, 2004). Chronic job demands and a lack of sufficient job resources to buffer these demands have been found to lead to burnout and eventual ill health (Bakker & Demerouti, 2008; Demerouti *et al.*, 2001; Schaufeli & Bakker, 2005; Schaufeli & Salanova, 2007). This process has been coined the *health impairment* process. Contrary, job resources lead to work engagement and positive organisational outcomes – a process termed *motivational*. These two processes together make up what is referred to as “*the dual process*” of job demands-resources theory (Bakker & Demerouti, 2007, p. 315).

In South Africa, it has also been found that if high job demands are experienced without sufficient job resources to cope with these demands, burnout will develop, which could lead to physical and/or psychological ill health (Montgomery, Mostert, & Jackson, 2005). Hakanen, Bakker, and Schaufeli (2006) also described and tested the health impairment process with a path from job demands to ill health through burnout, and found favourable results. Distress, without sufficient coping mechanisms or buffers, leads to burnout (Alsoofi, Al-Heeti, & Alwashli, 2000).

Schaufeli and Enzmann (1998, p. 36) define burnout as “a persistent, negative, work-related state of mind in ‘normal individuals’ that is primarily characterized by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work”. Burnout thus reflects a process of deteriorating energetic resources, and it is therefore reasonable to assume that it will predict decrements in individuals’ perceived health status and self-reported health (Shirom, 2009).

According to Schaufeli (2003), and Schaufeli and Taris (2005), burnout as a work-related phenomenon primarily comprises two components that form its core: Exhaustion and cynicism. The first: “exhaustion”, can be characterised by a lack of energy (mental and emotional) and therefore inability. Exhaustion is an energy-depleting process (Moore, 2000a, 2000b), and occurs

when employees feel that they no longer have the resources required to deal with their work demands. Furthermore, exhaustion has been connected with *inter alia*: low energy, feelings of restlessness and difficulty to concentrate (Weiss, 1983). The second component of burnout: “cynicism” can be characterised by a lack of motivation, unwillingness and mental distancing. The Maslach Burnout Inventory manual (Maslach *et al.*, 1996) explains cynicism as characteristic of having a distant or indifferent attitude towards one’s work. Moreover, it has been argued that cynicism develops in *response* to exhaustion (Leiter, 1993).

Depression symptomatology (e.g. lack of pleasurable experience, feelings of anger and guilt) has been shown to have a connection with burnout (Shirom *et al.*, 2005). It has been found that depression and burnout share similar symptoms, specifically the exhaustion component (e.g. low energy, fatigue and concentration problems; Glass & McKnight, 1996), but that they are not identical and are distinct and separable constructs (Schaufeli & Enzmann, 1998). In a self-assessment study by Virtanen *et al.* (2007), high job demands, high job strain and low job control were linked to depressive or anxiety disorders over a 12-month period in both men and women. Furthermore, when adjustments were made for lifetime and baseline mental disorders; men showed an increased risk for future antidepressant medication use when their job demands and job strain were found to be high. Furthermore, burnout has also been found to be positively associated with the following: cardiovascular conditions (Melamed *et al.*, 2006), cholesterol (Shirom *et al.*, 1997), diabetes (Melamed *et al.*, 2006), gastro-intestinal problems (Shirom *et al.*, 2006), hypertension (Cholongitas & Pipili, 2010), and atherosclerosis (Kitaoka-Higashiguchi *et al.*, 2009).

Demerouti *et al.* (2001) describe *job resources* as the organisational aspects of a job that are functional in achieving work goals and could reduce job demands. According to Bakker and Demerouti (2007), job resources are located at the level of the *organisation at large*, the level of *interpersonal and social relations*, the level of *organisation of work*, and at the *task level*. Some examples of job resources at these respective levels are: job security, supervisor- and colleague support, growth opportunities and role clarity. Job resources have been found to be strongly associated with work engagement in South Africa (De Beer, 2012).

Work *engagement* is defined as a “positive, work-related state of mind in employees characterised by *vigour*, *dedication*, and *absorption*” (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002, p. 74). The core components of engagement are considered as: Vigour and dedication (Schaufeli & Bakker, 2004). But absorption, which is more related to the concept of ‘flow’ (Csikszentmihalyi, 1990), can be seen as resultant of being engaged at work (cf. Langelan, 2007). Vigour has been argued to be the necessary *precursor* for people to dedicate themselves to their work (cf. Shirom, 2010). Therefore dedication is thought to be a consequence of available vigour.

Vigour is characterised by high levels of energy and mental resilience while working (Bakker & Demerouti, 2008; Schaufeli & Bakker, 2010). Additionally, vigour has been referred to by other names but it basically represents the affective experience of being energetic physically, mentally, and inter-personally (Shirom, 2010). Moreover, vigour may enhance the immune system’s ability to effectively respond to challenges; it was also found to be negatively correlated with inflammation biomarkers. Not only has feeling vigorous been associated with subjective work capacity, but also with positive self-rated health (cf. Shirom, 2010; Shirom, Vinokur, & Vaananen, 2008).

Engagement has been shown to be positively associated with positive organisational outcomes, specifically organisational commitment. It has also been found to be a mediator between job resources and organisational commitment in international findings (Hakanen, Bakker, & Schaufeli, 2006), and in South Africa (De Beer, 2012). Furthermore, engagement has been shown to be positively associated with self-rated health and working ability (Hakanen, 2002). Also, engaged employees are generally more satisfied with their jobs, report good health, and perform well (Bakker & Leiter, 2010).

Self-reported health variables and stress

This study set out to investigate the following dimensions of self-reported health: Cardiovascular conditions, cholesterol, depression, diabetes, hypertension and irritable bowel syndrome.

Stress hormones and burnout have been linked to cardiovascular conditions (cf. Pollard, 1997; Melamed, et al., 2006). Cholesterol levels have been linked to burnout (Shirom, et al., 1997). Burnout is correlated with depression and they share similar symptoms, but they remain two distinct concepts (Schaufeli & Enzmann, 1998). It has been postulated that depression can be viewed as a result of unsuccessful coping with job burnout (Toker & Biron, 2012). Burnout has also been linked to a higher incidence of diabetes (Melamed, et al., 2006). Work stress has been found to be linked to increases in blood pressure, which in turn could increase the risk of long-term blood pressure problems (cf. DeNoon, 2007; Mayo Clinic, 2010). However, it should be noted that conflicting results exist in the literature concerning this (cf. Rosenthal & Alter, 2012). Work stress has been linked to IBS and IBS-symptoms (National Health Service, 2010; The American Institute of Stress, 2012; WebMD, 2012).

Control variables

The two covariates or control variables for this study are age and gender.

Aging is considered one of the most recognised risk factors for chronic diseases. Examples of age-related diseases are, *inter alia*, cardiovascular conditions, diabetes and metabolic syndrome. Metabolic syndrome indicates a cluster of conditions that include, amongst others, hypertension and cholesterol (cf. Chung et. al, 2009). Furthermore, age has also been found to be a factor in depression levels and their intensity (Mirowsky & Ross, 1992). IBS prevalence has also shown an age-based difference (cf. Wilson *et al.*, 2004). Therefore the current evidence indicates that all these conditions have an increased incidence with age.

Gender was the second control variable (covariate) for this study and was selected because gender-based differences have been found for the following conditions: Cholesterol (cf. Shirom *et al.*, 1997), diabetes (Gale & Gillespie, 2001), heart disease (Weidner & Cain, 2003), and depression. Specifically, it has been found that the incidence of heart disease is more pronounced in men and the frequency of reported depression is higher in females (Kessler, 2003; Weissman & Olfson, 1995). Overall, diabetes has been proven to show a stronger female bias, but this could well depend on the context investigated (cf. Gale & Gillespie, 2001). It has also been found that

females are more likely than men to report IBS symptoms (Lee, Mayer, Schmulson, Chang & Naliboff, 2001; Wilson *et al.*, 2004). Some studies have also found gender differences for high blood pressure (cf. Wiinber *et al.*, 1995; Khoury, Yarows, O'Brien, & Sowers, 1992), with the onset and rapidity being more pronounced for males (Medical College of Georgia, 2007).

The present study

Based on the above review of the literature on burnout, engagement, working conditions and self-reported health, the literature indicates that:

- i) Self-rated health assessments are trustworthy; and
- ii) Self-rated health assessments can be accurate indicators of actual overall health.
- iii) Burnout is associated with various objective health conditions; and
- iv) Engagement is associated with reporting good health and positive organisational outcomes.

Hence it is important to investigate the connection of burnout and engagement with self-reported health conditions i.e., cardiovascular, cholesterol, depression, diabetes, hypertension and irritable bowel syndrome; whilst controlling for age and gender as covariates, within South African context.

The hypotheses for this study are as follows:

Hypothesis 1: Burnout will be associated with an increase in the estimated odds of reporting treatment for the following health conditions:

- a) Cardiovascular
- b) Cholesterol
- c) Depression
- d) Diabetes
- e) Hypertension
- f) Irritable Bowel Syndrome

Hypothesis 2: Engagement will be associated with a decrease in the estimated odds for reporting treatment for the following health conditions:

- a) Cardiovascular
- b) Cholesterol
- c) Depression
- d) Diabetes
- e) Hypertension
- f) Irritable Bowel Syndrome

Potential value add of this study

This study will provide information on the link between burnout, as a work-related phenomenon, and various self-reported health conditions. Moreover, this study also includes engagement as a potential indicator of reduced self-reported health conditions, and also controls for age and gender's potential confounding influences. This study also identified conditions by asking participants if they are currently receiving treatment for the conditions, in hopes of reducing false positives; indicating receiving treatment is usually coupled with a diagnosis and prescription for medication, which is a unique self-report angle. Therefore, this study will elucidate the links between burnout, engagement, gender and age with self-reported health outcomes.

RESEARCH DESIGN

Research approach

To assist in achieving the research aims, a survey design was used (Shaughnessy, Zechmeister, & Zechmeister, 2003). Within a cross-sectional design, data can be collected on more than one incident at a single point in time and analysis can be done to detect patterns of relationships (Bryman & Bell, 2003). Surveys were implemented in various organisations in different sectors of the South African economy. Data from these projects were aggregated to present the current sample. Since the aim was to describe the association between employees' experiences of burnout, engagement and self-reported health, this design is deemed appropriate.

Research method

Participants

A sample was used of individuals from South African service and manufacturing organisations ($n = 7\,895$). Employees of all ages and occupational levels were sampled at convenience.

Table 1

Characteristics of the participants ($n = 7\,895$)

Item	Category	Frequency	Percentage (%)
Gender	Male	3540	44.84
	Female	4355	55.16
Age	<20	12	0.15
	20-29	1585	20.08
	30-39	2486	31.49
	40-49	2455	31.10
	50-59	1212	15.35
	>60	145	1.84
Race	Black	3341	42.32
	White	3318	42.03
	Coloured	659	8.35
	Indian	525	6.65
	Unanswered	52	0.66
Home language	Afrikaans	2721	34.46
	English	1918	24.29
	Sepedi	1034	13.10
	Sesotho	419	5.31
	Setswana	415	5.26
	Siswati	111	1.41
	isiZulu	396	5.02
	isiNdebele	35	0.44
	isiXhosa	286	3.62
	Xitsonga	235	2.98
	Other	60	0.76
Sector	Unanswered	12	0.15
	Consulting	313	3.97
	Education	225	2.85
	Financial	2645	33.52
	Government	2118	26.84
	Health	1135	14.38
	Manufacturing	126	1.60
	Mining	634	8.03
	Retail	25	0.32
	Transportation	670	8.49

This study was conducted among 7 895 employees from 9 economic sectors in South Africa, where the majority of participants were female: 4 355 (55.2%), while 3 540 (44.8%) were male participants. In terms of the racial composition, Black and White people were most represented in the sample and relatively even, with 42.3% and 42.0% respectively. Ages of participants varied from younger than 20 years up to older than 60. The stratified levels between ages 30 and 49 were quite similar, i.e. ages 30 to 39 included 2 486 participants and 40 to 49 included 2 455 individuals. Similarly, ages 20-29 (1 585) and 50 to 59 (1 212) also had relatively similar numbers. There were 12 individuals (0.15%) younger than 20, and 145 (1.84%) individuals older than 60. The most prevalent home languages were Afrikaans ($n = 2721$; 34.5%) and English ($n = 1918$; 24.3%). The most represented sectors were those of financial ($n = 2 645$; 33.5%), government ($n = 2 118$; 26.8%) and health ($n = 1 135$; 14.4%).

Measuring instrument

In line with Schaufeli and Taris (2005), Burnout was measured by its two core components: Exhaustion and Cynicism. Therefore the following subscales were applied in this study: *Exhaustion*: ($\alpha = 0.81$) by 4 items, e.g. 'I feel tired before I arrive at work'; *Cynicism*: ($\alpha = 0.77$) by 4 items e.g. 'I am uncertain whether my work is important'. Engagement was measured by its two core components: Vigour and Dedication. *Vigour*: ($\alpha = 0.82$) by 3 items e.g. 'I am full of energy in my work'; *Dedication*: ($\alpha = 0.83$) by 4 items, e.g. 'I find my work full of meaning and purpose'. A total scale for burnout ($\alpha = 0.82$) and engagement ($\alpha = 0.87$) was estimated with the items from each of their afore-mentioned subcomponents. It was decided to proceed with composite scales, as opposed to individual dimensions of the constructs because the components are closely related. Burnout and engagement were negatively correlated with a large effect ($r = -0.67$). The components of burnout, exhaustion and cynicism were positively correlated with each other ($r = 0.56$), and with burnout ($r = 0.87$; $r = 0.89$) with large effects. Furthermore, the components of engagement, vigour and dedication were also highly positively correlated with each other ($r = 0.75$), and with engagement ($r = 0.94$; $r = 0.93$). The theoretical reasoning for focusing on a combined score is based on the grounds that a change in one of the components will result in a change in the underlying global latent construct (Shirom & Melamed, 2006).

Additionally, this study measured participants' knowledge of their own health conditions that were of interest for this study, i.e. cardiovascular, cholesterol, depression, diabetes, hypertension and irritable bowel syndrome. Respondents were posed the question: "Are you *currently receiving treatment* for any of the following conditions:", with a yes or no scale (own emphasis). The framing of the question is important, as it should not provide false positives or negatives. For example, a participant who felt "unsure" whether they suffer from a specific condition of interest, would still indicate "no" if they are not *currently receiving treatment*. Conversely, if a participant is *currently receiving treatment*, it is likely due to clinical diagnosis, coupled with medication or other prescribed treatment.

Research procedure

Data was collected from the various sectors, in 2010, for this study. The survey was web-based and anonymity of participants was guaranteed. Informed consent was obtained from all participants and relevant parties. All the participants received a hyperlink to the computer-based survey via e-mail. The system and connection was secured with the American Encryption Standard (AES) so that data could not be compromised even if illegally obtained. No identifying information was shared with organisation or other parties during or after the research.

A booklet (pen and paper) version of the survey was also made available to participants who were not computer literate. The booklet version had exactly the same questions and scales as the online version. Data from the booklets were then captured and added to the database. Anonymity of all participants was guaranteed.

Statistical analyses

Descriptive statistics were computed with the SPSS 19 (SPSS, 2011) software package to describe both the participants and their experience of burnout and engagement and incidence of the reported health conditions in the total sample. To investigate whether there are any major discrepancies between age and gender concerning burnout and engagement respectively, age correlated with burnout and engagement. Furthermore, multivariate analysis of variance statistics were conducted to investigate whether any significant difference exists between gender for

burnout and engagement. The results were analysed for statistical significance using Wilk's lambda statistics. Estimated marginal means were also computed.

To test the hypotheses, logistic regression analysis was implemented. Binomial (or binary) logistic regression is a form of multiple regression which is applied when the dependent variable is dichotomous – i.e. it has only two possible values; often interpreted as a yes or no, diseased or not, alive or dead (Elliot & Woodward, 2007). In the present study the response or dependent variables were for the dichotomous condition responses, e.g. cardiovascular condition. The main predictor variables were burnout and engagement, which were *continuous* variables. Covariates for the analysis were age and gender. Confidence Intervals of 95% were also calculated, as well as the statistical significance of each resultant analysis.

The odds ratios from the logistic regression were partial, i.e. they indicate the increase in odds that a person will report a health condition as a result of one unit increase in the independent variable, *while holding constant* all the other independent variables.

RESULTS

Prevalence of conditions

Table 2 below gives a complete overview of the incidence of the conditions in the total sample.

Table 2

Incidence of self-reported health conditions (n = 7 895)

Health condition	Frequency	Percentage (%)
Cardiovascular	181	2.3%
Cholesterol	629	8.0%
Depression	429	5.4%
Diabetes	324	4.1%
Hypertension	1026	13.0%
Irritable Bowel Syndrome	527	6.7%

The incidence of the health conditions in the sample showed the following: Hypertension was the most prevalent condition, with 1026 respondents (13.0%) receiving treatment for the condition, followed by cholesterol ($n = 629$; 8.0%), and irritable bowel syndrome ($n = 527$; 6.7%). Indication for receiving treatment for a cardiovascular condition was the lowest with only 181 affirmative respondents (2.3%). Furthermore, depression had 429 (5.4%) affirmative responses and diabetes 324 (4.1%).

Control variables

The correlation of age with both burnout ($r = -0.05$) and engagement ($r = 0.16$) was statistically significant but with small effects and of no practical significance. Therefore statistically, an increase in age is more associated with higher engagement and with lower burnout. However, the latter result has no practical significance. Furthermore, the correlation between burnout and engagement was significant at the statistical as well as practical level ($r = -0.67$).

The results of the multivariate indicated that there was a statistically significant difference between gender for burnout and engagement, $F = 49.93$, $p < .001$; Wilk's $\lambda = 0.988$, partial $\epsilon^2 = .012$. However, this result shows that this difference explains only 1.2% of the variance.

The results of the estimated marginal means indicated that burnout levels were slightly higher for females and engagement levels slightly higher for males.

Based on the results of the correlation matrix of age and the estimated marginal means of gender with burnout and engagement one can see that even though differences exist, they are small.

Associations between variables

Table 3 provides a summary of the regression analyses, followed by a condition specific reporting of the results.

Table 3

Summary of the logistic regression analyses

Health condition	Variable	Odds Ratio	95% Confidence Interval (CI)		<i>p</i>
			Lower	Upper	
Cardiovascular	Burnout	1.07*	1.00	1.14	0.01
	Engagement	0.93*	0.86	1.00	0.00
	Gender(F)	0.68	0.54	0.92	0.06
	Age	1.09*	1.07	1.10	0.04
Cholesterol	Burnout	1.07*	1.03	1.11	0.00
	Engagement	0.94*	0.90	0.98	0.00
	Gender(F)	0.68*	0.58	0.81	0.00
	Age	1.09*	1.08	1.10	0.00
Depression	Burnout	1.21*	1.15	1.26	0.00
	Engagement	0.95*	0.90	0.99	0.02
	Gender(F)	2.54*	2.02	3.20	0.00
	Age	1.03*	1.02	1.04	0.00
Diabetes	Burnout	1.06*	1.01	1.12	0.03
	Engagement	1.04	0.98	1.11	0.19
	Gender(F)	0.75*	0.59	0.94	0.01
	Age	1.08*	1.07	1.10	0.00
Hypertension	Burnout	1.05*	1.02	1.09	0.00
	Engagement	1.01	0.97	1.04	0.78
	Gender(F)	0.82*	0.71	0.94	0.01
	Age	1.10*	1.10	1.11	0.00
Irritable Bowel Syndrome	Burnout	1.14*	1.09	1.19	0.00
	Engagement	0.99	0.95	1.04	0.64
	Gender(F)	3.28*	2.63	4.08	0.00
	Age	1.02*	1.01	1.03	0.00

Cardiovascular condition

The odds ratio of a respondent to report a yes on cardiovascular treatment for burnout was 1.07 ($p < .013$); indicating that for every unit increase in burnout the estimated odds increase 7% that a respondent will select a 'yes' response for this condition. With regard to engagement, the odds ratio is 0.93 ($p < .001$), indicating that for every unit increase in engagement that the estimated

odds decrease by 7% a respondent will report a cardiovascular condition for which they are receiving treatment.

For every unit increase in age, the odds increase by 9% (1.09; $p < .038$) that a respondent will report a 'yes' for receiving treatment for a cardiovascular condition. Gender was not a significant predictor ($p < .057$).

Cholesterol

The odds ratio for burnout with regard to cholesterol is 1.07 ($p < .001$); for every unit increase in burnout the estimated odds increase 7% that a respondent will select "yes" for receiving treatment for cholesterol. Conversely, engagement's odds ratio is 0.94 ($p < .004$), indicating that for every unit increase in engagement, a respondent's estimated odds would decrease by 6% to report a 'yes' for this condition.

For every unit increase in age the odds increase 9% (1.09; $p < .001$) that a respondent will answer a 'yes' for receiving treatment for cholesterol. Females showed an odds ratio of 0.68 which indicates that, compared to males, they are 32% (0.68; $p < .001$) less likely to report receiving treatment for cholesterol.

Depression

Burnout indicated an odds ratio of 1.21 ($p < .001$), indicating that every unit increase in burnout would lead to the estimated odds increasing by 21% to report treatment for depression. Engagement showed an odds ratio of .95 ($p < .021$), which indicates that for every unit increase in engagement the estimated odds are decreased 5% to report a 'yes' for treatment of depression.

For females, the odds ratio indicated 2.54 ($p < .001$), which shows that females were about two and a half times more likely to report receiving treatment for depression than men. For every unit increase in age the estimated odds increased 3% (1.03; $p < .001$) that a respondent will indicate a 'yes' for receiving treatment for depression.

Diabetes

The odds ratio for burnout with regard to diabetes is 1.06 ($p < .032$); for every unit increase in burnout the odds increase 6% that a respondent will select 'yes' for receiving treatment for diabetes. The result for engagement was not significant 1.04 ($p < .188$). Furthermore, the odds increased with every unit increase in age (1.10; $p < .001$). The odds were less for females to indicate treatment for diabetes than for males (0.75; $p < .012$).

Hypertension

Burnout indicated an odds ratio of 1.05 ($p < .001$), indicating that every unit increase in burnout leads to an increase in estimated odds of 5% to report receiving treatment for hypertension. Engagement was not found to be significant (1.01; $p < .779$). The odds of reporting treatment for hypertension increased with 10% for every unit increase in age (1.10; $p < .001$). Furthermore, females showed lower odds than men for reporting treatment for hypertension (0.82; $p < .001$).

Irritable Bowel Syndrome (IBS)

The odds ratio for burnout with regard to this condition is 1.14 ($p < .001$). Therefore for every unit increase in burnout the estimated odds increase 14% that a respondent will select 'yes' for receiving treatment for IBS. Engagement was not found to be significant (0.99; $p < .637$).

For every unit increase in age the odds increase 2% (1.02; $p < .001$) that a respondent will answer a 'yes' for reporting treatment for IBS. For females the odds ratio was 3.28 ($p < .001$), which reveals that females were more than 3 times more likely to report the condition than men.

DISCUSSION

The current study investigated the relationship of burnout and engagement with self-reported health outcomes, i.e. cardiovascular condition, cholesterol, depression, diabetes, hypertension and irritable bowel syndrome. Logistic regression analysis was performed to calculate the odds ratios using gender and age as control variables. All of hypothesis 1 was supported, i.e. an

increase in burnout was associated with increasing the estimated odds for the incidence of reporting treatment for all of the conditions under investigation. Engagement had significant results for cardiovascular conditions, cholesterol and depression; indicating that increases in engagement decreased the estimated odds of reporting these conditions. However, no significant results were found for engagement increasing or decreasing the estimated odds for diabetes, hypertension or IBS.

The comparableness of this study's sample regarding the incidence and prevalence of the conditions studied to the broader South African context proves difficult, mainly due to difficulty in finding more current and other more contextually relevant information, i.e. the work environment. The South African Demographic and Health Survey (Department of Health, Medical Research Council, OrcMacro, 2003) does, however, provide the following numbers for the following conditions based on self-reporting in South Africa: High blood pressure (male: 8.8%; female: 18.9%), high cholesterol (male: 2.0%; female: 2.2%), diabetes (male: 2.6%; female: 3.9%) and ischaemic heart disease (IHD), commonly known as a heart attack or having angina (male: 2.7%; female: 4.0). When comparing these numbers to the sample, hypertension was also found to be the most prevalent self-reported condition. Furthermore, the percentage for diabetes was also quite similar. However, the writers of that report caution the reader on the results of the survey self-reports due to problems that exist with under- and incorrect reporting.

The findings of this study show that the higher the burnout score the higher the estimated odds increase for an individual reporting a "yes" to any of the conditions under investigation on the self-report measure. The odds were highest for depression; a reason for this could be that depression has been shown to share common dysphoric symptoms with burnout (Shirom *et al.*, 2006), and exhaustion has been found to be a common factor related to both burnout and depression. They are thus closely related but the constructs have been shown not to be the same (Brenninkmeyer, Van Yperen, & Buunk, 2011; Glass & McKnight, 1996; Schaufeli & Enzmann, 1998). With regard to engagement, it was revealed that the estimated odds are lowered for reporting treatment for depression the higher the engagement score.

Irritable bowel syndrome (IBS) showed the second largest increase in odds with regard to burnout. This condition has been found to be related to stress symptoms, and an increase in work stress can consequently either cause or exacerbate this condition (Leka *et al.*, 2004). Engagement showed no significant result for IBS, indicating that an increase in engagement neither increases nor decreases the estimated odds for reporting treatment for this condition.

Cardiovascular conditions and cholesterol revealed similar results for both burnout and work engagement. The higher the burnout score, the higher the estimated odds will be for an employee to select current treatment for both these conditions. This is in line with the findings of Melamed, Shirom, Toker, Berliner and Shapira (2006) and Kitaoka-Higashiguchi *et al.* (2009), who found that links exist from burnout and vital exhaustion to cardiovascular-related symptoms; and those findings of Shirom *et al.* (1997) who linked overload and burnout with cholesterol and triglyceride levels. Contrary, these results show that a higher engagement level will lower the odds of reporting a cardiovascular condition.

With regard to hypertension, a higher burnout level once again showed an increase in the estimated odds of the employee indicating an affirmative on the self-report for receiving treatment for the condition. Engagement, in contrast, showed no significant result for hypertension. The higher the burnout level the higher the estimated odds will be for indicating treatment for diabetes. Melamed *et al.* (2006) found an increased risk of type-2 diabetes for burnt out individuals in a longitudinal study. Engagement showed no significant impact on the odds for reporting diabetes; indicating that an increase in engagement neither increases nor decreases the estimated odds for reporting treatment for this condition.

The covariates (or control variables) for this study were age and gender. Some interesting results were found: Age showed a significant result for all of the conditions under investigation, i.e. an increase in age increases the estimated odds to report receiving treatment for all of the health conditions. This is in line with research on age and age-related diseases (cf. Chung *et al.*, 2009; Karasek, 2004). Furthermore, significant gender differences were found. Females were less likely to report treatment than males for the following conditions: Cardiovascular conditions, cholesterol, diabetes and hypertension. However, for irritable bowel syndrome females' odds

were three times more to report receiving treatment for this condition. Moreover, the odds for females to report treatment for depression were two and a half times higher than for males. This is similar to past research which indicates that depression is at least two times more common in females than in males (cf. Kessler, 2003; Weissman & Olfson, 1995).

In conclusion, this study shows that the higher the level of burnout, the higher the estimated odds that an individual would report any of the health conditions under investigation. A higher engagement score showed an association with a decrease in the odds of reporting some of the conditions under investigation, i.e. cardiovascular, cholesterol and depression; but not for diabetes, hypertension and irritable bowel syndrome.

Whether burnout and engagement are seen as independent variables or the opposite ends of the same variable or divided into two other components, i.e. energy (exhaustion and vigour) and identification (cynicism and dedication) (cf. Demerouti, Mostert, & Bakker, 2010; González-Romá, Schaufeli, Bakker, & Lloret, 2006), the results of this study has the same implications. Attempts should be made to decrease the levels of burnout and increase engagement levels of employees in order to assist in ensuring optimal employee well-being.

It must be borne in mind that this study was cross-sectional and self-report; therefore the issue of non-causality applies here, e.g. does burnout predict the condition, or does the condition exacerbate burnout, or is the relationship reciprocal? Be that as it may, these results show that where burnout is evident, the odds of the health conditions of this study being present have an increased association.

Limitations and recommendations for future research

The most apparent limitation of this study is its cross-sectional design; therefore it is generally advised that causality should not be inferred. It is recommended that for future studies that researchers implement a longitudinal investigation, for South Africa, to draw further conclusions from.

Researchers should consider controlling for additional factors in their analyses, such as tobacco use, alcohol use, and being overweight. Moreover, they could also consider depression as a control variable seeing that burnout and depression are so closely related. Furthermore, this study did not take into account individuals who may have received treatment for a condition previously and may have stopped taking the treatment and therefore still have the condition but is not currently receiving treatment.

Future researchers should also attempt to include medical aid claim data of respondents to investigate whether a difference exists in medical aid claim expenditure for individuals who are stressed or burnt out, to therefore attempt to link objective financial outcomes to subjective well-being states, e.g. burnout.

Recommendations for management

It is recommended that the employee and the employer should be on the lookout for symptoms of work stress in themselves, subordinates and colleagues to address the health impairment process that could lead to both psychological and physical ill health outcomes. This can be done by proactively combating burnout and promoting engagement with various interventions, as engagement seems to be at least associated with a lower incidence of reporting some of the conditions associated with burnout.

REFERENCES

- Alsoofi, M. A., Al-Heeti, K. N., & Alwashli, A. (2000). *Burnout and its relationship with job stress and coping with stress for Yemeni teachers*. Paper presented at the 28th International Congress of Psychology, Stockholm, Sweden.
- Armon, G. (2009). Do burnout and insomnia predict each other's levels of change over time independently of the job demand control-support (JDC-S) model? *Stress and Health, 25*, 333–342.
- Armon, G., Melamed, S., Shirom, A., Berliner, S., & Shapira, I. (2010). Elevated burnout predicts the onset of musculoskeletal pain among apparently healthy employees. *Journal of Occupational Health Psychology, 15*(4), 399–409.
- Armon, G., Shirom, A., Berliner, S., Shapira, I., & Melamed, S. (2008). A prospective study of the association between obesity and burnout among apparently healthy men and women. *Journal of Occupational Health Psychology, 13*(1), 43–57.
- Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Development International, 13*(3), 209–223.
- Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology, 22*, 309–328.
- Bakker, A., Demerouti, E., Taris, T., Schaufeli, W., & Schreurs, P. (2003). A multigroup analysis of the job demands-resources model in four home care organizations. *International Journal of Stress Management, 10*(1), 16–38.
- Bakker, A. B., & Leiter, M. P. (2010). *Work Engagement: A handbook of essential theory and research*. New York, NY: Psychology Press.
- Brenninkmeyer, V., Van Yperen, N. W., & Buunk, B. P. (2001). Burnout and depression are not identical twins: Is decline of superiority a distinguishing feature? *Personality and Individual Difference, 30*, 873–880.
- Bryman, A., & Bell, E. (2003). *Business research methods*. (2nd ed.). New York, NY: Oxford University Press.
- Cholongitas, E., & Pipili, C. (2010). Impact of burnout syndrome on gastroesophageal reflux disease and irritable bowel syndrome in health care workers. *Journal of Clinical Psychiatry, 71*(2), 209–210.

- Chung, H. Y., Cesari, M., Anton, S., Marzetti, E., Giovannini, S., Seo, A. Y., Carter, C., Yu, B. P., & Leeuwenburgh, C. (2009). Molecular inflammation: Underpinnings of aging and age-related diseases. *Ageing Research Reviews*, 8, 18–30.
- Crossley, T. F., & Kennedy, S. (2002). The reliability of self-assessed health status. *Journal of Health Economics*, 21, 643–658.
- Danaei, G., Finucane, M. M., Lu, Y., Singh, G. M., Cowan, M. J., Paciorek, C. J., Lin, J. K., Farzadfar, F., Khang, Y., Stevens, G. A., Rao, M., Ali, M. K., Riley, L. M., Robinson, C. A., & Ezzati, M. (2011). National, regional, and global trends in fasting plasma glucose and diabetes prevalence since 1980: systematic analysis of health examination surveys and epidemiological studies with 370 country-years and 2.7 million participants. *The Lancet, Early Online, Publication*, doi:10.1016/S0140-6736(11)60679-X
- De Beer, L. T. (2012). Job demands-resources theory, health and well-being in South Africa. Doctoral dissertation, North West University, Potchefstroom, South Africa.
- DeNoon, D. J. (2007). *Job stress jacks up blood pressure*. Retrieved from <http://www.webmd.com/hypertension-high-blood-pressure/news/20070410/job-stress-jacks-up-blood-pressure>
- Demerouti, E., Mostert, K., & Bakker, A. B. (2010). Burnout and work engagement: A thorough investigation of the independency of both constructs. *Journal of Occupational Health Psychology*, 15(3), 209–222.
- Department of Health, Medical Research Council, OrcMacro (2007). *South Africa demographic and health survey 2003*. Pretoria, ZA: Department of Health.
- Elliot, A. C., & Woodward, W. A. (2007). *Statistical analysis quick reference guidebook: With SPSS examples*. Thousand Oaks, CA: Sage Publications.
- Everest College (2011). *Survey reveals 77% of Americans stressed about something at work*. Retrieved from <http://news.everest.edu/post/2011/03/survey-reveals-77-of-americans-stressed-about-something-at-work>
- Gale, E. A., & Gillespie, K. M. (2001). Diabetes and gender. *Diabetologia*, 44(1), 3–15.
- Glass, D. C., & McKnight, J. D. (1996). Perceived control, depressive symptomatology, and professional burnout: a review of the evidence. *Psychology and Health*, 11, 23–48.
- Goldstein, M. S., Siegel, J. M., & Boyer, R. (1984). Predicting changes in perceived self-reported health status. *American Journal of Public Health*, 74, 611–614.

- González-Romá, V., Schaufeli, W. B., Bakker, A. B., & Lloret, S. (2006) Burnout and work engagement: Independent factors or opposite poles? *Journal of Vocational Behaviour*, *68*, 165–174.
- Grant, M. D., Piotrowski, Z. H., & Chappell, R. (1995). Self-reported health and survival in the longitudinal study of aging. *Journal of Clinical Epidemiology*, *48*(3), 375–387.
- Hakanen, J. J. (2002). Työuupumuksesta työn imuun—Positiivisen työhyvinvointikä sitteen ja— Menetelmän suomalaisen version validointi opetusalan organisaatiossa [From burnout to job engagement—Validation of the Finnish version of an instrument for measuring job engagement (UWES) in an educational organization]. *Työ ja ihminen*, *16*, 42–58.
- Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology*, *43*, 495–513.
- Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The job demands-resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress*, *22*, 224–241.
- Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behaviour*, *38*, 21–37.
- Karasek, M. (2004). Melatonin, human aging, and age-related diseases. *Experimental Gerontology*, *39*, 1723–1729.
- Karasek, R. A. (1979). Job demand, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly*, *24*(2), 285–308.
- Kessler, R. C. (2003). Epidemiology of women and depression. *Journal of Affective Disorders*, *74*(1), 5–13.
- Khoury, S., Yarows, S. A., O'Brien, T. K., & Sowers, J. R. (1992). Ambulatory blood pressure monitoring in a nonacademic setting: effects of age and sex. *American Journal of Hypertension*, *5*, 616–623
- Kitaoka-Higashiguchi, K., Morikawa, Y., Miura, K., Sakurai, M., Ishizaki, M., Kido, T., Naruse, Y., & Nakagawa, H. (2009). Burnout and risk factors for arteriosclerotic disease: Follow-up study. *Journal of Occupational Health*, *51*, 123–131.
- Lee, O. Y., Mayer, E. A., Schmulson, M., Chang, L., & Naliboff, B. (2001). Gender-related differences in IBS symptoms. *American Journal of Gastroenterology*, *96*(7), 2184–2193.

- Leiter, M. P. (1993). Burnout as a developmental process: Consideration of models. In W. B. Schaufeli, C. Maslach, & T. Marek (Eds.), *Professional burnout: Recent developments in theory and research* (pp. 237–250). Washington, DC: Taylor and Francis.
- Leka, S., Griffiths, A. & Cox, T. (2004). Work organization & stress. *World health organization: Protecting workers' health series*, 3, 80.
- Manderbacka, K., Lahelma, E., & Martikainen, P. (1998). Examining the continuity of self-rated health. *International Journal of Epidemiology*, 27, 208–213.
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *Maslach Burnout Inventory manual*. (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.
- Mayo Clinic (2010). *Stress and high blood pressure: What's the connection?* Retrieved from <http://www.mayoclinic.com/health/stress-and-high-blood-pressure/HI00092>
- McGrath, A., Houghton, D., & Reid, N. (1989). Occupational stress and teachers in Northern Ireland, *Work and Stress*, 3, 359–368.
- Melamed, S., Shirom, A., Toker, S., & Shapira, I. (2006). Burnout and risk of type 2 diabetes: A prospective study of apparently healthy employed persons. *Psychosomatic Medicine*, 68, 863–869.
- Menec, V. H., Chipperfield, J. G., & Perry, R. P. (1999). Self-perceptions of health: A prospective analysis of mortality, control, and health. *Journals of Gerontology: Biological Sciences & Medical Sciences*, 54B, 85–93.
- Miilunpalo, S., Vuori, I., Oja, P., Pasanen, M., & Urponen, H. (1997). Self-rated health status as a health measure: The predictive value of self-reported health status on the use of physician services and on mortality in the working-age population. *Journal of Clinical Epidemiology*, 5(5), 517–528.
- Mirowsky, J., & Ross, C.E. (1992). Age and depression. *Journal of Health Social Behaviour*, 33(3), 187–205.
- Montgomery, A., Mostert, K., & Jackson, L. (2005). Burnout and health of primary school educators in the North West Province. *South African Journal of Education*, 25(4), 266–272.
- Moore, J. E. (2000a). One road to turnover: An examination of work exhaustion in technology professionals. *Management Information Systems Quarterly*, 21(1), 141–168.

- Moore, J. E. (2000b). Why is this happening? A causal attribution approach to work exhaustion consequences. *Academy of Management Review*, 25(2), 335–349.
- Mossey, J. M., & Shapiro, E. (1982). Self-rated health: A predictor of mortality among the elderly. *American Journal of Public Health*, 72, 800–808.
- National Health Service (2010). *Symptoms of stress*. Retrieved from <http://www.nhs.uk/Conditions/Stress/Pages/Symptoms.aspx>
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.
- Pollard T. M. (1997) Physiological consequences of everyday psychosocial stress. *Collegium Antropologicum*, 21(1), 17–28.
- Reuben, D. B., Siu, A. L., & Kimpau, S. (1992). The predictive validity of self-report and performance-based measures of function and health. *Journal of Gerontology*, 47, M106–M110.
- Rosenthal, T., & Alter, A. (2012). Occupational stress and hypertension. *Journal of the American Society of Hypertension* 6(1), 2–22.
- Rothmann, S., & Rothmann, J. C. (2007). *The South African Employee Health and Wellness Survey (SAEHWS)*. User manual (4th ed.). Potchefstroom, ZA: Afriforte.
- Schaufeli, W. B. (2003). Past performance and future perspectives of burnout research. *South African Journal of Industrial Psychology*, 29(4), 1–15.
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behaviour*, 25, 293–315.
- Schaufeli, W. B., & Bakker, A. B. (2010). Defining and measuring work engagement: Bringing clarity to the concept. In A. B. Bakker & M.P. Leiter (Eds.), *Work engagement: A handbook of essential theory and research* (pp. 10–24). New York, NY: Psychology Press.
- Schaufeli, W. B., & Enzmann, D. (1998). *The burnout companion to study and practice: A critical analysis*. Washington, DC: Taylor & Francis.
- Schaufeli, W. B., & Salanova, M. (2007). Work Engagement: an emerging psychological concept and its implications for organizations. In S. W. Gilliland, D.D. Steiner & D. P.

- Skarlicki (Eds.), *Managing social and ethical issues in organizations* (pp. 135–177). Greenwich, CT: Information Age Publishers.
- Schaufeli, W. B., & Taris, T.W. (2005). The conceptualization and measurement of burnout: Common ground and worlds apart. *Work and Stress, 19*(3), 256–262.
- Shirom, A. (2009). Editorial; Burnout and health: Expanding our knowledge. *Stress and Health, 25*(5), 281–285.
- Shirom, A. (2010). Feeling energetic at work: On vigor's antecedents. In A. B. Bakker & M. P. Leiter (Eds.) *Work engagement: Recent developments in theory and research* (pp. 69-84). New York, NYC: Psychology Press.
- Shirom, A., Melamed, S., Toker, S., Berliner, S., & Shapira, I. (2005). Burnout and health review: Current knowledge and future research directions. *International review of industrial and organizational psychology, 20*, 269-308.
- Shirom, A., Vinokur, A. D., & Vaananen, A. (2008). *Vigor and emotional exhaustion are independently associated with self-rated health and work capacity: A cross-country comparison*. Manuscript in preparation. Faculty of Management, Tel Aviv University, Tel Aviv, Israel.
- Shirom, A., Westman, M., Shamai, O., & Carel, R. F. (1997). Effects of work overload and burnout on cholesterol and triglycerides levels: The moderating effects of emotional reactivity among male and female employees. *Journal of Occupational Health Psychology, 2*(4), 275–288.
- SPSS Inc. (2011). *SPSS 19.0 for Windows*. Chicago, IL: SPSS Inc.
- The American Psychological Association (2011). *APA survey finds many U.S. workers feel stressed out and undervalued*. Retrieved from <http://www.apa.org/news/press/releases/2011/03/workers-stressed.aspx>
- The American Institute of Stress (2012). *Effects of stress*. Retrieved from <http://www.stress.org/topic-effects.htm>
- Toker, S., & Biron, M. (2012). Job burnout and depression: Unraveling their temporal relationship and considering the role of physical activity. *Journal of Applied Psychology. Advance online publication*. doi: 10.1037/a0026914

- Virtanen, M., Honkonen, T., Kivimaki, M., Ahola, K., Vahtera, J., Aromaa, A., & Lonnqvist, J. (2007). Work stress, mental health and antidepressant medication findings from Health 2000 Study. *Journal of Affective Disorders*, 98, 189–197.
- WebMD (2012). *Stress management health centre: Stress symptoms*. Retrieved from <http://www.webmd.boots.com/stress-management/stress-symptoms>
- Weidner, G., & Cain, V. S. (2003). The gender gap in heart disease: Lessons from Eastern Europe. *American Journal of Public Health*, 93(5), 768–770.
- Weiss, M. (1983). Effects of work stress and social support on Information Systems Managers. *MIS Quarterly*, 7, 29–43.
- Weissman, M. M., & Olfson, M. (1995). Depression in women: Implications for health care research. *Science*, 269(5225), 799–801.
- Wiinber, N., Hoegholm, A., Christensen, H. R., Bang, L. E., Mikkelsen, K. L., Nielsen, P. E., Svendsen, T. L., Kampmann, J. P., Madsen, N. H., & Bentzon, M. W. (1995). 24-h ambulatory blood pressure in 352 normal Danish subjects, related to age and gender. *American Journal of Hypertension*, 8, 978–986.
- Wilson, S., Roberts, L., Roalfe, A., Bridge, P., & Singh, S. (2004). Prevalence of irritable bowel syndrome: a community survey. *British Journal of General Practice*, 54(504), 495–502.

CHAPTER 5

RESEARCH ARTICLE 4

THE HIGH COST OF LIVING (AND WORK): LINKING EMPLOYEE BURNOUT TO MEDICAL AID EXPENDITURE³

ABSTRACT

Orientation: Burnout has been connected to objective organisational outcomes, such as absenteeism, in the past, but the connection of burnout with financial outcomes has been limited.

Research purpose: To investigate the connection of burnout with objective medical aid claim and expenditure data.

Motivation for the study: To investigate the impact burnout can have on health care expenditure.

Research design, approach and method: A cross-sectional design was used. The sample consisted of 3 182 participants. The available objective claims data connected to each participant was: Total insured benefits, general practitioner visits, specialist visits, general practitioner insured benefits and claims for medicine. A high and a low burnout group was extracted based on specific comorbidity criteria, namely the core components of burnout (i.e. high scores on both exhaustion and cynicism). Analysis of covariance (ANCOVA) was then implemented to investigate the differences in estimated marginal means between the low and the high burnout groups, whilst controlling for age and gender as covariates.

Main findings: The high burnout group frequented a general practitioner more often and their medical aid fund expenditure is close to double the amount of the low burnout group, on all the variables. Specialist visits did not show a significant result.

Practical/managerial implications: These findings will make stakeholders aware of the financial ramifications that burnout can have, and measures to combat burnout in organisations should therefore be strongly considered.

Contribution/value-add: This study provides information on the link of burnout with health care expenditure, i.e. medical aid provider expenditure.

Keywords: burnout; health outcomes; financial outcomes; medical aid expenditure

³ A shortened version of this article meeting the journal's editorial guidelines has been accepted for publication in the *South African Medical Journal*

INTRODUCTION

Healthcare has become a major source of expenditure in both macro- and micro-contexts. The United States spent 16.3% of its gross domestic product (GDP) on healthcare in 2009, which was the highest of any country. Comparatively, South Africa spent 8.7% of GDP on healthcare. In South Africa, the public health sector provides healthcare to 86% of the population, but only accounts for 40% of healthcare spending. Subsequently, the private sector services the remaining 14% of the population and accounts for 60% of healthcare spending. Total healthcare expenditure for South Africa is higher than in *most* other upper-middle income countries and similar to *some* high-income countries, but the health status indicators are much worse than in other countries with the same level of economic development; large socio-economic inequalities still exist as a result of the *apartheid* legacy, i.e. high unemployment, poverty, and a high crime-rate. Furthermore, South Africa has the largest incidence of HIV cases in the world, estimated at 11.9% of the population in 2007 and a total number of 5.7 million cases in 2009 (Health of Nations, 2011; UNGASS, 2010). It is expected that spending on healthcare services and products will increase fairly rapidly during the years 2010 to 2014 (Health of Nations, 2011).

Based on their pre-existing risk medical scheme contributors choose options. Therefore the younger and wealthier choose the lower risk options. Conversely, the sick contributors (rich or poor) select the more expensive high risk options as this would provide the most medical cover for them. Table 1 provides a summary of estimated expenditure per capita for a medical scheme package by providers for the insured and uninsured population (cf. Harrison, 2009).

Table 1

Average cost of medical packages per capita for the period 2008/2009

Description	Option	Costs		Total Spent (ZAR)
		Average Cost (ZAR)	Average Cost (USD)	
Insured population ⁺	Low risk	2 880	386.06	13 940*
	High risk	7 680	1 029.49	1 639*
Uninsured population ⁺⁺	n/a	678	90.88	28 132*

Notes: * Amount in millions of rand (ZAR); ⁺ Beneficiaries number: 7 827 842; ⁺⁺ Beneficiaries number: 41 492 158

As can be seen from Table 1, the average cost *to the insurer*, i.e. how much the medical aid fund(s) pay the providers for each insured person, of a medical scheme package in 2008/2009 in South Africa varied between R2 880 (US\$386.06)⁴ for the low risk option, and R7 680 (US\$1 029.49) for the high risk option. The former mentioned costs are from the privately insured population who number close to 8 million people. Contrasting this to the uninsured population of 41.5 million people and the government per capita allocation of R678 or US\$90.88 per person (cf. Harrison, 2009) becomes glaring. As can be seen, the uninsured population outnumbered the insured population by a huge margin.

According to the Health Systems Trust (2011), the figures as of 2010 show that total private expenditure on health care per capita was R10 279 (US\$1 342), and public health care per capita was R2 635 (US\$344) in South Africa. A major disparity therefore exists between private and public healthcare expenditure. Consequently, Harrison (2009) shares that the minimum benefits provided to one low-risk scheme beneficiary would need to be increased 1.5 fold (or to 2.5 people) at the same cost for a private practitioner to provide primary care to a person currently uninsured and managed by the public sector. Furthermore, the South African government is considering a mandatory National Health Insurance System to enable access for all of the population to receive health care according to their needs which all members of the population will be required to contribute to. In 2005/2006, general tax accounted for 40% of total health care funds. Moreover, the richest quintile receives 68.7% of the total income and contributes 82% to the total health care funding. There are also specific risks with the establishment of such a system that include *inter alia*: Financing for the uninsured could lead to a rise in private sector costs, depending on the willingness of the wealthy to pay for this care. The uniqueness of the South African context also makes the establishment of this system quite challenging; consider *inter alia* the HIV/AIDS statistics as well as the ever widening gap between the wealthy and the poor.

⁴ As of May 2012 the South African Rand (ZAR) has averaged R 7.46 to \$ 1.00 (USD) over a 10 year period.

Work stress and health

For decades it has been known that work stress has adverse effects on physical and psychological health (McGrath, 1989). According to Lee (1997), the majority of employers are ignorant of the annual costs of employee stress to their businesses. Furthermore, mental health problems have significant implications on annual expenditures of businesses, and society as a whole, of several billion dollars (International Labour Organisation, 2000). According to Marchand, Demers and Durand (2005, p. 1), occupations, and to a greater extent "pathogenic" work organisation conditions, e.g. "physical and psychological demands, irregular schedules, and workplace harassment, contribute independently to psychological distress." Nearly 30% of workers in Europe described themselves as being "exposed to stress" (Eurostat, 2009), while more recently the Ipsos MORI / EU-OSHA (2012) survey found that eight in ten of the work force across Europe believe that the number of individuals afflicted by job-related stress will increase over the next five years.

The World Health Organisation (Leka *et al.*, 2004) states that work stress can lead to inter alia the following physical health consequences: heart disease, disorders of the digestive system, increased blood pressure and musculoskeletal disorders. Psychological distress has also been implicated in an increased risk of coronary heart disease (Stansfeld *et al.*, 2001). Recent cancer research has also shown that there is a direct link between chronic stress and damage to the chromosomes in cells, with the ends – called telomeres – shortening as individuals are exposed to chronic stress; affecting the risk and timing of diseases from cancer to cardiovascular disease, stroke and diabetes (American Association for Cancer Research, 2011).

Not only does work stress have a health consequence, but it also has a fiscal impact, e.g. the annual cost of stress-related presenteeism and absenteeism to the Australian economy numbers \$14.81 billion dollars (Medibank, 2008). A Safe Work Australia (2012) study revealed that stress (body and mental) costs Australia more than \$30 billion a year. Furthermore, in the United States, the cost of stress in the workplace, including absenteeism, reduced productivity and sick leave were estimated at \$300 billion in 2010 (Barroux, 2011). The consequences of the most

recent economic recession should not be discounted when considering the current dynamics of work stress and work-related well-being.

Chronic job stress due to workload (an environmental factor) is more related to burnout than is neuroticism (a personality factor) or age (a demographic factor) (Schaufeli & Enzmann, 1998; Lee & Ashforth, 1996). Therefore, without sufficient coping mechanisms or buffers, stress leads to burnout (Alsoofi, Al-Heeti, & Alwashli, 2000). Burnout is the state of physical, mental and emotional exhaustion caused by a depletion of the ability to cope with the environment, resulting from our responses to the on-going demands of our daily lives (Maslach, 1982). According to Schaufeli and Taris (2005), *exhaustion* (lack of energy) and *cynicism* (negative, indifferent, overly detached attitudes) are the two core components of burnout. The seriousness of burnout becomes apparent with studies such as that of Ahola (2010), finding that burnout may be a risk factor for overall survival.

Burnout and health

Maslach (2001) poses the question as to whether physical health is a critical outcome of burnout, and also states that this causal link is considered to be true in stress research but that the actual research on links between burnout and physical health has been limited. Since then, some studies have attempted to link burnout with physical health, with some success.

As discussed in Shirom *et al.* (2006), burnout is associated with *inter alia*, namely anxiety, somatic complaints (sleep disturbances, recurrent headaches, and gastro-intestinal problems) and depression symptomatology: “lack of pleasurable experience, feelings of anger, guilt, apprehension, and physiological symptoms of distress”. Furthermore, Shirom *et al.* (2006) explain that, even though burnout and depression share common symptoms such as fatigue, concentration issues and low energy, they have been shown to be two distinct and separable constructs (Schaufeli & Enzmann, 1998). In a literature review by Glass and McKnight (1996) it was also found that depression and burnout are not identical even though they share symptoms; specifically the exhaustion component.

Melamed, Shirom, Toker, Berliner and Shapira (2006) found evidence for the link between burnout (as indicated by a related measure of it, i.e. “vital exhaustion”) and cardiovascular disease and cardiovascular-related events. Vital exhaustion is characterised by feelings of excessive tiredness, i.e., fatigue, increased irritability, and demoralisation (Raikkonen, *et al.*, 1996). Kitaoka-Higashiguchi *et al.* (2009) investigated burnout and risk factors for arteriosclerotic disease and found that burnout may indeed be associated with risk factors pertaining to it.

In a longitudinal study by Melamed *et al.* (2006) it was found that burnout symptoms over time remained remarkably consistent, and that there was a 1.86-fold increase in the odds of type 2-diabetes in burned out individuals over time; indicating the possibility of chronic burnout as possible risk factor (predictor) for the onset of type 2 diabetes. A longitudinal study by Armon *et al.* (2008), however, did not confirm that burnout predicted obesity over time. Furthermore, Armon (2009, p. 333) investigated the relationship, and change, between burnout and insomnia over a period of time and found “that burnout and insomnia may adversely affect one another, even in workers with low job strain”. Evidence therefore suggests that burnout and insomnia are mutually associated with one another over time, i.e. reciprocal. Burnout has also been found to predict the onset of musculoskeletal problems in apparently healthy employees over time. Interestingly, no reverse causation was found for musculoskeletal problems elevating burnout levels (Armon, 2010).

Shirom *et al.* (1997) found a link between burnout and cholesterol levels. However, gender-based differences were found in their results, where for men burnout was a positive predictor of the change in cholesterol level, and in women the changes in the levels of cholesterol and triglycerides tended to be positively predicted by emotional burnout, but were negatively predicted by fatigue. In Melamed *et al.* (1999) it was found that a link does indeed exist between burnout and elevated cortisol levels; which they suggested as a possible mechanism underlying the then emergent connection between burnout and the risk of cardiovascular disease.

A method of investigating well-being at work is with the job demands-resources (JD-R) model. The JD-R model is based on a dual process which comprises the “motivational process” and the “health impairment process”. This is graphically represented and discussed below.

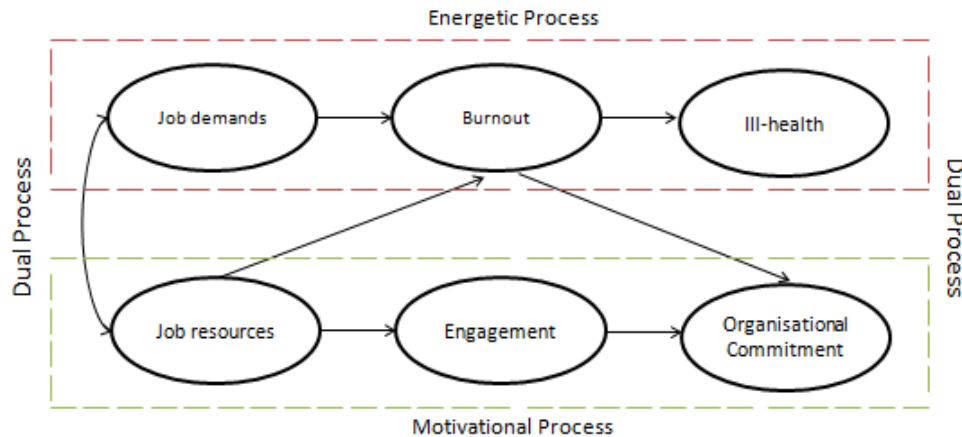


Figure 1. A JD-R model adapted from Hakanen, Bakker, and Schaufeli (2006).

Of specific interest here is the health impairment process which can be described as an energy-depleting process due to job demands, where specifically work overload (such as pace and amount of work) leads to exhaustion and eventual burnout, which in turn can have health consequences (Bakker *et al.*, 2003; Maslach, Jackson, & Leiter, 1996). The motivational process should also be mentioned in that job resources lead to engagement and positive organisational outcomes such as commitment (Schaufeli & Bakker, 2004).

Maslach (2001) states that the central tenet of health psychology is the relationship between stress and poor health and that the myriad of health and wellness programmes and workplace interventions are a consequence of this relationship. Furthermore, Bakker and Demerouti (2006) suggest that future research should attempt to focus on objective outcomes that are important to businesses, e.g. productivity and employee turnover. Thus, even though some of the former studies have connected burnout to physical health, it is imperative that research investigates other objective data, and this imperative forms the objective of this research, with an attempt to connect burnout with medical aid expenditure/claims.

At the time of this writing, it is gleaned that there have been limited or no studies that have investigated burnout (as measured by a self-report survey) with objective medical aid

expenditure/claims linked to the specific respondents, with data such as general practitioner visits, insured benefits, and/or other medical aid claim data in order to estimate ramifications and, of course thus also the cost implications.

Subsequently, this study will create two contrast-groups from the sample based on the burnout, i.e. exhaustion and cynicism, scores of the participants (a *high* and a *low* group); and investigate differences in the objective expenditure claim variables.

The hypotheses for this study are therefore as follows:

Hypothesis 1: The high burnout group will, more often than the low burnout group, frequent:

- a) General Practitioners (GP visits)
- b) Specialists (SP visits)

Hypothesis 2: The insured benefit claims will differ significantly for the low and high burnout groups with regard to:

- a) Total Insured Benefits
- b) General Practitioner Insured Benefits

Hypothesis 3: The high burnout group will claim more for medicinal purchases than the low burnout group.

Potential value add of this study

This study will provide information on the connection of burnout to medical aid provider expenditure, which appears to be the first study in any context to connect burnout, as a subjectively identified work-related phenomenon, with to this financial indicator. Therefore, this will provide additional evidence of the consequences burnout, as a subjective state, has on real-world outcomes.

RESEARCH DESIGN

Research approach

A survey design was used to achieve the research objective (Shaughnessy, Zechmeister, & Zechmeister, 2003). Individual cross-sectional surveys were conducted at convenience as part of

a consultation project in an organisation from the financial sector. A cross-sectional design enables researchers to observe a group of people at a specific point in time, for a short period, such as a day or a few weeks (Du Plooy, 2002).

Research method

Participants

A sample of individuals ($n = 3\ 182$) was used from a South African organisation in the financial sector. Employees of all ages and education levels were sampled at random as part of an organisational diagnosis consultation project conducted by Afriforte (Pty) Ltd. Afriforte (Pty) Ltd. is the commercial arm of the WorkWell Research Unit of the North-West University. Anonymity of the participants was assured.

Table 2

Characteristics of the total sample ($n = 3\ 182$) and the burnout groups

Item	Category	Total Sample ($n = 3182$)		Low Burnout ($n = 236$)		Excluded Population ($n = 2176$)		High Burnout ($n = 770$)	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%
Gender	Male	1150	36.14	124	52.54	809	37.18	217	28.18
	Female	2032	63.86	112	47.46	1367	62.82	553	71.81
Age	<20	3	0.01	0	0.00	3	0.14	0	0.00
	20-29	1043	32.78	42	17.80	670	30.79	331	42.99
	30-39	1062	33.38	71	30.08	748	34.38	243	31.56
	40-49	630	19.80	66	27.97	433	19.90	131	17.01
	50-59	378	11.88	42	17.80	279	12.82	57	7.40
	>60	66	2.07	15	6.36	43	1.98	8	1.04
Marital status	Single	1283	40.32	68	28.81	866	39.80	349	45.32
	Engaged	156	4.90	3	1.27	103	4.73	50	6.49
	Married	1400	44.00	137	58.05	954	43.84	309	40.13
	Divorced	289	9.08	22	9.32	214	9.83	53	6.88
	Widow	50	1.57	6	2.54	36	1.65	8	1.04
	Widower	4	0.13	0	0.00	3	0.14	1	0.13
Language	Afrikaans	909	28.57	70	29.66	605	27.80	234	30.39
	English	1434	45.06	89	37.71	1009	46.37	336	43.64
	Sepedi	131	4.12	12	5.08	96	4.41	23	2.99
	Sesotho	120	3.77	10	4.24	78	3.58	32	4.16

	Setswana	178	5.59	21	8.90	115	5.28	42	5.45
	Siswati	15	0.47	1	0.42	7	0.32	7	0.91
	Tshivenda	27	0.85	3	1.27	16	0.74	8	1.04
	isiZulu	211	6.63	18	7.63	144	6.62	49	6.36
	isiNdebele	21	0.66	3	1.27	15	0.69	3	0.39
	isiXhosa	92	2.89	2	0.85	66	3.03	24	3.12
	Xitsonga	35	1.10	5	2.12	19	0.87	11	1.43
	Other	9	0.28	2	0.85	6	0.28	1	0.13
Qualification	Grade 8	23	0.72	4	1.69	16	0.74	3	0.39
	Grade 9	21	0.66	2	0.85	15	0.69	4	0.52
	Grade 10	126	3.96	10	4.24	75	3.45	41	5.32
	Grade 11	51	1.60	3	1.27	39	1.79	9	1.17
	Grade 12	1729	54.34	117	49.58	1166	53.58	446	57.92
	3 Year Degree	732	23.00	63	26.69	510	23.44	159	20.65
	4 Year Degree	317	9.96	21	8.90	221	10.16	75	9.74
	Master's Degree	176	5.53	15	6.36	129	5.93	32	4.16
	Doctoral Degree	7	0.22	1	0.42	5	0.23	1	0.13
Province	Gauteng	2466	77.50	169	71.61	1719	79.00	578	75.06
	Mpumalanga	36	1.13	6	2.54	21	0.97	9	1.17
	North West	25	0.79	5	2.12	12	0.55	8	1.04
	Limpopo	19	0.60	3	1.27	7	0.32	9	1.17
	Free State	72	2.26	8	3.39	33	1.52	31	4.03
	Northern Cape	14	0.44	1	0.42	6	0.28	7	0.91
	Western Cape	278	8.74	18	7.63	185	8.50	75	9.74
	Eastern Cape	60	1.89	6	2.54	40	1.84	14	1.82
	KwaZulu-Natal	212	6.66	20	8.47	153	7.03	39	5.06

The majority of the total sample was female, namely 2 032 (63.9%), while 1 150 (36.1%) were male participants. Furthermore, the number of participants from the 20-39 year age group was in the majority. The most prevalent home languages were English with 1 434 (45.1%) participants and Afrikaans with 909 (28.6%). Employees that were married numbered 1 400 or 44.0%, and those that were single 1 283 (40.3%). The majority of participants, 1 729 (54.3%), had a general high school education (Grade 12). Furthermore, 732 (23.0%) participants had a three-year degree/diploma, and 317 people (10.0%) had a four-year university degree/diploma. The vast majority of the participants, 2 466 (77.5%), were from the Gauteng province.

Measuring instrument

The *South African Employee Health and Wellness Survey* (SAEHWS) was developed as a web-based, or paper-and-pencil, self-administered survey to be applied in organisational diagnoses by the Research Unit of which the researcher forms part. The SAEHWS comprises different sections, collecting additional wellness, work, financial and health information from the respondents.

The SAEHWS fuses organisational climate assessment with other important variables influencing the climate in order to achieve maximum management information whilst implementing one measurement/assessment only (Rothmann & Rothmann, 2007). The internal consistency of all the subscales of the SAEHWS is satisfactory compared to generally accepted guideline (i.e. $\alpha \geq 0.70$; Nunnally & Bernstein, 1994).

In line with Schaufeli and Taris (2005), Burnout was measured by the two core components, namely Exhaustion and Mental distance (Cynicism). Therefore the following subscales were measured by Likert scales for this study: *Exhaustion*: ($\alpha = 0.80$) based on 4 items, e.g. 'I feel tired before I arrive at work'; *Mental distance (Cynicism)*: ($\alpha = 0.75$) based on 4 items, e.g. 'I am uncertain whether my work is important'.

Objective medical claims expenditure data were made available by the organisation for each of the respondents. Anonymity of the organisation and the participants was assured; the only identifier was a unique but arbitrary number to connect the correct respondent with the correct data from the medical claims data to ensure accuracy for the data analyses. No other identifying information, or the number itself, was made available to any party after analyses in any form. The available claims data was: Total insured benefits, number of GP (General Practitioner) visits, Specialist visits, insured benefit general practitioner claims, and claims for medication. Furthermore, it is important to add that all the data was only for a six-month period for each individual and not for the total medical plan on which a whole family might be, for example. This adds to the accuracy and validity of the findings.

Research procedure

Data was collected from the financial sector in 2010 for this study. The survey was web-based and anonymity of participants was guaranteed. Informed consent was obtained from all participants and relevant parties. All participants were assigned a unique number connected to medical aid expenditure data for the participant. All the participants received a link to the computer-based survey via e-mail. The system and connection was secured with the American Encryption Standard (AES) so that data could not be compromised even if illegally obtained. No identifying information was shared with organisation or other parties during or after the research.

Statistical analyses

The statistical analysis was carried out with the SPSS 19 (SPSS Inc., 2011) package. From the sample, a high burnout group and a low burnout group was created. The high burnout group was calculated by including in it individuals in the 80th, 90th and 100th percentile of burnout scores, i.e. individuals scoring in the specified range on *both* exhaustion and cynicism. In contrast, the 10th, 20th and 30th percentile of burnout scores (on *both* exhaustion and cynicism) were then grouped together into the low burnout group. Subsequently, the remaining number of participants was the unused population and not included in the analyses (see Table 2 for a breakdown). This established two contrast groups for investigation; the antipodes of the components of burnout, from the sample. The number of participants in the high burnout group numbered 770 and in the low burnout group 236 individuals.

To test the hypotheses, analysis of covariance (ANCOVA) was performed. ANCOVA is basically a one-way ANOVA (Analysis of Variance), but the means across groups are not compared directly. Instead, the means are adjusted by other variables called a covariate (also called a concomitant variable) that needs to be intrinsic to the subject observed, i.e. the covariate should not be influenced by the study itself (Elliot & Woodward, 2007). Therefore ANCOVA was performed, controlling for age and gender, to investigate the significance and differences between the means of the contrast groups, i.e. the high burnout group and the low burnout group. Levene's test (Levene, 1960) was applied to ascertain the homogeneity of the variances. The

variances were found to be homogeneous. The Bonferroni correction was selected to, inter alia, limit the occurrence of Type I errors; it is also valid for equal and unequal sample sizes.

RESULTS

Based on the correlations computed, exhaustion and cynicism were found to be statistically and practically related ($r = 0.53$; $p < 0.01$) with a large effect. Analysis of covariance (ANCOVA) was undertaken to explore the difference in means from a low and high burnout group, whilst controlling for age and gender, in all instances, as the covariates. The dependent variables in each analysis were: General practitioner visits, general practitioner-insured benefits, specialist visits, claims for medicine and the total insured benefits. Table 3 presents the estimated marginal means with confidence intervals of 95% from the ANCOVA analyses.

Table 3

Estimated marginal means with 95% confidence intervals

Description	Burnout		95 % CI			p
	Group	Mean	SE	Lower	Upper	
GP Visits	Low	2.42	0.19	2.04	2.80	.001
	High	3.26	0.10	3.05	3.46	
	Difference	0.84				
GP Insured Benefits	Low	89.18	24.34	41.42	136.94	.014
	High	158.90	13.02	133.35	184.45	
	Difference	69.72				
Specialist Visits	Low	1.05	0.14	0.78	1.335	.776
	High	1.01	0.08	0.86	1.158	
	Difference	0.04				
Medicine Claims	Low	81.93	28.41	26.18	137.68	.016
	High	161.76	15.20	131.93	191.59	
	Difference	79.83				
Total: Insured Benefits	Low	2411.45	919.79	606.52	4216.37	.010
	High	5148.75	492.12	4183.05	6114.45	
	Difference	2737.30				

Notes: Covariates were age and gender; Difference calculated by subtracting the higher mean value from the lower mean value; GP = General Practitioner; All mean values excluding visits are currency values (ZAR); All mean visit values indicate number of visits.

As can be seen from Table 3, all the differences obtained from the ANCOVA analyses were significant, except for Specialist visits ($p = .679$). This result therefore rejects H1b.

General Practitioner Visits (GP visits)

The results of the ANCOVA indicated that both age, $F(1, 1002) = 17.85$; $p < .001$, and gender, $F(1, 1002) = 30.03$; $p < .001$ were significant covariates of GP visits. After controlling for the former, a significant difference was still found; $F(1, 1002) = 14.08$; $p < .001$. This result supports hypothesis 1a by showing that the higher burnout group does frequent the general practitioner on average more (0.84, or almost one visit more) than the lower burnout group.

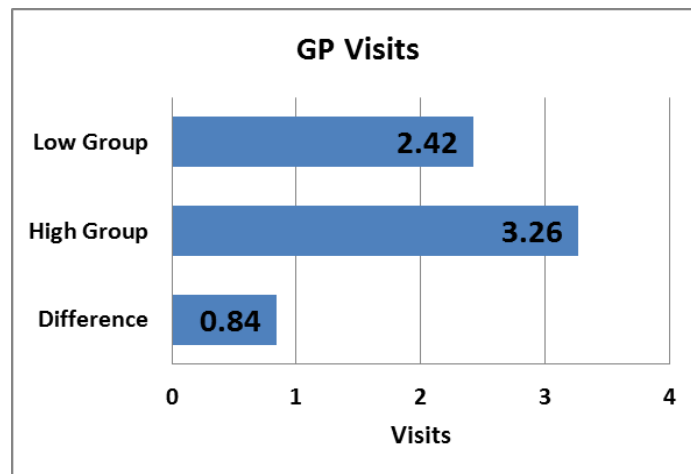


Figure 2. Difference in general practitioner visits per burnout group.

Specialist Visits

The result of this analysis was not significant. Therefore there were no significant differences between the estimated means of the low and high burnout groups, rejecting hypothesis 1b.

General Practitioner-Insured Benefits

The results of the ANCOVA analysis indicated that neither the covariate of age ($p < .76$), nor gender ($p < .18$) had a significant impact. However, a significant difference was found between

the low and high burnout groups, $F(1, 1004) = 6.10$; $p < .014$. This result supports hypothesis 2a by illustrating that expenditure on the high burnout group is on average more (R69.72) than for the lower burnout group.

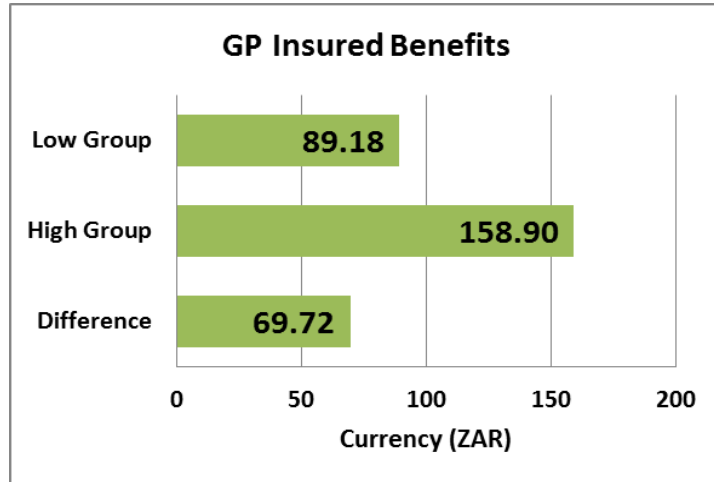


Figure 3. Difference in GP-insured benefits claims per burnout group.

Total: Insured Benefits

The results of the ANCOVA indicated that only age, $F(1, 1002) = 8.01$; $p < .005$, was a significant covariate. Controlling for the former, a significant difference in total insured benefit claims was found, $F(1, 1004) = 6.59$; $p < .010$. This result shows that expenditure for the high burnout group is more (R2 737.30 more) than the low burnout group, and this result supports hypothesis 2b.

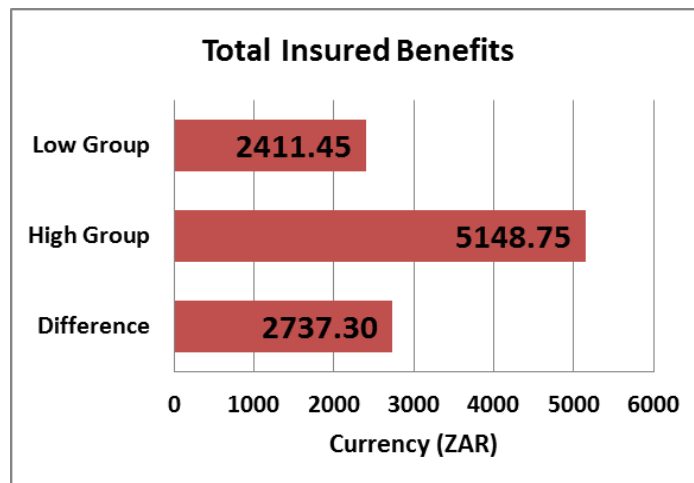


Figure 4. Difference in the total insured benefits claims per burnout group.

Medicine Claims

The results of the ANCOVA indicated that only gender, $F(1, 1002) = 5.64$; $p < .018$, was a significant covariate. Controlling for the former, a significant difference was found, $F(1, 1004) = 5.87$; $p < .016$. This result supports hypothesis 3 by showing that the high burnout group, on average, claims more (R79.83) than the low burnout group.

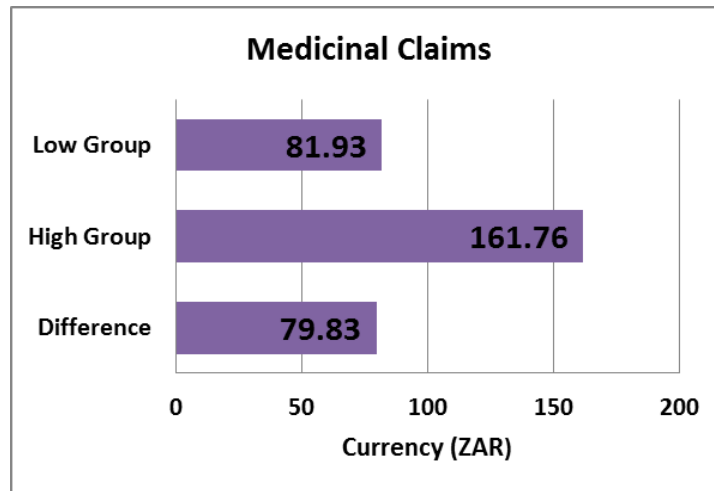


Figure 5. Difference in medicine claims per burnout group.

DISCUSSION

The aim of this study was to attempt to connect burnout as a subjective, self-identified phenomenon with objective outcome data, i.e. medical aid expenditure and claims data. Therefore a cost component could be investigated to ascertain the association that burnout level (*low* versus *high*) can have financially, i.e. on medical aid expenditure.

A quick review of Table 1 will reveal that in the majority of cases, the high burnout group had higher expenditure values than the low burnout group. The only result that was not significant was that there was no clear difference in specialist visits between the high and low groups. As for why specialist visits were not significant, one can present various reasons; it is most likely that individuals first go to their general practitioner and are only referred to specialists in

extraordinary cases when the general practitioner sees the need for this to happen; and that the general practitioner might be the only necessary stop for a diagnosis.

The findings of this study indicate that individuals that score high on burnout visit general practitioners on average close to one time more than the low burnout group. Reasons for this can be speculated on: one of the first thoughts that come to mind is that it could be that the high burnout group individual realises that *something* is wrong, or general health has already deteriorated as a result of an affliction of burnout. This can also be connected to past studies like that of Melamed *et al.*, (2006) and Melamed, Shirom, and Toker (2006) that found that burnout has a detrimental effect on physical health, and concomitantly, very likely also *perceptions* of one's own physical health.

It is important to remind the reader that all claims were only for a six-month period and not for an entire year. The results further show that expenses for claims by the provider that are made for medicine by the high burnout individuals are almost double the amount of the lower burnout group. This also applies to the total insured benefit claims and insured benefits for general practitioner visits. Therefore these findings suggest that high burnout individuals claim almost double the amounts of the low burnout individuals if one looks at the difference between the two groups. According to Golden (2004), even though it has indicated that stress can add 10% to the estimated work stress costs that are estimated, it is emphasised that the principle of correlation versus causation should be understood and that high medical bills could, for example, also cause stress in an individual.

Employers, medical aid funds, and legislators now have additional evidence that work-related well-being is a major factor when it comes to general health and therefore also medical aid claims, as well as general medical aid expenditure. Logically, it would then be in the interest of employers and medical aid fund administrators to focus on reducing burnout levels in employees to curb their own expenses and the incidence of claims. Research also shows that burnout may even transfer, directly or indirectly, from one employee to another, i.e. contagion (cf. Bakker, Demerouti, & Schaufeli, 2003; Bakker, Le Blanc, & Schaufeli, 2005; Bakker, Schaufeli, Sixma, & Bosveld, 2001). Employees should therefore guard against this phenomenon by ensuring

adequate job resources and effort-recovery strategies to off-set the health impairment process. The difficult option of having to consider leaving current employment should perhaps even be considered if the environment is too 'toxic' and does not show clear signs of improvement. If not, the health consequences could be disastrous for the employee. Moreover, if employers do not do their part in ensuring the well-being of their employees, it could have a contagious effect on other employees and lead to more absenteeism, sick leave and other unwanted consequences.

Lastly, the South African and other governments that are considering National Health Insurance Systems, or similar systems, would be well served in focusing more of their efforts and attention on the psychological well-being of the labour force through policies and even legislation, which in turn could have a significant cost-reduction impact on expenditure of government healthcare spending currently and also in the event of the creation of a NHIS.

Limitations and recommendations for future research

The most apparent limitation of this study is its cross-sectional design. It is therefore generally advised that causality should not be inferred. Future research should attempt a longitudinal design and investigation. Such studies could include an objective assessment by medical practitioners to ascertain general health status of participants.

This sample was also taken from the financial sector, so care should be taken not to generalise the findings, even though it does make sense to extrapolate to other sectors as burnout has been confirmed to exist in a variety of occupations and sectors. Therefore future research could attempt to confirm these results by performing similar studies in different sectors. However, researchers are hard pressed to find objective medical aid data; hence it is advised that academic institutions approach employers and/or medical aid funds for their cooperation in this regard.

Recommendations to stakeholders

Medical schemes are regulated. However, significant cost escalations have happened in recent years, and this points to inadequacy of legislation and the industry's ability to contain costs

(HSRC, 2007). Therefore the South African and other governments that are considering National Health Insurance Systems should focus on the psychological well-being of the labour force through policies and even legislation, which in turn could have significant cost-reduction impact on expenditure of government currently, and also in the event of the official inception of a NHIS which would help keep this NHIS liquid and lessen potential burdensome increases on tax payers. Governments could even consider subsidies for businesses that implement work-related well-being policies through relevant professionals, i.e. industrial psychologists and the like.

REFERENCES

- Ahola, K., Vaananen, A., Koskinen, A., Kouvonen, A., & Shirom, A. (2010). Burnout as a predictor of all-cause mortality among industrial employees: A ten-year prospective register-linkage study. *Journal of Psychosomatic Research, 69*(1), 51–57.
- Alsoofi, M. A., Al-Heeti, K. N., & Alwashli, A. (2000). *Burnout and its relationship with job stress and coping with stress for Yemeni teachers*. Paper presented at the 28th International Congress of Psychology, Stockholm, Sweden.
- American Association for Cancer Research (2011). Chronic stress of cancer causes accelerated telomere shortening. *ScienceDaily*. Retrieved from <http://www.sciencedaily.com/releases/2011/04/110402163423.htm>
- Armon, G. (2009). Do burnout and insomnia predict each other's levels of change over time independently of the job demand control-support (JDC-S) model? *Stress and Health, 25*, 333–342.
- Armon, G., Melamed, S., Shirom, A., Berliner, S., & Shapira, I. (2010). Elevated burnout predicts the onset of musculoskeletal pain among apparently healthy employees. *Journal of Occupational Health Psychology, 15*(4), 399–409.
- Armon, G., Shirom, A., Berliner, S., Shapira, I., & Melamed, S. (2008). A prospective study of the association between obesity and burnout among apparently healthy men and women. *Journal of Occupational Health Psychology, 13*(1), 43–57.
- Bakker, A., Demerouti, E., & Schaufeli, W. B. (2003). The socially induced burnout model. In S.P. Shohov (Ed.), *Advances in psychology research* (Vol. 25, pp. 13–30). New York, NY: Nova Science Publishers.
- Bakker, A., Demerouti, E., Taris, T., Schaufeli, W., & Schreurs, P. (2003). A multigroup analysis of the job demands-resources model in four home care organizations. *International Journal of Stress Management, 10*(1), 16–38.
- Bakker, A. B., Le Blanc, P. M. & Schaufeli, W. B. (2005). Burnout contagion among intensive care nurses. *Journal of Advanced Nursing 51*(3), 276–287.
- Bakker, A. B., Schaufeli, W. B., Sixma, H. J., & Bosveld, W. (2001). Burnout contagion among general practitioners. *Journal of Social and Clinical Psychology, 20*(1), 82–98.

- Barroux, R. (2011). *Workplace stress: Western social ill spreads to developing world*. Retrieved from <http://www.worldcrunch.com/workplace-stress-western-social-ill-spreadsdeveloping-world/2915>
- Council for Medical Schemes (2012). *Definition: What are PMBs?* Retrieved from http://www.medicalschemes.com/medical_schemes_pmb/index.htm
- Danaei, G., Finucane, M. M., Lu, Y., Singh, G. M., Cowan, M. J., Paciorek, C. J., Lin, J. K., Farzadfar, F., Khang, Y., Stevens, G. A., Rao, M., Ali, M. K., Riley, L. M., Robinson, C. A., & Ezzati, M. (2011). National, regional, and global trends in fasting plasma glucose and diabetes prevalence since 1980: systematic analysis of health examination surveys and epidemiological studies with 370 country-years and 2.7 million participants. *The Lancet*, Early Online, Publication. doi: 10.1016/S0140-6736(11)60679-X
- De Beer, L. T. (2012). *Job demands-resources theory, health and well-being in South Africa*. Doctoral dissertation, North West University, Potchefstroom, South Africa.
- Discovery Health (2012). *General practitioners (GP)*. Retrieved from https://www.discovery.co.za/discovery_za/web/logged_out/you_and_your_family/health/healthcare_professionals/general_practitioners.html
- Du Plooy, G. M. (2002). *Communication research: Techniques, methods and applications* (2nd ed.). Cape Town, ZA: Juta.
- Elliot, A. C., & Woodward, W. A. (2007). *Statistical analysis quick reference guidebook: With SPSS examples*. Thousand Oaks, CA: Sage Publications.
- Eurostat (2009). *Your key to European statistics*. Retrieved from <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>
- ForeCastChart (2011). *South African Rand Rate Forecast: Current Analysis & Forecast*. Retrieved from <http://forecastchart.com/usd-african-rand.html>
- Golden, R. (2004). *Counting the costs of stress*. STATS: Take a quantitative leap. Retrieved from http://stats.org/stories/2004/counting_costs_stress_sep23_04.htm
- Hakanen, J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *The Journal of School Psychology, 43*, 495–513.
- Harrison, D. (2009). *An overview of health and health care in South Africa 1994–2010: Priorities, progress and prospective new gains*. Retrieved from <http://www.doh.gov.za/docs/reports/2010/overview1994-2010.pdf>

- Health of Nations (2011). *South Africa: Country profile and spending overview*. Retrieved from <http://www.healthofnations.com/countries/profile/south-africa>
- Health Systems Trust (2011). *Per capita health expenditure*. Retrieved from <http://www.healthlink.org.za/healthstats/78/data>
- HSRC (2007). *A National Health System- Opportunities and Challenges for South Africa*. Retrieved from <http://www.hsrc.ac.za/Document-2319.phtml>
- International Labour Office ILO (2000). *Mental Health in the workplace*. International Labour Organization, Geneva.
- Ipsos MORI / EU-OSHA (2012). *Stress in the workplace to rise, say 8 out of 10 in major pan-European opinion poll*. Retrieved from <http://www.ipsos-mori.com/researchpublications.aspx>
- Kitaoka-Higashiguchi, K., Morikawa, Y., Miura, K., Sakurai, M., Ishizaki, M., Kido, T., Naruse, Y., & Nakagawa, H. (2009). Burnout and risk factors for arteriosclerotic disease: Follow-up study. *Journal of Occupational Health, 51*, 123–131.
- Lee, D. (1997). Employee stress: The true cost. *The John Liner Review, 11*(3), 33–38.
- Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology, 81*(2), 123–133.
- Leka, S., Griffiths, A., & Cox, T. (2004). Work Organization & Stress. *World Health Organization: Protecting Workers' Health Series, 3*, 80.
- Levene, H. (1960). Robust testes for equality of variances. In *Contributions to Probability and Statistics* (I. Olkin, ed.) 278–292. Palo Alto, CA: Stanford University Press.
- Marchand, A., Demers, A., & Durand, P. (2005). Does work really cause distress? The contribution of occupational structure and work organization to the experience of psychological distress. *Social Science & Medicine, 61*(1), 1–14.
- Maslach, C. (2001). What have we learned about burnout and health? *Psychology and Health, 16*, 607–611.
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *Maslach Burnout Inventory manual*. (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.
- McGrath, A., Houghton, D., & Reid, N. (1989). Occupational stress and teachers in Northern Ireland, *Work and Stress, 3*, 359–368.

- Medibank (2008). *The cost of workplace stress in Australia*. Retrieved from <http://www.medibank.com.au/Client/Documents/Pdfs/The-Cost-of-Workplace-Stress.pdf>
- Medicalis (2012). *The directory of health practitioners in South Africa*. Retrieved from <http://www.medicalis.co.za/medical/index.php>
- Melamed, S., Shirom, A., Toker, S., & Shapira, I. (2006). Burnout and risk of type 2 diabetes: A prospective study of apparently healthy employed persons. *Psychosomatic Medicine*, 68, 863-869.
- Melamed, S., Shirom, A., Toker, S., Berliner, S., & Shapira, I. (2006). Burnout and risk of cardiovascular disease: Evidence, possible causal paths, and promising research directions. *Psychological Bulletin*, 132(3), 327-353.
- Melamed, S., Ugarten, U., Shirom, A., Kahana, L., Lerman, Y., & Froom, P. (1999). Chronic burnout, somatic arousal and elevated salivary cortisol levels. *Journal of Psychosomatic Research*, 46(6), 591-598.
- My Future (2011). *Occupation details: Specialist medical practitioners*. Retrieved from <http://www.myfuture.edu.au/the Facts/Work and Employment/Occupations/>
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.
- Raikkonen, K., Keltikangas-Jarvinen, L., Adlercreutz, H., & Hautanen, A. (1996). Psychosocial stress and the insulin resistance syndrome. *Metabolism*, 45, 1533-1538.
- Safe Work Australia (2012). *The cost of work-related injury and illness for Australian employers, workers and the community*. Retrieved from <http://www.safeworkaustralia.gov.au/AboutSafeWorkAustralia/WhatWeDo/Statistics/Pages/Statistics.aspx>
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behaviour*, 25, 293-315.
- Schaufeli, W. B., & Enzmann, D. (1998). *The burnout companion to study and practice: A critical analysis*. Washington, DC: Taylor & Francis.
- Schaufeli, W. B., & Taris, T. W. (2005). The conceptualization and measurement of burnout: Common ground and worlds apart. *Work and Stress*, 19(3), 256-262.

- Shirom, A., Westman, M., Shamai, O., & Carel, R. F. (1997). Effects of work overload and burnout on cholesterol and triglycerides levels: The moderating effects of emotional reactivity among male and female employees. *Journal of Occupational Health Psychology, 2*(4), 275–288.
- SPSS Inc. (2011). *SPSS 19.0 for Windows*. Chicago, IL: SPSS Inc.
- Stansfeld, S. A., Fuhrer, R., Shipley, M. J., & Marmot, M. G. (2002). Psychological distress as a risk factor for coronary heart disease in Whitehall II Study. *International Journal of Epidemiology, 31*(1), 248–255.
- UNGASS (2010). *Country progress report on the declaration of commitment on HIV/AIDS*. Retrieved from <http://www.unaids.org/en/regionscountries/countries/southafrica/>

CHAPTER 6

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

The purpose of this chapter is to present and draw conclusions from the empirical investigations which formed the core of this thesis. Conclusions are drawn in accordance with the objectives outlined in the first chapter. Furthermore, limitations of this study are discussed and recommendations are made for the application of the results in organisations. Finally, future research opportunities emanating from this investigation are proposed.

6.1 CONCLUSIONS

The first objective of this study was to conduct a literature review on general work-related well-being, the job demands-resources model, work stress, the dual process, and health outcomes. This objective was achieved by conducting literature studies throughout the manuscript in each of the preceding chapters.

The second objective was to investigate a job demands-resources (JD-R) model in a large South African sample with a categorical estimator, i.e. using the variance-adjusted weighted least-squares method (WLSMV), a robust categorical estimator. This appeared to be the first JD-R study to use a weighted least squares approach (Muthén, Du Toit, & Spisic, 1997), which is more suited to categorical data (Newsom, 2012). Furthermore, this research article did not allow for the correlation of error terms between burnout and engagement (the dependent variables), as has been done in previous studies that investigated JD-R models (cf. Hakkanen, Bakker, & Schaufeli, 2006; Schaufeli & Bakker, 2004), as this can be seen as capitalisation on chance (MacCallum, Roznowski, & Necowitz, 1992). In the meta-analysis of Hermida, Conjar, and Najab (2010) it is stated that there are incidents where authors do not report that they allowed the correlation of error terms and that this can only be deduced from a drawn illustration that is not always present in the research paper. Furthermore, confusion reigns surrounding the issue of allowing correlations of measurement error in structural equation modelling (SEM); some

authors indicate that it may be acceptable in specific cases, i.e. measuring the same variables over time, and that it may be theoretically permitted (Hermida *et al.*, 2010). However, some methodologies state that errors should never be allowed to correlate as it presents problems with model interpretation and the likelihood of its replication. It is therefore used as a method to increase model fit as some researchers do not want to unnecessarily discard data that cost a great deal of time and effort to collect (Landis, Edwards, & Cortina, 2008; Smolkowski, 2007).

Regarding the proposed scenario of allowed correlation of error terms when it has a theoretical justification, there appears to be two schools of thought concerning burnout and engagement, i.e. that burnout and engagement are opposites on a continuum; and the other, that burnout and engagement are two independent constructs. Consequently, some researchers have felt it necessary to measure the two individual concepts with two different measures. The independent-constructs stance was also the approach taken for this research as the dual process implies two processes at work, with the additional motivation of not having allowed errors between these concepts to correlate (cf. Schaufeli & Bakker, 2004). It should be mentioned that research into this issue has found that an arrangement into energy (i.e. exhaustion and vigour) and identification (i.e. cynicism and dedication) components are scalable on two distinct bipolar dimensions (González-Romá, Schaufeli, Bakker, & Lloret, 2006). However, in South Africa this has also been researched and it was found that, although the two dimensions are distinct, the identification component was on a continuum, while the energy component was not (Demerouti, Mostert, & Bakker, 2010). Furthermore, the objective of firstly establishing, i.e. investigating acceptable fit of, the research model was deemed to be necessary as a foundation for the remaining research objectives.

The results of the analysis showed that the proposed generic JD-R model fits the data adequately. Similar results have been found in European context (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Hakanen, Bakker, & Schaufeli, 2006; Llorens, Bakker, Schaufeli, & Salanova, 2006). Work overload, the indicator of job demands, was associated with burnout and eventual ill health. Similarly, the job resources, at least one from each of the four levels proposed by Bakker and Demerouti (2007), (colleague and supervisor support (*interpersonal and social relations*), communication (*organisation at large*), growth

opportunities (*task level*) and role clarity (*organisation of work*), were linked to engagement, and engagement was linked to organisational commitment.

For the mediation analyses, the indirect effects were tested with the Mplus-programme (Muthén & Muthén, 2010) by implementing the model indirect function with bootstrap resampling option to investigate the mediating effects of engagement and burnout in their respective processes of the proposed JD-R model. Kappa-squared values were also calculated in order to apply descriptive labels to the mediation results. The results indicated that burnout mediated the relationship between job demands and ill health with a *medium effect*. However, engagement was shown to mediate the relationship between job resources and organisational commitment with a *large effect*. Corresponding results have been found in other studies that implemented different statistical methods to investigate mediating effects in the JD-R model (cf. Bakker & Demerouti, 2007; Hakanen, Bakker, & Schaufeli, 2006; Llorens, Bakker, Schaufeli, & Salanova, 2006).

In summary, even though the JD-R model has been tested thoroughly in European context during the last decade, and some studies have attempted basic model variants in local context, this was the first study to test a generic JD-R model, including the outcomes of ill health and commitment, in South African context with a large sample aggregated from a variety of sectors in one study. Moreover, this was also the first study, locally or internationally, to use the categorical estimator (WLSMV) and to implement newly suggested methods to be able to describe mediating effect sizes for the dual process in any context (Preacher & Kelley, 2011; Rucker, Preacher, Tormala, & Petty, 2011). This further contributes to the robustness (Llorens, Bakker, Schaufeli, & Salanova, 2006) of the JD-R model as a measure for investigating work-related well-being in organisations and different contexts in South Africa.

The third objective was to investigate the reversed causal hypotheses of burnout and engagement in job demands-resources theory over time. To achieve this aim, structural equation modelling techniques were implemented to investigate the proposed reversed hypotheses. The variance-adjusted weighted least-squares method (WLSMV), a categorical estimator, was also chosen as it is more fitting to use when categorical data is concerned (Newsom, 2012).

The results indicated that burnout had a reverse causal relationship to colleague support as well as supervisor support. No significant reversed relationships were found between burnout and communication, growth opportunities or role clarity. Furthermore, engagement revealed only one significant reversed causal effect; a small negative effect to supervisor support – this result was also contrary to the hypothesis that postulated that engagement would lead to increased perceptions of supervisor support over time.

Comparing the latter finding to previous research, De Lange, De Witte, and Notelaers (2008) investigated the causal effects of job resources and work engagement, including reversed causal hypotheses, and found that work engagement had a small positive reversed causal relationship with social support (colleague and supervisory). Results of the current study's investigation are contrary to this finding and it thus warrants further investigation. One proposed reason for the current study's finding is that it has been found that social support can have a negative impact, i.e. employees feel that they do not need the support or that they would not need it if they were more competent, and it can therefore be seen as a negative experience at the cost of self-esteem (Macey, Schneider, Barbera, & Young, 2009). Therefore the engaged person might feel less of a need to be actively or continuously supported by his or her supervisor at work.

The largest causal effect found in this study was burnout's negative relationship to supervisor support over time. This, in conjunction with the negative relationship of burnout to colleague support, indicates that burnout leads, causally, to deterioration in relationships at work, at least in the mining sector.

The fourth objective was to investigate the likelihood of reporting receiving treatment for health conditions based on burnout and engagement, i.e. cardiovascular condition, cholesterol, depression, diabetes, hypertension and irritable bowel syndrome. Binary logistic regression analyses were implemented to investigate the estimated odds ratio's for reporting receiving treatment for any of the conditions under investigation, based on an increase in one unit of burnout and engagement, whilst controlling for age and gender as covariates.

Concerning the control variables, an increase in age was associated with an increase in the likelihood of all the conditions. This result is supported by studies such as those of Chung *et al.*, (2009) and Karasek (2004). Regarding gender, men were more likely to report receiving treatment for cardiovascular conditions, cholesterol, diabetes and hypertension. However, females were 3 times more likely to report treatment for irritable bowel syndrome. Females were also 2.5 times more likely to report treatment for depression. This has also been found in previous studies (Kessler, 2003; Weissman & Olfson, 1995), indicating similarity in terms of gender distribution and health conditions from this South African working sample and the rest of the world.

Results indicated that an increase in burnout was associated with an increase in estimated odds for reporting treatment for all of the conditions under investigation. An increase in a unit of burnout increased the estimated odds for reporting treatment for irritable bowel syndrome the most, while the estimated odds for reporting the remaining of the five conditions were similar. Irritable bowel syndrome has been found to be related to stress-related conditions and therefore it does make sense that work stress and burnout would be associated with this condition (National Health Service, 2010; The American Institute of Stress, 2012).

An increase in engagement indicated a decrease in the estimated odds for reporting cardiovascular conditions, cholesterol and depression. However, no significant results were found for diabetes, hypertension and irritable bowel syndrome. This indicates that engagement could be a protective factor, or buffer, for the first three conditions, but have no significant effect for the latter three. Therefore better health might be associated with higher levels of engagement, or perhaps it is something inherent or specific to an engaged person's behaviour, e.g. physical activity. Studies have found that a core component of engagement, i.e. vigour, is negatively correlated with inflammation biomarkers and also associated with positively self-rated health (Shirom, 2010; Shirom, Vinokur, & Vaananen, 2008). Recently it was found that positive psychological attributes may be independently associated with superior cardiac outcomes and cardiac health behaviours, e.g. healthy eating and physical activity (DuBois *et al.*, 2012).

The fifth objective was to investigate the link between burnout and health by medical aid expenditure data, i.e. a subjective, self-rated state with an objective, financial outcome. Analysis of Covariance (ANCOVA) was implemented to ascertain the differences in estimated marginal means between low and high burnout group expenditures, whilst controlling for age and gender as covariate variables. The high and the low burnout groups were extracted from the sample based on the co-morbidity of the components of burnout, i.e. the presence of both exhaustion and cynicism.

Results indicated that expenditure on the high burnout group was consistently more, and close to double in most cases, for all the insured benefits under investigation, when compared to the low burnout group. Moreover, the high burnout group frequented general practitioners more than the low burnout group. The only non-significant result was for specialist visits, where there were no clear distinctions between the number of times the low and the high burnout group frequent specialists. A reason for this could be that a specialist visit has little to do with one's level of burnout; who one might only visit when referred by a general practitioner or one wants a second opinion. Most medical aid providers also have very strict regulations in terms of specialist-visits. For example, a visit to a specialist is usually only authorised if recommended by a general practitioner.

The sixth and last objective of this study was to present and discuss conclusions, limitations and recommendations on the findings of the present study. This objective has been achieved as set out in the review above, and the limitations and recommendations follow below.

6.2 LIMITATIONS

The limitations of this research in general and as applies to the empirical studies are discussed below.

A limitation of this research in general was the use of the same self-report survey in all of the empirical studies. This invokes the possibility of common method bias and common method variance. This refers to using the same method of data collection, and when the correlations

between two variables are artificially inflated due to shared biases (Spector, 2006). According to Podsakoff *et al.* (2003), common method variance can occur due to various factors, such as social desirability, item ambiguity, item grouping, and measurement context effects. One suggested solution proposed is observer ratings, but these observers cannot be freed from their own biases and stereotypes. Moreover, the common method bias effect has been indicated as minor in magnitude (Meade, Watson, & Kroustalis, 2007), and common method variance is even considered a myth; while it has been suggested that the terminology should be abandoned altogether (Spector, 2006).

The first empirical study's objective sought to establish a generic JD-R model with a categorical estimator. The cross-sectional design of this study was the most blatant limitation, and therefore causality should generally not be inferred. However, JD-R models have been confirmed longitudinally by other researchers, in other contexts, so evidence for causality of the model is not absent from the literature. Research concerning the causality of work-related well-being found that an increase in job demands and a decrease in job resources negatively affect outcomes of employees, i.e. psychological well-being at work and also absenteeism (Schaufeli, Bakker, & Van Rhenen, 2009).

Furthermore, the indicator of job demands, which was work overload, has also been used in other studies (Boyd *et al.*, 2011, where work pressure and work load (overload) was used as the indicator for job demands). Moreover, based on the literature and also issues with the measurement of the construct in various contexts, emotional overload was discarded, as it has also been shown to not apply to all occupations and sectors (Bakker & Demerouti, 2007). However, even given this explanation, some might still question whether it is plausible that the use of only work overload as the indicator of demands might have influenced the mediation result in the health impairment process statistically, i.e. affected the resultant kappa-squared value for the mediation of burnout between job demands and ill health, downwardly. The mediation effect-size could be described as a medium effect, though when using the indicated kappa-squared value calculated, this value bordered on being a large effect. Finally, the reader is reminded that this specific study sought to use the most general of variables, which would be relevant to all the industries/sectors under investigation, in the analysis of the aggregated sample.

The objective of the second empirical study was to investigate the reversed causal hypotheses of burnout and engagement in job demands-resources theory over time. A strength of this study was its longitudinal design. However, even considering this strength, a third wave of data would have been ideal. Concerning the sample itself, the vast majority of participants were male; participation by females in the study was therefore not satisfactory. Reasons put forward for this could be that the sample was collected at random and also that, traditionally, mining is perceived to be a more male dominated environment (Anglo American, 2012; Mphokane, 2008) and that work in this industry is not always confined to an office and can be very physical in nature.

The result of supervisor support at time two being negatively predicted by engagement at time one was a result that was contrary to the hypothesis formulated. The construct of work engagement and supervisor support both showed acceptable reliability levels as per Cronbach's alpha-coefficient. Furthermore, this study did not control for which supervisors might have moved within the organisational structure to different departments or employees, and this may have affected this result. However, the result could simply have been a sample-specific phenomenon, and therefore warrants additional investigation in future.

The difference in correlations at the specific points in time of the study, i.e. correlations being higher at the second instance than in the first instance of measurement, could possibly be due to employees having become more familiar and aware of the constructs of work-related well-being after the initial measurement, and at some level paid more attention to the variables in their work contexts throughout the study. There was no control group to confirm or deny the aforementioned possibility, and how to measure well-being without having a sensitizing effect in this control group to compare to other groups is a complex question. However, a Solomon 4-group design appears to be an appropriate solution that can address these issues in behavioural research (cf. McCambridge, Butor-Bhavsar, Witton, & Elbourne, 2011)

The objective of the third empirical study was to investigate the likelihood of self-reporting treatment for various objective health conditions, i.e. cardiovascular conditions, cholesterol, depression, diabetes, hypertension and irritable bowel syndrome. The most obvious limitation of this study was its cross-sectional design. It therefore begs a very important question, i.e. reversed

causality - whether burnout is indeed causally related to all cases of these health conditions and actually is a precursor or predictor; or could it be that burnout also develops as a result of suffering from these conditions? Notwithstanding the former, certain studies have found causal links from burnout to physical health conditions, such as an increase in the odds for type 2 diabetes (Melamed *et al.*, 2006), and insomnia (Armon, 2009). A thorough literature review on the link between burnout and conditions such as cardiovascular conditions and metabolic syndrome has been conducted by Melamed, Shirom, Toker, Berliner, and Shapira (2006).

The objective of the final empirical study was to investigate the link between burnout and health by medical aid provider expenditure. This study had a cross-sectional design and therefore causality should generally not be inferred. For example, Golden (2004) states that stress increases costs by 10%, but criticism of this holds that financial pressure on employees might just as well be causing additional stress in employees' lives. Therefore, in future, to address this issue a longitudinal design should be implemented. Moreover, this study collected data from the financial sector and care should be taken when extrapolating to other sectors. However, other studies have found that burnout exists in a number of occupations and it could be postulated that the effect in other sectors might be similar. The reader is reminded again that the results of this study were based on medical aid expenditure data over a *six month period*, as readers might be tempted to consider this as per year values, when in fact a per year scenario would undoubtedly paint a gloomier picture compared to the current findings.

It should also be mentioned that this data is from the private sector and therefore does not reflect public sector numbers. However, it stands to reason that, if the results indicate that burnout is connected to an increase in expenditure on all factors measured in the well-funded and resourced private sector, a similar phenomenon may be present in the public sector which is generally less resourced and more cash-strapped, even though there are no real values to connect to that sector in this present research.

6.3 RECOMMENDATIONS

6.3.1 Recommendations to managers and organisations

This research underscores the importance of work-related well-being and the consequences it has for the individual, on a psychological and physical level, and also on the organisation. The general results of this research indicate that work overload leads to ill health outcomes through burnout and that job resources lead to commitment through engagement, in South Africa as in the rest of the world. Furthermore, the results showed that engagement and burnout have reversed causal effects on relationships at work, i.e. perceived support from supervisors and colleagues. Moreover, burnout was also found to be associated with treatment for various physical health conditions and with an increase in expenditure by medical aid providers. Engagement was associated with commitment, a positive organisational outcome, and a decreased association with treatment for some of the health conditions indicating that engagement might be a protective factor to some degree.

Hence organisations and stakeholders should be concerned with lowering burnout levels as this would offset ill health and financial consequences. Job demands have been found to be the strongest predictor of burnout; therefore organisations should ensure that employee workloads are at fair levels (Xanthopoulou *et al.*, 2007). The results indicated that providing adequate job resources can buffer the demands on the employee and has also been found in other studies (Hakanen *et al.*, 2004; Schaufeli & Bakker, 2004). Furthermore, it has been found that supervisor support buffers the adverse effect of job demands on exhaustion in situations with low decision authority. Decisional authority also makes employees less vulnerable to job demands and promotes positive outcomes (Willemse *et al.*, 2012). Thus supervisors should empower subordinates with decisional authority as far as possible, which may then also act as a buffer on job demands and lessen strain.

Employers should investigate work-related well-being in their work contexts via a survey or questionnaire designed to do such, and then ascertain the work stress climate in their organisations. The results would then indicate the state of employee well-being, i.e. which

demands and which resources (or lack thereof) play the major roles in their unique environment. Industrial psychologists or similar professions within the organisation could then devise interventions, based on the results, to rectify any imbalances and as such address the job demands and resources in attempts to increase engagement and decrease burnout, in order to avoid psychological and physical ill health outcomes. Moreover, employers could build upon the positives in the organisational climate, i.e. which job resources are working well, and optimize those in order to reduce strain and promote engagement and eventual positive organisational outcomes such as commitment.

Toker and Biron (2012) found that physical activity is significantly related to both depression and burnout, i.e. individuals involved in more physical activity showed little to no signs of depression *or* burnout, and that physical activity should therefore be considered in intervention planning by managers and employers. This is, of course, a significant finding in the context of *this* research, seeing that physical activity (also exercise) is also known to be an important promoter, protector and enhancer of physical health, e.g. cardiovascular (Giannuzzi *et al.*, 2003).

Burnout was also associated with a major increase in medical aid provider expenditure. The current data was from the private sector, but it makes sense to extrapolate that a similar phenomenon will be present in the public sector, even though figures cannot be estimated here. Subsequently, whatever ones' position on socialised and universal health care may be, if the government moves ahead with the establishment of a national health insurance system in South Africa, the year-on-year costs could be reduced if burnout is reduced in the overall working population, according to these findings. Government could provide incentives for companies, perhaps in the form of tax-breaks if they employ an industrial psychologist or other relevant professional in the organisation to oversee the well-being of employees through various evidence-based implementations. Not only would this assist in creating a more productive workforce, result in more optimal physical health and a growing economy, but it would also lessen potential burdensome tax increases on the general population to fund a national health care system once it has been implemented.

6.3.2 Recommendations for future research

Future studies in JD-R theory within South African context should focus on longitudinal designs and equivalence testing. Longitudinal studies, in South Africa, with regard to JD-R theory, appear to be lacking and researchers should turn their focus to this area. Furthermore, additional mediating and moderating factors should also be considered in investigations.

Mention should be made to researchers of the computationally demanding nature of structural equation modelling with bootstrapping in Mplus. For example, the bootstrapping resampling of 2 000 draws for the first article computed for a total of 42 continuous hours on a dedicated server in 2011. Minimum bootstrapping draws should typically be set to no less than 1 000, but it is suggested that the draws should be set up to 5 000 draws (Hayes, 2009). However, since the time of that analysis, computer processors have taken another step up in performance with more widely available technologies.

Longitudinal investigations regarding self-reported health should be considered a research area. In addition, more control variables could be measured and added to analyses, e.g. smoking, obesity, alcohol use and depression. Depression should be considered to be a control variable in research designs as it is known to be closely related to burnout and shares common symptoms with the construct (Shirom *et al.*, 2006).

Concerning medical expenditure and burnout in other sectors, the problem is finding willing and enthusiastic organisations with medical aid expenditure data connected to them. This will prove challenging to researchers and they should consider strategies for approaching large organisations that have group medical aid schemes, so that the medical aid provider can also be approached as this type of research is in the interest of all parties. Another issue with this type of research is of course the matter of funding and conflicts of interest that may exist.

REFERENCES

- Anglo American (2012). *Working at Anglo American*. Retrieved from <http://www.angloamerican.com/careers/working/employer-of-choice/women-in-mining>
- Armon, G. (2009). Do burnout and insomnia predict each other's levels of change over time independently of the job demand control-support (JDC-S) model? *Stress and Health, 25*, 333–342.
- Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology, 22*, 309–328.
- Boyd, C. M., Bakker, A. B., Pignata, S., Winefield, A. H., Gillespie, N., & Stough, C. (2011). A longitudinal test of the job demands-resources model among Australian university academics. *Applied Psychology: An International Review, 60*, 112–140.
- Chung, H. Y., Cesari, M., Anton, S., Marzetti, E., Giovannini, S., Seo, A. Y., Carter, C., Yu, B. P., & Leeuwenburgh, C. (2009). Molecular inflammation: Underpinnings of aging and age-related diseases. *Ageing Research Reviews, 8*, 8–30.
- De Lange, A. H., De Witte, H. & Notelaers, G. (2008). Should I stay or should I go? Examining longitudinal relations among job resources and work engagement for stayers versus movers. *Work & Stress, 22*(3), 201-223.
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology, 86*, 499–512.
- Demerouri, E., Mostert, K., & Bakker, A. B. (2010). Burnout and work engagement: A thorough investigation of the independency of both constructs. *Journal of Occupational Health Psychology, 15*(3), 209-222.
- DuBois, C. M., Beach, S. R., Kashdan, T. B., Nyer, M. B., Park, E. R., Celano, C. M., Huffman, J. C. (2012). Positive psychological attributes and cardiac outcomes: Associations, mechanisms, and interventions. *Psychosomatics, 53*(4), 303-318.
- Giannuzzi, P., Mezzani, A., Saner, H., Bjornstad, H., Fioretti, P., Mendes, M., Cohen-Solal, A., Dugmore, L., Hambrecht, R., Hellemans, I., McGee, H., Perk, J., Vanhees, L., & Veress, G. (2003). Physical activity for primary and secondary prevention. Position paper of the Working Group on Cardiac Rehabilitation and Exercise Physiology of the European Society of Cardiology. *European Journal of Preventive Cardiology, 10*(5), 319–327.

- Golden, R. (2004). *Counting the costs of stress*. STATS: Take a quantitative leap. Retrieved from http://stats.org/stories/2004/counting_costs_stress_sep23_04.htm
- González-Romá, V., Schaufeli, W. B., Bakker, A. B., & Lloret, S. (2006). Burnout and work engagement: Independent factors or opposite poles? *Journal of Vocational Behavior*, *68*, 165-174.
- Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology*, *43*, 495–513.
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, *76*(4), 408–420.
- Hermida, R., Conjar, E., & Najab, J. (2010). *Allowing Correlated Measurement Errors in Structural Equation Modeling: A Review and Meta-Analysis* (Unpublished manuscript). Retrieved from <http://mres.gmu.edu/pmwiki/uploads/Main/Current%20Manuscript.doc>
- Karasek, M. (2004). Melatonin, human aging, and age-related diseases. *Experimental Gerontology*, *39*, 1723–1729.
- Kessler, R. C. (2003). Epidemiology of women and depression. *Journal of Affective Disorders*, *74*(1), 5–13.
- Landis, R. S., Edwards, B. D., & Cortina, J. M. (2008, April). *On allowing correlated residuals in structural equation modeling*. In C. E. Lance (Chair) and R. J. Vandenberg (Discussant), Statistical/Methodological myths and urban legends III: The saga continues. Symposium at the 23rd Annual Conference of the Society for Industrial and Organizational Psychology, San Francisco, California.
- Llorens, S., Bakker, A. B., Schaufeli, W. B., & Salanova, M. (2006). Testing the robustness of the job demands-resources model. *International Journal of Stress Management*, *13*, 378–391.
- MacCallum, R., Roznowski, M., & Necowitz, L. B. (1992). Model specifications in covariance structure analysis: the problem of capitalization on chance. *Psychological Bulletin*, *111*, 490–504.
- Macey, W. H., Schneider, B., Barbera, K., & Young, S. A. (2009). *Employee engagement: Tools for analysis, practice, and competitive advantage*. London, UK: Blackwell.
- McCambridge, J., Butor-Bhavsar, K., Witton, J., & Elbourne, D. (2011). Can research assessments themselves cause bias in behaviour change trials? A systematic review of

- evidence from Solomon 4-Group studies. *PLoS ONE* 6(10), e25223. doi:10.1371/journal.pone.0025223.
- Meade, A. W., Watson, A. M., & Kroustalis, C. M. (2007). *Assessing common methods bias in organizational research*. Paper presented at the 22nd annual meeting of the Society for Industrial and Organizational Psychology, New York.
- Melamed, S., Shirom, A., Toker, S., Berliner, S., & Shapira, I. (2006). Burnout and risk of cardiovascular disease: Evidence, possible causal paths, and promising research directions. *Psychological Bulletin*, 132(3), 327–353.
- Melamed, S., Shirom, A., Toker, S., & Shapira, I. (2006). Burnout and risk of type 2 diabetes: A prospective study of apparently healthy employed persons. *Psychosomatic Medicine*, 68, 863–869.
- Mphokane, M. S. (2008). *Profiles of successful managers held by male and female managers in the coal mining industry* (Master's dissertation). University of Pretoria.
- Muthén, B., du Toit, S.H.C., & Spisic, D. (1997). *Robust inference using weighted least squares and quadratic estimating equations in latent variable modeling with categorical and continuous outcomes*. Accepted for publication in *Psychometrika*.
- Muthén, L.K., & Muthén, B.O. (2010). *Mplus User's Guide* (6th ed.). Los Angeles, CA: Muthén & Muthén.
- National Health Service (2010). *Symptoms of stress*. Retrieved from <http://www.nhs.uk/Conditions/Stress/Pages/Symptoms.aspx>
- Newsom, J. (2012). *Practical Approaches to Dealing with Nonnormal and Categorical Variables*. Retrieved from <http://www.upa.pdx.edu/IOA/newsom/semclass/>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903.
- Preacher, K. J., & Kelley, K. (2011). Effect sizes measures for mediation models: Quantitative strategies for communicating indirect effects. *Psychological Methods*, 16(2), 93–115.
- Rucker, D. D., Preacher, K. J., Tormala, Z. L., & Petty, R. E. (2011). Mediation analysis in social psychology: Current practices and new recommendations. *Social and Personality Psychology Compass*, 5/6, 359–371.

- Schaufeli, W., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: a multi-sample study. *Journal of Organisational Behaviour*, 25, 293–315.
- Schaufeli, W. B., Bakker, A. B., & Van Rhenen, W. (2009). How changes in job demands and resources predict burnout, work engagement and sickness absenteeism. *Journal of Organizational Behaviour*, 30, 893–917.
- Shirom, A. (2010). Feeling energetic at work: On vigor's antecedents. In A. B. Bakker & M. P. Leiter (Eds.) *Work engagement: Recent developments in theory and research* (pp. 69-84). New York, NY: Psychology Press.
- Shirom, A., Melamed, S., Toker, S., Berliner, S., & Shapira, I. (2005). Burnout and health review: Current knowledge and future research directions. *International review of industrial and organizational psychology*, 20, 269-308.
- Shirom, A., Vinokur, A. D., & Vaananen, A. (2008). *Vigor and emotional exhaustion are independently associated with self-rated health and work capacity: A cross-country comparison*. Manuscript in preparation. Faculty of Management, Tel Aviv University, Tel Aviv, Israel.
- Smolkowski, K. (2007). *Correlated Errors in CFA and SEM Models*. Retrieved from http://www.ori.org/~keiths/Files/Tips/Stats_SEMErrorCorrs.html
- Spector, P. E. (2006). Method variance in organisational research: Truth or urban legend? *Organizational Research Methods*, 9(2), 221–232.
- The American Institute of Stress (2012). *Effects of Stress*. Retrieved from <http://www.stress.org/topic-effects.htm>
- Toker, S., & Biron, M. (2012). Job burnout and depression: Unravelling their temporal relationship and considering the role of physical activity. *Journal of Applied Psychology*. Advance online publication. doi: 10.1037/a0026914
- Weissman, M. M., & Olfson, M. (1995). Depression in women: Implications for health care research. *Science*, 269(5225), 799–801.
- Willemse, B. M., De Jonge, J., Smit, D., Depla, M. F. I. A., & Pot, A. M. (2012). The moderating role of decision authority and co-worker and supervisor support on the impact of job demands in nursing homes: A cross-sectional study. *International Journal of Nursing Studies*, 49(1), 822-833.

Xanthopoulou, D., Bakker, A. B., Dollard, M. F., Demerouti, E., Schaufeli, W. B., Taris, T. W., & Schreurs, P. J. G. (2007). When do job demands particularly predict burnout? The moderating role of job resources. *Journal of Managerial Psychology*, 22(8), 766–786.