

**Repetitive strain injury among South African employees:
Prevalence and the relationship with exhaustion and work
engagement**

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COMMENTS

The reader is reminded of the following:

- The editorial style as well as the references referred to in this mini-dissertation follow the format prescribed by the Publication Manual (5th edition) of the American Psychological Association (APA). This practice is in line with the policy of the Programme in Industrial Psychology of the North-West University (Potchefstroom) to use APA style in all scientific documents as from January 1999.
- The mini-dissertation is submitted in the form of a research article. The editorial style specified by the South African Journal of Industrial Psychology (which agrees largely with the APA style) is used, but the APA guidelines were followed in constructing tables.

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ABSTRACT

Title:

Repetitive strain injury amongst South African employees: Prevalence and the relationship with exhaustion and work engagement

Key terms:

Repetitive strain injury (RSI); eyestrain; stiffness; back pain; work-related upper limb disorders; musculoskeletal disorders; vitality; work devotion; exhaustion.

The work environment of today is synonymous with stress, fatigue and exhaustion. As a result, the incidence of workplace injury and disease is increasingly commonplace. Repetitive Strain Injury (RSI) is the most common form of work-related ill-health. If the symptoms are not recognised and addressed early, serious and more chronic manifestations of the symptoms can emerge, subsequently affecting the quality and duration of a persons' working life. RSI also has significant implications for organisations in terms of lost productivity, drops in work quality and costly compensation claims. Although there is ongoing international research available concerning workplace injury and disease to inform business and the employee, there is less comprehensive and regularly updated research within the South African context. Considering employers can be held accountable for diseases that have arisen out of and in the course of an individual's employment, this research adds value in ascertaining the magnitude of RSI in South Africa. Bearing in mind international research has expanded its focus to include the potential influence of ergonomic and psychosocial factors in the development of RSI, it has become necessary to consider additional factors that may play a role in the development and maintenance of RSI.

The objectives of this study were to 1) determine the frequency of RSI experienced amongst South African employees; 2) examine the frequency of RSI across three well-being groups; and 3) identify whether there are significant differences across the three well-being groups. An availability sample ($N = 15\ 664$) was utilised to determine the frequency of experience of RSI in a sample of South African employees. Frequencies were used to determine the incidence of RSI symptoms for the total sample. Participants were then selected into groups based on their experience of vitality, work devotion and exhaustion ($n = 4\ 411$) in order to determine the frequency of RSI experienced for

three well-being groups. ANOVA was used to determine if there were significant RSI differences between these three well-being groups.

The results of this study highlight that RSI is prevalent amongst the South African population. Of those participants who responded “sometimes” and “frequently” (experiencing RSI), 47% indicated experiencing neck, shoulder and back discomfort, followed by 42% reporting eyestrain, and 24% muscle stiffness. These results are comparable with international statistics, indicating that a relatively large percentage of South African employees experience RSI. The results further showed that the frequency of experience of RSI symptoms does differ across the three well-being groups. It is evident that RSI is more prevalent in the well-being group that demonstrates vital exhaustion when compared to those who are work engaged yet exhausted, and those who are truly work engaged. Secondly, the results clearly revealed statistically significant differences between all of these groups. Thus, those individuals who are vitally exhausted experience significantly greater RSI symptoms than those who are truly work engaged or engaged with exhaustion. In addition, those individuals who are work engaged with exhaustion demonstrate significantly more RSI symptoms than those who are truly work engaged. Thus, this study suggests the potential role of exhaustion in the development of RSI.

Recommendations were made for the organisation and for future research.

OPSOMMING

Titel:

Ooreisingsaandoening by Suid-Afrikaanse werknemers: Voorkoms en die verhouding met uitputting en werksbegeestering

Sleuteltermes:

Ooreisingsaandoening; gesigsoorspanning; styfheid; rugpyn; werkverwante ooreisingsaandoening-sindroom; muskuloskeletale versteurings; lewenskragtigheid; werktoewyding; uitputting.

Vandag se werksomgewing is sinoniem met stres, afmatting en uitputting. Werkplekbeseerings en -siektes kom gevolglik toenemend voor. Ooreisingsaandoening is die algemeenste vorm van werkverwante gesondheidsprobleme. Indien die simptome nie vroegtydig herken en ondervang word nie, kan dit aanleiding gee tot ernstige en meer chroniese manifestasies van die simptome, wat uiteindelik 'n impak kan hê op die gehalte en duur van die betrokke persone se werklewe. Ooreisingsaandoening het ook verreikende implikasies vir organisasies ten opsigte van verlore produktiwiteit, afname in werkgehalte en duur vergoedingseise. Hoewel daar internasionale navorsing beskikbaar is met betrekking tot werkplekbeseerings en -siektes, wat as inligtingsbron kan dien vir besighede en werknemers, bestaan daar minder omvattende en gereeld bygewerkte navorsing in die Suid-Afrikaanse konteks. Aangesien werknemers aanspreeklik gehou kan word vir siektetoestande wat weens en gedurende 'n individu se tyd van indiensneming ontstaan, voeg hierdie navorsing waarde toe deurdat dit die omvang van ooreisingsaandoening in Suid-Afrika bepaal. In die lig van die feit dat internasionale navorsing sy fokus uitgebrei het om die potensiële invloed van ergonomiese en psigososiale faktore in die ontwikkeling van ooreisingsaandoening in te sluit, het dit nodig geword om bykomende faktore te oorweeg wat 'n rol kan speel in die ontwikkeling en voortbestaan van ooreisingsaandoening.

Die doelstellings van hierdie studie was om 1) die frekwensie van ooreisingsaandoening onder Suid-Afrikaanse werknemers te bepaal; 2) ondersoek in te stel na die frekwensie van ooreisingsaandoening by drie spesifieke welstandsgroepe; en 3) te identifiseer of daar beduidende verskille tussen die drie welstandsgroepe bestaan. 'n Beschikbaarheidsteekproef ($N = 15\ 664$) is gebruik om die frekwensie van ervaring van ooreisingsaandoening by 'n steekproef van Suid-Afrikaanse werknemers te bepaal. Frekwensies is gebruik om die voorkoms van

ooreisingsaandoening-simptome vir die totale steekproef te bepaal. Deelnemers is vervolgens op grond van hul ervaring van lewenskragtigheid, werktoewyding en uitputting in groepe geselekteer ($n = 4\,411$) om die frekwensie van ooreisingsaandoening by die drie welstandsgroepe te bepaal. ANOVA is gebruik om te bepaal of daar beduidende verskille t.o.v. ooreisingsaandoening tussen hierdie drie welstandsgroepe was.

Hierdie studie het bevind dat ooreisingsaandoening algemeen voorkomend is in die Suid-Afrikaanse bevolking. Van die deelnemers wat “soms” en “dikwels” geantwoord het, het 47% nek-, skouer- en rugprobleme gerapporteer, gevolg deur 42% (gesigsoorspanning), en 24% (spierstyfheid). Hierdie resultate is vergelykbaar met internasionale statistiek, wat daarop dui dat ’n relatief groot persentasie Suid-Afrikaanse werknemers ooreisingsaandoening ervaar. Die resultate het verder aangetoon dat die frekwensie van ervarings van ooreisingsaandoening verskillend is vir die drie welstandsgroepe. Dit is duidelik dat ooreisingsaandoening meer algemeen voorkom by die welstandsgroep wat uitputting toon – vergeleke met dié wat werksbegeesterd dog uitgeput is, en met dié wat werklik werksbegeesterd is. Tweedens het die resultate statisties beduidende verskille tussen al hierdie groepe duidelik uitgewys. Die individue wat uitgeput is, ervaar beduidend meer simptome van ooreisingsaandoening as dié wat werklik werksbegeesterd is, en ook meer as dié wat begeesterd dog uitgeput is. Verder toon individue wat werksbegeesterd dog uitgeput is beduidend meer simptome van ooreisingsaandoening as diegene wat werklik werksbegeesterd is. Hierdie studie is dus ’n aanduiding van die potensiële rol van uitputting in die ontstaan van ooreisingsaandoening.

Aanbevelings is gemaak vir die organisasie en vir verdere studie.

CHAPTER 1

INTRODUCTION

This mini-dissertation investigates the frequency of experience of Repetitive Strain Injury (RSI) symptoms among South African employees. More specifically, the focus is on the frequency of experience of RSI (eyestrain, muscle stiffness, neck, shoulder and back discomfort) for three well-being groups (i.e. truly engaged employees, engaged employees with exhaustion and vitally exhausted employees) and to investigate whether significant differences exist between these well-being groups (i.e. truly engaged employees, engaged employees with exhaustion and vitally exhausted employees) and their frequency of experienced RSI.

This chapter presents the problem statement and a discussion of the research objectives, where the general and specific objectives are set out. The research method is explained and an overview of chapters is provided.

1.1 PROBLEM STATEMENT

The computerisation of work has produced the conditions for a multitude of contemporary health concerns, including eyestrain, headaches, back pain, stiffness and tenderness of the neck, shoulders and forearms. These symptoms are commonly referred to as musculoskeletal strain (Compensation Commission, 2004; Silman & Newman, 1996). Musculoskeletal strain, if not addressed, can lead to more serious and chronic manifestations of the symptoms that can severely affect the quality and duration of a persons' working life. This can become visible in upper-limb disorders that cover a variety of musculoskeletal problems, affecting the tissues of the hand, wrist, arm and shoulder (Compensation Commission, 2004; Silman & Newman, 1996; Sprigg, Stride, Wall, Holman & Smith, 2007). Conditions emergent as a result of exposure to various risk factors within the work environment (forceful exertion, awkward work postures, repetitive movements, reduced opportunity for recovery periods, etc.) are termed Work-Related Upper-Limb Disorders (WRULDs). These conditions can also be referred to as Musculoskeletal Disorders (MSDs), Overuse Syndrome, Repetitive Strain Injury (RSI) and Cumulative Trauma Disorder (CTD) (Silman & Newman, 1996; Sleator,

Gore & Vidler, 1998). For the purpose of this study, the term “Repetitive Strain Injury” (RSI) will be used to refer to these conditions.

According to the Health and Safety Executive, RSI is the most common occupational-related form of ill-health (Robertson & Stewart, 2004). The Labour Force Survey covering self reported workplace illness and workplace injury 2008/2009 across Great Britain indicates that 1,2 million people reported illnesses they associated with their workplace and of that, the most commonly reported were those suffering from RSI (538 000 people). Of these, an estimated 227 000 (42%) suffered from a disorder mainly affecting their back, 215 000 (40%) from a disorder mainly affecting their upper limbs or neck, and 96 000 (18%) mainly affecting their lower limbs. Of the estimated frequency of experience of work-related RSI in people who worked in 2008/2009, about a third of cases (191 000) were new. This implies an estimated incidence rate of 630 per 100 000 people (63%). To equate the self-reported injury with days lost, 7,3 million workdays were lost due to RSI mainly affecting the upper limbs or neck caused or made worse by work. On average, each individual reporting the symptoms took an estimated 17.3 days off in that 12 month period, which equates to an annual loss in Great Britain of 0,39 days per worker (Health and Safety Executive, 2009).

RSI is also a significant problem within the United States as it accounts for over half of all occupational illnesses and injuries and is reported to be the third most common reason for disability and early retirement (Dunning et al., 2010; Sprigg et al., 2007). According to the Bureau of Labour Statistics in 2008, RSIs account for 29% of all workplace injuries and illnesses requiring time away from work in private industry compared to 22% in state government and 25% in local government (Bureau of Labour Statistics, 2010). Dunning et al. (2010) reported that RSIs were the leading cause of a work disability estimating annual costs being greater than those of cancer and cardiovascular disease. An estimated cost of work-related musculoskeletal disorders in the United States in 1995 was 215 billion dollars. In 1998, 26 billion Canadian dollars was spent in Canada (Da Costa & Vieira, 2010). RSIs in the United States have shown significant implications for the day-to-day functioning of workers, affecting their capacity to perform work-related tasks as well as subsequently impacting on their home life (Dunning et al., 2010).

New Zealand has indicated that RSIs (back, neck, arm and knee injuries) are the highest reported occupational illness/disease, representing between 40% and 63% of reported

musculoskeletal pain. The Accident Compensation Corporation (ACC) of New Zealand is said to pay out 350 million New Zealand dollars per annum and employees are believed to be absent 250 000 days relating to back pain alone. However, these figures do not fully reflect the physical, psychological, societal and financial losses associated with RSI (Harcombe, McBride, Derrett & Gray, 2009).

As stated in the Compensation Commissioner's Guidelines for Health Practitioners and Employers to manage RSI, "no statistics are available for South Africa regarding the impact of RSIs on health care and the economy" (Compensation Commission, 2004, p. 8). There is also limited data available on the incidence of RSIs within South Africa. As seen globally and within South Africa the world of work is demanding far more from individuals than what was previously expected. Studies within South Africa have provided evidence the incidence of other stress related problems, exhaustion, emotional fatigue and burnout amongst employees (Rothmann, 2003; Levert, Lucas, & Ortlepp, 2000; Pienaar, 2002; Van der Linde, Van der Westhuizen & Wissing, 1999; Visser & Rothmann, 2009). Considering the impact RSIs can have on the employee, the employer and the country's economy it is of value to explore the frequency of experience of the disorder within the South African working population.

Risk factors that are increasingly referenced as plausible contributors to the emergence of RSI include psychosocial factors (Bongers, De Winter, Kompier & Hildebrandt, 1993; Bongers, Kremer & Ter Laak, 2002; Collins & O'Sullivan, 2010; Conway, 1999; Devereux, Vlachonikilis & Buckle, 2002; Kompier & Van der Beek, 2008; Larsman & Hanse, 2008; Sauter & Swanson, 1996). A psychosocial factor, as defined by the International Labour Office (ILO) and the World Health Organisation (WHO), is "any factor or condition, whether individual or work related, that contributed to the stress process" (Sauter & Swanson, 1996, p. 5). The Job Demands-Resources (JD-R) model is a well sited model that links job demands with psychosocial stress, sleeping problems, exhaustion, ill health and repetitive strain and job resources with job learning, engagement and work commitment (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Duraisingam & Dollard, 2005; Hakanena, Schaufeli, & Aholaa, 2008). Job demands refer to those physical, psychological, social or organisational aspects of a job that require sustained physical and/or psychological effort on the part of the employee and are therefore associated with physiological and/or psychological stress (Schaufeli & Bakker, 2004). Generally, individuals adapt and adjust to stress. However, if it is prolonged or the stress goes beyond the resources available to the

individual, stress becomes strain, which can be seen as a physiological, behavioural, and/or psychological deviation from healthy functioning (Quick et al., 2006).

Strain is an adverse result of stress, creating a need for recovery, which if not addressed may manifest in exhaustion, as well as physical, psychological, or behavioural problems (Le Blance, De Jonge & Schaufeli, 2000; Quick et al., 2006). Thus, as the individual is exposed to higher job demands, he or she undergoes a process of expending additional effort in order to achieve the same level of task performance. This process of expending compensatory effort causes strain and drains the individual's energy. Individuals who experience high workplace demands are at a greater risk of exhausting their energy reserves and experiencing psychological strain. This psychological state of strain can manifest physically and affect the musculature of the individual, creating the conditions for a greater incidence of RSI (Bridger, 2009; Schaufeli, Bakker & Van Rhenen, 2009; Sprigg et al., 2007).

It is assumed that if work-engaged individuals are exposed to high job demands and demonstrate loyalty and commitment to their work, they could expect negative health conditions associated with that work devotion. However, this study hypothesises that this is not the case, but rather that the state of exhaustion is a key component in the development and exacerbation of RSI. This will be demonstrated by examining the incidence of RSI risk factors among people at various points along the continuum of exhaustion, namely: low exhaustion and high vitality and work devotion (work engaged), engaged but with high exhaustion levels, and vitally exhausted (low engagement levels and very high levels of exhaustion).

Organisations are always looking for employees who are willing and committed to go the extra mile – those individuals who demonstrate proactive behaviours, are goal directed, resilient, accountable, responsible, as well as dedicated to high quality (Bakker & Schaufeli, 2008; Bakker, Schaufeli, Leiter & Taris, 2008; Schaufeli & Salanova, 2008). Work engagement has thus become a popular concept that organisations desire to develop in their employees. According to Bakker et al. (2008, p. 187), “work engagement is a positive, fulfilling, affective-emotional state of work-related well-being”. It is commonly understood that engaged workers tend to express vitality (liveliness, high energy and resilience in investing energy in one's work and persisting in the face of setbacks) and work devotion (positive identification with work, whereby the individual demonstrates loyalty, enthusiasm,

dedication and a sense of pride and inspiration from his/her work environment) (Rothmann, 2008; Xanthopoulou, Bakker, Demerouti & Schaufeli, 2009).

Work devotion implies that the engaged worker is willing, and committed to going the extra mile, therefore exerting energy over and above what is required. Work-engaged employees are exposed to high work demands, are generally asked to take on additional responsibilities, are known to be hard workers and are dedicated to the achievement of work goals (Bakker et al., 2008). Hence, engaged workers could be expected to be exhausting their mental and physical resources, thus putting themselves at risk for health problems (Sprigg et al., 2007). According to Taris et al. (2006), employees who expend large amounts of energy at work are inclined to experience and demonstrate health problems in time. These health problems are said to develop as a result of high work demands, as those who experience their work as strenuous report a high need for recovery and thus are at a greater risk for experiencing strain, fatigue and the associated RSI (Jansen, Kant & Van den Brandt, 2002). According to Feuerstein (1996), the work style that individuals adopt in response to increasing work demands can increase their likelihood of developing symptoms of RSI. High-risk work styles include taking less rest periods or missing breaks and working through discomfort or pain (Van den Heuvel, Van der Beek, Blatter & Bongers, 2007). Therefore, it is commonly expected that those individuals who are engaged would demonstrate dedication, commitment and intense investment in their work. This could create the conditions for a work style (limited movement, static work postures, awkward or unnatural work postures, less opportunities for recovery periods, etc.) that can overwork particular musculoskeletal structures, producing psychological and physical stress and the related RSI (Panel on Musculoskeletal Disorders and the Workplace, 2001; Smith & Carayon, 1996; Sprigg et al., 2007; Todd, Bennett & Christie, 2007).

The literature and this study, however, suggest otherwise. Despite high job demands and subsequent additional effort expended, the engaged worker is able to draw on resources available and sustain high levels of energy, work performance, resilience and well-being (Rook & Zijlstra, 2006; Schaufeli et al., 2009; Schaufeli, Taris & Bakker, 2006). Research attributes this to engaged workers enjoying their work, and working hard because they like it. However, the engaged individual may also have greater access to resources to manage daily stressors and possess the capacity to benefit from positive events at work (Sonnentag, Mojza, Binnewies & Scholl, 2008). This study aims to indicate that although it is assumed that

engaged workers are more prone to RSI because of their high work devotion, they are in fact less inclined to demonstrate the symptoms. It is postulated that this is a result of higher energy levels (low exhaustion), sustained through appropriate effort recovery.

Maintaining sustained energy and enthusiasm despite high job demands can be attributed to periods of detachment from work, as recovery has been shown to have a positive effect on work engagement, well-being, and proactive work behaviours (Rook & Zijlstra, 2006; Sonnentag, 2003). This can be illustrated when comparing workaholics and work-engaged individuals. Although both states illustrate work devotion, the workaholic would tend to work excessively or compulsively, showing an uncontrollable obsession to working excessively hard, so much so that it affects the balance in their lives and endangers their health. Workaholics are inclined to spend a lot of time at work, and frequently think about work when they are not at work (Schaufeli, Bakker, Van der Heijden & Prins, 2009). They tend to experience high levels of work strain and related health complaints, whereas engaged employees do not (Schaufeli et al., 2006). Recovery from stress can be considered one of the factors that differentiate workaholism from work engagement. Engaged workers are more inclined to detach from their work and recover their energy and resources in order to ensure sustained energy and work performance (Bakker et al., 2008; Meijman & Mulder, 1998). So it is assumed that although engaged workers show high dedication, commitment, extra role behaviours, are hard workers, etc., they are less likely to indicate exhaustion – possibly as a result of a recovery of their energy reserves and resources. It is thus expected that when an individual works beyond the resources available to him/her, and does not engage in efficient recovery periods, such a person is exposing him/herself to strain, exhaustion and RSI.

If an individual is unable to experience the recovery required to replenish his or her energy sources, then the individual is inclined to become increasingly fatigued and notice changes in his/her physiological responses and moods. The fatigued individual will possibly also be required to expend compensatory effort in order to reach the same level of task effectiveness (Binnewies & Sonnentag, 2008; Sonnentag & Zijlstra, 2006; Zijlstra & Sonnentag, 2006). This can result in cumulated fatigue, which can develop into prolonged fatigue and vital exhaustion (De Croon et al., 2004). There is a strong relationship between work strain, fatigue, vital exhaustion and RSI (De Croon et al., 2004; Sprigg et al., 2007).

Exhaustion can be explained as a severe form of fatigue, caused by long-lasting and intense physical, affective, and cognitive strain as a result of chronic exposure to demanding working conditions (Peterson, Demerouti, Bergstrom, Asberg & Nygren, 2008). It can be considered “a side effect of work that lowers the capacity for further work of the same kind” (Bridger, 2009, p. 8). Work-related fatigue can act as a link between high job demands and various health problems (Sluiter et al., 2003). Bongers et al. (2002) report that the strain associated with high mental load or job demands could have an impact on the velocity and acceleration of movements, as seen in the force and posture of the individual. It may also trigger physiological stress reactions (muscle fatigue, instability and changes in immune system responses) that could place an individual at greater risk for RSI (Sprigg et al., 2007). Exhaustion can also affect an individual’s physiology and musculature, eventually increasing the individuals risk for developing symptoms of RSI (Sprigg et al., 2007). Muscle fatigue resulting from consistent tensing of muscles (neck and shoulder) can elicit changes in work behaviour as seen in avoidance of rest breaks, unusual postures, or excessive forces placed on the muscles (Devereux et al., 2004). Chronic job stress and strain may also hamper an individual’s capacity to unwind, thus interrupting the recovery period, which may further reduce his/her capacity for recuperation. In addition, the state of experiencing exhaustion may hinder the responsiveness of the individual to the experience of risk factors, thus allowing the symptoms and problems to exacerbate without proper treatment or behaviour change (Bongers et al., 2002; Kompier & Van der Beek, 2008; Sauter & Swanson, 1996).

It is thus suggested that extended periods of fatigue and insufficient recovery can place greater demands on the health and well-being of the individual and as a result be a contributing feature in the emergence and maintenance of the symptoms of RSI (Binnewies & Sonnentag, 2008; Devereux et al., 2004; Panel on Musculoskeletal Disorders and the Workplace, 2001; Rothmann & Rothmann 2006; Schaufeli, Taris & Van Rhenen, 2008). It is therefore expected that the risk for RSI will increase as exhaustion increases (i.e. employees who are truly engaged will be at lower risk for experiencing RSI compared to engaged employees with exhaustion and those employees who are vitally exhausted).

Exhaustion, or severe energy depletion, is recognised as a core symptom of burnout, and those individuals who rate themselves as burned out are inclined to be experiencing a greater severity of exhaustion, particularly as a consequence of high demands, job strain and poor effort recovery (Sonnenschein et al., 2007). Vital exhaustion is a long-lasting response to

work stress and entails emotional, mental and physical exhaustion (Demerouti et al., 2001). Over time, the individual is said to have devoted extra energy as a result of increasing work demands, and as a result of poor psychophysiological unwinding after effort expenditure, the individual exceeds his/her energy resources and therefore experiences exhaustion. Without the necessary resources or recovery periods, the individual is required to expend additional effort to meet the same level of task performance. This can create the conditions for poor health (Geurts & Sonnentag, 2006; Houkes, Winants & Twellaar, 2008; Schaufeli & Bakker, 2004; Stenlund, 2009). It would thus be expected that those vitally exhausted individuals will demonstrate the highest incidence of RSI (Toppinen-Tanner, Ojajarvi, Vaananen, Kalimo & Jappinen, 2005). Vital exhaustion, as a component of burnout, can also be directly related to mental and behavioural disorders and diseases of the musculoskeletal system. In addition to the expected RSIs, the condition of vital exhaustion is related to numerous health conditions (anxiety, depression, sleep disturbances, gastro-intestinal problems, headaches, circulatory and respiratory diseases, etc.) and is said to be negatively associated with drops in productivity, intention to leave, job satisfaction, commitment, absenteeism and turnover (Schaufeli & Bakker, 2004; Toppinen-Tanner et al., 2005; Wright & Hobfoll, 2004).

A theoretical framework that can be used to understand the relationship between well-being (work engagement and exhaustion) and RSI is the Effort-Recovery (E-R) model as proposed by Meijman and Mulder (1998). Recovery periods can be seen as the mechanism through which acute stress and chronic health problems are explained (Geurts & Sonnentag, 2006). According to the E-R model, individuals within the work environment are subjected to certain work demands in order to achieve particular job-related outcomes. As employees are exposed to work demands and work stressors, they are depleting their energy resources (physical, mental and emotional). High job stressors and long work hours are said to be associated with higher energy depletion and a greater need for recovery. A need for recovery refers to the individual's desire to have a rest from demands, whether physical, mental or emotional as well as to avoid any additional demands (Binnewies & Sonnentag, 2008). This desire for recuperation can be considered the antecedent of prolonged fatigue or psychological distress (Jansen et al., 2002).

The need for recovery and whether an individual actively engages in recovery periods differentiate employees who are likely to demonstrate exhaustion or show vitality through being engaged in their work. Therefore, if the individual is not able to regulate his/her energy

expenditure and take opportunities for recuperation, optimal recovery cannot be achieved. This may lead to chronic health problems associated with prolonged fatigue, such as chronic tension, ill-health and RSI (Binnewies & Sonnentag, 2008; Geurts & Sonnentag, 2006; Sonnentag & Zijlstra, 2006). Through a reduction or change in demands, the individual can restore his/her energy and associated resources and experience recovery. Within the process of recuperation, the individual is likely to experience an improvement in mood, well-being and ability, as well as a greater keenness for tackling new demands (Binnewies & Sonnentag, 2008). The individual may also be less inclined to experience strain to the point of exhaustion, thus buffering the probability of developing RSI.

It is commonly understood that an organisation's success depends largely upon the health and well-being of its employees (Schaufeli et al., 2009). With a greater trend towards investigating that which is positive, there is much research into understanding the conditions for developing work-engaged employees (Bakker et al., 2008). However, if work-engaged individuals demonstrate a commitment beyond the call of duty, then some would expect negative health conditions that could be associated with that work devotion. It is, however, postulated that it is not work devotion that creates the risk for poor well-being and RSI but rather the exhaustion associated with inadequate recovery from high work demands. Therefore, if conditions within the work environment, as well as individual work style characteristics, foster exhaustion, it may exacerbate the influence of ergonomic factors and allow for an increased emergence of RSI. It is therefore expected that the risk for RSI will increase as exhaustion increases (i.e. employees who are truly engaged will be at lower risk for experiencing RSI compared to engaged employees with exhaustion and vitally exhausted employees). Hence, an organisation made up of employees experiencing exhaustion would be at a greater risk for poor employee health and worker disability (Jansen et al., 2002). The literature currently available does not sufficiently indicate the frequency of experience of RSI within South Africa or the suggested link between work engagement, exhaustion and RSI. RSI is a workplace injury that can lead to costly compensation claims; consequently, organisations stand to benefit from a better understanding of the role of exhaustion in the development and exacerbation of RSI.

The following research questions emerge from the above-mentioned problem statement:

- How is RSI and its relationship with exhaustion and work engagement conceptualised in the literature?

- What is the frequency of experience of RSI (eyestrain, muscle stiffness, neck, shoulder and back discomfort) in a sample of South African employees?
- What is the frequency of experience of RSI (eyestrain, muscle stiffness, neck, shoulder and back discomfort) for three well-being groups (i.e. truly engaged employees, engaged employees with exhaustion and vitally exhausted employees)?
- Are there significant RSI differences between truly engaged employees, engaged employees with exhaustion and vitally exhausted employees?
- Can recommendations be made for future research and practice?

1.1.1 Expected contribution of the study

Contribution for the Individual

RSI and the more serious and chronic manifestations of the symptoms can severely affect the quality and duration of a person's working life and lead to physical, psychological, societal and financial losses. In recognising the impact of exhaustion on the development and maintenance of RSI and acknowledging the essential role of effective recovery periods in the progression of stress, strain and fatigue one can encourage the individual to engage in more efficient periods of recuperation, thus reducing the emergence of exhaustion and related RSI. This study can also serve to encourage the need for greater awareness of RSI for the individual within the workplace.

Contribution for the Organisation

RSI is a compensatable organisational disease, thus greater awareness can contribute to healthier employees but also allow for less exposure to hefty compensation claims. RSI's place enormous strain on the employee, employer and the economy worldwide as they represent one of the leading health concerns affecting the quality and duration of an employees work life. The physical complications associated with the disorder if not dealt with early can have far-reaching effects on not only the day to day physiological functioning and motivation of the individual, but on productivity, absenteeism and early retirement. Current and accurate awareness of the prevalence of RSI and the relationship with exhaustion and work engagement is vital. The aim is to ensure organisations are aware of the prevalence of such health concerns, particularly amongst office workers, and how exhaustion can be associated in the manifestation of additional illnesses or diseases. This understanding can

encourage employees and employers to take active steps in the prevention of RSI as well as the support of those who are suffering from the symptoms. Effective communication of the risks associated, can create an opportunity for targeting RSI in organisations and individuals. This can equip organisations to encourage earlier detection and recovery by employees, thus providing them with the platform and support to avoid the exacerbation of the symptoms and the development of more chronic forms of the disorder. This knowledge can aid in the design of conducive work environments, promote effort recovery, as well as encourage a greater responsiveness to the emergence of RSI symptoms (Robertson & Stewart, 2004).

Contribution to Industrial/Organisational Literature

There is much research and investment in understanding RSI's and their impact internationally, however little information exists within the South African context. In evaluating the prevalence of RSI as well as the relationship with burnout and work engagement, this study aims to encourage further research. Also by creating a platform for further discussion, I/O Psychologists can be made aware of the importance of incorporating a greater awareness of RSI within the workplace.

1.2 RESEARCH OBJECTIVES

The research objectives can be divided into a general objective and specific objectives.

1.2.1 General objective

The general objective of this research is to ascertain the frequency of experience of RSI and its relationship with exhaustion and work engagement among South African employees.

1.2.2 Specific objectives

The specific objectives of this research are:

- To determine how RSI and its relationship with exhaustion and work engagement is conceptualised in the literature.
- To determine the frequency of experience of RSI (eyestrain, muscle stiffness, neck, shoulder and back discomfort) in a sample of South African employees.

- To determine the frequency of experience of RSI (eyestrain, muscle stiffness, neck, shoulder and back discomfort) for three well-being groups (i.e. truly engaged employees, engaged employees with exhaustion and burned out employees)?
- To investigate whether there are significant RSI differences truly engaged employees, engaged employees with exhaustion and burned out employees.
- To make recommendations for future research and practice.

1.3 RESEARCH METHOD

The research method consists of a literature review and an empirical study. The results obtained are presented in the form of a research article.

1.3.1 Literature review

The literature review focuses on the incidence of RSI internationally and the gap that exists in the data regarding its frequency of experience among South African employees. Furthermore, in-depth research is conducted to investigate the relationships between RSI, work engagement and exhaustion. The reader should note that a literature study is conducted for the purposes of the article and focuses on aspects relevant to the empirical study that is conducted. The results obtained from the research is presented in article format.

Relevant articles published between 1990 and 2010 is consulted via the following databases: *Academic Search Premier; APA PsycArticles; EbscoHost; Emerald; Metacrawler; Proquest; SACat; SAE Publications; Science Direct; ProQuest* and *Nexus*. The following journals will be studied as a result of their relevance to the current topic: *South African Journal of Industrial Psychology; South African Journal of Human Resource Management; Ergonomics South Africa; Journal of Applied Psychology; Journal of Occupational and Organizational Psychology; Journal of Occupational Environmental Medicine; Journal of Managerial Psychology; Journal of Occupational Health Psychology; Journal of Organizational Behavior; Journal of Work and Stress; European Journal of Work and Organizational Psychology, European Journal of Public Health; Scandinavian Journal of Work, Environment & Health; American Journal of Industrial Medicine; American Journal of Industrial Medicine;*

International Journal of Human-Computer Interaction; International Journal of Behavioral Medicine; Occupational Medicine.

1.3.2 Research participants

An availability sample of 15 664 is utilised to reach the first objective (i.e. to determine the frequency of experience of RSI in a sample of South African employees). To reach the second and third objective (i.e. to determine the frequency of experience of RSI for three well-being groups and to evaluate whether there are significant RSI differences between these three well-being groups), participants are selected based on their experience of vitality, work devotion and exhaustion. Individuals who experience high levels of vitality and work devotion and low levels of exhaustion formed the truly engaged group. Individuals who have high levels of vitality and work devotion but also average to high levels of exhaustion formed the second group – the engaged but exhausted group. Those who experienced low vitality and work devotion (lack of work engagement) and very high levels of exhaustion formed the vitally exhausted group. In total, 4 411 employees were included in this sample.

1.3.3 Measuring instrument(s)

The South African Employee Health and Wellness Survey (SAEHWS) is used to measure the study variables. The SAEHWS instrument measures the health and wellness status of the employees within the different sectors. These responses are related to the organisational climate and then compared to the South African norm (Rothmann & Rothmann, 2006). Therefore, the measuring instrument is objective and comparative. The validity of the factor structures of the SAEHWS is equivalent for different ethnic groups and organisations. The SAEHWS is culturally sensitive, with no bias against any cultural group. The SAEHWS is also supported by a predictive model, which allows for human capital risk prediction and the proactive management of risks and work-related well-being of employees, teams and areas of operations (Rothmann & Rothmann, 2006).

Repetitive Strain Injury. To determine if the participants experienced RSI symptoms, questions are asked on the experience of stiffness, back pain and neck pain. The three items (one item for each RSI symptom) are rated on a four-point Likert scale, ranging from 0 (never) to 4 (often), with questions such as: “*How often do you experience eyestrain?*”;

“How often do you experience discomfort or stiffness in the hands, wrists, fingers, forearms or elbows?”; and *“How often do you experience pain and/or spasms in the upper back, shoulders, or neck?”*. The Cronbach alpha internal consistency coefficients of the scales support the reliability of the RSI risk scale.

Work-related well-being. The SAEHWS is also used to measure work-related well-being (i.e. exhaustion and work engagement). The work-related well-being dimension utilises a seven-point Likert rating scale, ranging from 0 (never) to 6 (always) and includes the following subscales: exhaustion (five items, e.g. “I feel tired before I arrive at work”); vitality (five items, e.g. “I am full of energy in my work”) and work devotion (five items, e.g. “I am passionate about my job”). The internal consistencies are also acceptable with the Cronbach alpha coefficient above the cut-off point of 0,70. More specifically, exhaustion: 0,84; vitality: 0,84 and work devotion: 0,83 (Rothmann & Rothmann, 2006).

1.3.4 Research procedure

The method of data collection is through self-administered self-report questionnaires. Respondents are provided with a detailed description of the purpose of the study and assured of the confidentiality of their responses prior to completing the questionnaire. The respondents will give informed consent and will be allowed 20 to 30 minutes to complete the questionnaire. Authorisation from the respective organisations to utilise the data for research purposes is also obtained via the general managers. The data is electronic and will remain within a survey data archive. It covers the respondents' biographical data as well as individual responses to the survey questions.

1.3.5 Statistical analysis

The statistical analysis is carried out with the help of the SPSS program (SPSS Inc. 2009). Descriptive statistics (e.g. means, standard deviations, skewness and kurtosis) is used to analyse the data. Cronbach alpha coefficients is used to assess the reliability of the constructs included in the study (Clark & Watson, 1995). Pearson product-moment correlation coefficients is used to specify the relationship between the variables. In terms of statistical significance, it is decided to set the value at a 95% confidence interval level ($p \leq 0,05$). Effect sizes are used to decide on the practical significance of the findings (Stein, 1999). Cut-off points of 0,30

(medium effect, Cohen, 1988) and 0,50 (large effect) will be set for the practical significance of correlation coefficients.

The frequency of experience of RSI (eyestrain, muscle stiffness, neck, shoulder and back discomfort) is statistically determined through frequencies. It is important to experiment with these three constructs in order to determine if there is a significant difference in the experience of RSI risk factors for the three groups.

Frequencies are used to determine the incidence of RSI symptoms for the total sample and the frequency of experience of RSI in the three well-being groups. ANOVA is used to determine differences between the groups. ANOVA reflects the expression of the hypothesis tests of interests in terms of variance estimates (Muller & Fetterman 2002). Levene's test of homogeneity of variance is used to test that variances across difference groups are equal. When the variances are different, and the assumptions of homogeneity of variance are violated, the Welch F test is utilised to test for the equality of means. A Bonferroni-type adjustment is made for inflated Type 1 error. The Games-Howell procedure is used to determine if the differences between groups are statistically significant.

1.3.6 Ethical considerations

Fair and ethical research is imperative to the success of this project, therefore issues such as voluntary participation, informed consent, doing no harm, confidentiality and privacy are taken into account (Devous, 2002).

1.4 OVERVIEW OF CHAPTERS

In Chapter 2, the findings of the research objectives are discussed in the form of a research article. Chapter 3 deals with the conclusions, limitations and recommendations of this research.

1.5 CHAPTER SUMMARY

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

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CHAPTER 2

RESEARCH ARTICLE 1

REPETITIVE STRAIN INJURY AMONG SOUTH AFRICAN EMPLOYEES: PREVALENCE AND THE RELATIONSHIP WITH EXHAUSTION AND WORK ENGAGEMENT

ABSTRACT

Orientation: Repetitive Strain Injury (RSI) is the most common form of work-related ill-health. If the symptoms are not recognised and addressed early, serious and more chronic manifestations of the symptoms can emerge, subsequently affecting the quality and duration of a person's working life. RSI also has significant implications for organisations in terms of lost productivity, drops in work quality and costly compensation claims.

Research purpose: To ascertain the frequency of experience of RSI and the relationship with exhaustion and work engagement among South African employees.

Motivation for the study: To draw attention to the pervasiveness of RSI, and its relationship with work engagement and exhaustion in order to highlight the need for greater awareness.

Research design, approach and method: A cross-sectional field survey approach was used. The South African Employee Health and Wellness Survey was administered to identify several aspects related to the health and wellness status of employees. An availability sample of ($N = 15\,664$) was utilised to determine the frequency of experience of RSI in a sample of South African employees. Participants were then selected into groups based on their experience of vitality, work devotion and exhaustion ($n = 4\,411$) in order to determine the frequency of experience of RSI for three well-being groups and to evaluate whether there are significant RSI differences between these three well-being groups. Frequencies were used to determine the incidence of RSI symptoms for the total sample and three well-being groups. ANOVA was used to determine differences between the groups.

Main findings: Of the employees who indicated that they experienced RSI symptoms sometimes and frequently, 47% indicated experiencing neck, shoulder and back pain, followed by 42% reporting eyestrain, and 24% experiencing muscle stiffness. Significant RSI differences existed between truly engaged employees, engaged employees with exhaustion, and vitally exhausted employees. Results indicate that RSI symptoms are reported more as exhaustion increases in severity.

Practical/Managerial implications: As RSI is an organisational disease that can lead to compensation claims, greater awareness and current knowledge can contribute to healthier employees but also allow for reduced exposure to hefty compensation claims.

Contribution/Value-add: This study contributes to the limited research on the frequency of experience of RSI and the relationship with exhaustion and work engagement within the South African context.

Keywords: Repetitive strain injury (RSI); work-related upper-limb disorders; musculoskeletal disorders; eyestrain; muscle stiffness; neck, shoulder and back discomfort; vitality; work devotion, exhaustion.

INTRODUCTION

Key focus

The ever-increasing demands of the modern world of work are creating conditions for the emergence of occupational-related injuries and disorders. Internationally, research points to repetitive strain injuries (RSI) as being the most common form of work-related ill-health, severely affecting millions of employees, organisations and society at a physical, psychological and financial level (Dunning et al., 2010; Harcombe, McBride, Derrett & Gray, 2009; Health and Safety Executive, 2009, Robertson & Stewart, 2004; Sprigg, Stride, Wall, Holman & Smith, 2007). Although research is available internationally, there is limited information indicating the frequency of experience of RSIs within the South African context (Compensation Commission, 2004). There is growing research with regard to the experience of stress related problems, exhaustion, emotional fatigue and burnout amongst employees within South Africa (Rothmann, 2003; Levert, Lucas, & Ortlepp, 2000; Pienaar, 2002; Van der Linde, Van der Westhuizen & Wissing, 1999; Visser & Rothmann, 2009). However, there is little investigation into RSI as a form of stress related occupational disease within the South African workforce. Exploring the frequency of experience as well as potential factors impacting on the prevalence of RSI would offer unique insight into RSI within the South African context (Compensation Commission, 2004).

Internationally, there is noteworthy interest in job-related well-being, as low work-related well-being manifests itself in many detrimental ways, ranging from exhaustion and lower work devotion to reduced concentration and psychosomatic complaints (Rothmann, 2008; Van Horn, Taris, Schaufeli & Schreurs, 2004). More specifically, psychosocial factors and their impact on work-related well-being are receiving a great deal of attention internationally as a strong link is emerging between high work demands, chronic stress, exhaustion and adverse health problems such as RSI (Bongers, De Winter, Kompier & Hildebrandt, 1993; Bongers, Kremer & Ter Laak, 2002; Cahill, 1996; Collins & O'Sullivan, 2010; Conway, 1999; Devereux, Vlachonikilis & Buckle, 2002; Kompier & Van der Beek, 2008; Larsman & Hanse, 2008; Sauter & Swanson, 1996). No research could be found within the South African context that investigates the relationship between well-being and RSI, in particular the effect of work engagement and exhaustion on the incidence of RSI.

Background to the study

RSI refers to a range of medical conditions that can be caused or made worse by work. It often manifests as tension affecting the muscles, tendons, ligaments, nerves or other soft tissues and

joints. Common symptoms associated with RSI include stiffness, cramps, pain, fatigability and muscle weakness. If not addressed, more serious and chronic manifestations of the symptoms can emerge (e.g. epicondylitis at the elbow, tenosynovitis and nerve entrapments such as carpal tunnel syndrome), severely affecting the quality and duration of a person's working life (Compensation Commission, 2004; Harcombe et al., 2009). RSIs affect absenteeism, productivity and the motivation of its sufferers. It can also lead to serious physiological complications, increased medical costs, possible incapacity and potentially costly compensation claims for organisations (Compensation Commission, 2004).

RSI accounts for over half of all occupational-related illnesses and diseases in the United States and New Zealand. In Britain, an estimated 538 000 people who had worked in 2008/2009 believed that they were suffering from repetitive strain injury that was caused or made worse by their current or past work. As a result, 7,3 million work days were lost (Dunning et al., 2010; Harcombe et al., 2009; Health and Safety Executive, 2009; Sprigg et al., 2007). Estimated costs associated with compensation claims include 215 billion dollars in the US in 1995, 26 billion Canadian dollars in Canada in 1998 and 350 million New Zealand dollars annually in New Zealand (Da Costa & Vieira, 2010; Harcombe et al., 2009). No statistics are currently available for South Africa regarding the impact of RSIs on employees and the economy, although it is clear that RSIs are having an alarming effect on the work-related well-being of employees (Compensation Commission, 2004).

Considering the severe impact of RSI on the individual, organisation and society, much effort has been focused on understanding the etiology of RSI. Typically, physically demanding or strenuous occupations were seen as the primary source of RSI. However, there has been a great interest in the effect of psychosocial factors (Ariens, Van Mechelen, Bongers, Bouter & Van der Wal, 2001; Devereux et al., 2004; Kompier & Van der Beek, 2008; Silman & Newman, 1996). Psychosocial factors are those conditions within the environment or person that can affect the employee's experience of stress and well-being (Kompier & Van der Beek, 2008). The Job Demands-Resources (JD-R) examines how a combination of demands and resources can lead to distress or eustress and affect physical health and psychological well-being (Rothmann, Mostert, & Strydom, 2006). More specifically, it refers to the interaction between conditions in the work environment (job demands, job variety, autonomy, social support, time pressure, uncertain job future, etc.) and the individual's personal resources that lead to physical, psychological or behavioural reactions impacting on the health of the individual (Sauter & Swanson, 1996). High work demands are seen to impact the well-

being of individuals. In examining the impact of high work demands on the experience of RSI, it was initially assumed that a particular work style could add to the risk of developing RSI.

Researchers argued that highly engaged employees are exposed to high work demands yet are strongly devoted to their work, and as a result could overwork certain musculoskeletal structures, producing psychological and physical stress and the related RSI (Panel on Musculoskeletal Disorders and the Workplace, 2001; Smith & Carayon, 1996; Sprigg et al., 2007; Todd, Bennett & Christie, 2007). However, in contrast to these expectations, engaged individuals demonstrate high vitality, resilience and well-being despite tending to work over and above what is expected of them (Rook & Zijlstra, 2006; Schaufeli, Bakker & Van Rhenen, 2009; Schaufeli, Taris & Bakker, 2006). Thus, the incidence of adverse health problems (anxiety, depression, sleep disturbances, gastrointestinal problems, headaches etc) and RSI is not sufficiently explained by the experience of high work demands alone, it is therefore proposed that exhaustion may have a role to play in the emergence of RSI.

If an individual is exposed to increasingly high work demands with a shortage of job resources, the individual will expend additional effort in order to achieve the same level of task performance. This process of exerting compensatory effort exhausts the individual's energy reserves, and if energy is not adequately recovered through rest periods, it can cause physical and psychological strain. Long-lasting and intense physical, affective, and cognitive strain can lead to extreme fatigue and exhaustion. Work-related exhaustion can therefore act as a link between high job demands and various adverse health problems, including RSI (Peterson, Demerouti, Bergstrom, Asberg & Nygren, 2008; Sluiter, De Croon, Meijman & Frings-Dresen, 2003).

According to Sprigg et al. (2007), individuals who report work-related strain are more inclined to experience RSI in the upper body and lower back. Psychological stress associated with these psychosocial factors are pertinent within the work environment of today as they impact the individual in terms of work productivity, reduced product quality, increased absenteeism and, most importantly, worker health (Smith & Carayon, 1996). Although much research exists internationally with regard to the impact of psychosocial factors on the incidence of RSI, research into the effect of work engagement and exhaustion on the frequency of experienced RSI within South Africa is not known. It is therefore important to compare employees with different well-being (exhaustion and work engagement) levels in terms of the frequency with which they experience RSI symptoms.

Research purpose

The objectives of this study were to 1) investigate the frequency with which RSI symptoms (eyestrain, muscle stiffness, neck, shoulder and back discomfort) are experienced among South African employees; 2) examine the frequency of RSI across three well-being groups (i.e. truly engaged employees, engaged employees with exhaustion, and vitally exhausted employees); and 3) evaluate if there are significant RSI differences between truly engaged employees, engaged employees with exhaustion, and vitally exhausted employees.

Trends from the research literature

Frequency of RSI symptoms

RSI symptoms are progressive, which implies that without appropriate treatment or behavioural change, the initial symptoms, which could have been reversible with rest and minor treatment, escalate into chronic permanent forms of the disorder (Compensation Commission, 2004). Initially the symptoms may appear as discomfort or uneasiness; however, as they progress they increasingly impact on the quality of life and productivity of the employee (Haufler, Feuerstein & Huang, 2000). RSI is considered the leading cause of worker disability, placing an undeniably large burden on the individual, the organisation and society. New Zealand reports the incidence of RSI between 40% and 63%. In Great Britain, 48% of working employees have indicated suffering from RSI, and in the United States, RSIs account for 29% of all workplace injuries and illnesses requiring time away from work in private industry (Bureau of Labour Statistics, 2008; Harcombe et al., 2009; Health and Safety Executive, 2009). No statistics are currently available to indicate the frequency of RSI among South African employees. The Occupational Health and Safety Act (Act No. 85 of 1993), requires employers to assess health and safety risks, and to implement measures to ensure the continued well-being of their employees. Failure to comply could lead to costly legal action against the employer (Lacerda, Nacul, Augusto, Olinto, Rocha & Wanderley, 2005). Understanding the frequency of experience of RSI and its impact on the workforce could allow more proactive steps in RSI prevention and management.

The relationship between RSI, work engagement and exhaustion

Traditionally, ergonomic risk factors such as repetition, force, and posture were attributed to the development of RSI. This was seen primarily within physically demanding or strenuous occupations whereby the tasks entailed poor handgrips, static awkward postures, vibration,

inadequate work-rest cycles or extreme temperatures (Ariens et al., 2001; Devereux, Rydstedt, Kelly, Weston & Buckle 2004; Silman & Newman, 1996). However, there is a growing incidence of RSI in more office-related environments and with this a greater interest in the combined role of ergonomic factors and psychosocial factors such as workload or job stress (Haufler et al., 2000; Sprigg et al., 2007). In investigating those individuals who are likely to be exposed to high workload, individuals experiencing work engagement were identified.

According to Schaufeli, Salanova, González-Romá and Bakker (2002, p. 74) “work engagement is a positive, fulfilling, affective-emotional state of work-related well-being”. The core dimensions making up work engagement include vigour and dedication. Rothmann and Rothmann (2006) refer to these dimensions as vitality and work devotion. Vitality represents an individual’s available energy and capability to invest this energy into the required tasks. Work devotion is defined as the positive identification with and strong involvement in one’s work, thus contributing to an individual’s sense of loyalty, enthusiasm and inspiration from his/her work. Work-engaged individuals are also known for their propensity to drive themselves quite hard and become engrossed in work tasks. They can usually be relied upon to go over and above what is expected, and show high work devotion and commitment (Bakker & Schaufeli, 2008; Bakker, Schaufeli, Leiter & Taris, 2008; Schaufeli & Salanova, 2008). According to Taris et al. (2006), employees who expend large amounts of energy at work, as a result of high work demands, are inclined to experience and demonstrate health problems in time. Hence, engaged workers could be expected by some to be exhausting their mental and physical resources and adopting a high-risk work style (limited movement, static work postures, awkward or unnatural work postures, less opportunities for recovery periods, etc.) thus putting themselves at risk for health problems (Sprigg et al., 2007). The literature, however, suggests that engaged workers show liveliness, high energy and resilience in the face of setbacks, and are thus less inclined to demonstrate a high risk for adverse health problems (Rook & Zijlstra, 2006; Schaufeli et al., 2009; Schaufeli et al., 2006). Rest periods, efficient recovery and detachment from work have been shown to have a positive effect on work engagement, well-being, and proactive work behaviours (Rook & Zijlstra, 2006; Sonnentag, 2003).

It is proposed that the experience of exhaustion, and not high levels of work engagement alone, could be a major source of developing RSI. Exhaustion is the incapacity to perform due to drained energy (Rothmann & Rothman, 2006). Similarly, Schaufeli et al. (2002) describe emotional exhaustion as the draining of resources, namely being emotionally overextended by one’s work. It is important to note that there is a difference between exhaustion and fatigue. When employees are

exposed to high work demands, they are steadily tapping into their energy reserves. Without supplementary resources or appropriate periods of recovery, the individual will begin to experience fatigue, which can be seen as the inability and the unwillingness to spend effort or maintain a particular performance level (Schaufeli & Taris, 2005). Ongoing mental or emotional fatigue experienced as a result of insufficient recovery or on-going energy depletion experienced over an extended period of time, can result in feelings of vital exhaustion (Demerouti, Bakker, Nachreiner & Ebbinghaus, 2002). Vital exhaustion entails severe energy depletion or a chronic form of fatigue where the individual may no longer respond to normal periods of rest and be seen to mentally distance him/herself from all tasks, thus disrupting task performance (Rothmann & Rothmann, 2006; Sonnentag, Sorbi, Doornen & Maas, 2006). Although work engagement (vitality and work devotion) has been proposed theoretically to represent the opposite of burnout (exhaustion and mental distance), individuals can experience work engagement (vigour and dedication) and exhaustion at the same time. Studies have shown that although work devotion and mental distance can stand for two opposing poles on a single scale, exhaustion and vitality represent two independent yet related scales (Demerouti, Mostert & Bakker, 2010; González-Romá, Schaufeli, Bakker, & Lloret, 2006). Therefore, individuals can be engaged yet, experience high levels of exhaustion.

The Effort-Recovery (E-R) model of Meijman and Mulder (1998) can assist in illustrating the underlying mechanism involved in the development of exhaustion, ill-health and RSI. This model proposes that, when faced with work demands, individuals expend effort and deplete their energy resources in order to achieve results. This is associated with short-term psycho-physiological reactions (e.g. accelerated heart rate, increased hormone secretion, and mood changes). Periods of rest and recovery are required in order to stabilise the functional systems that were activated. However, if the individual fails to adequately recover before being exposed to further work demands, the psychobiological systems are activated again before having been able to stabilise at a baseline level. Thus the individual is required to invest additional compensatory effort in order to perform at an equal level, resulting in further energy depletion and increased demands on the recovery process.

An individual's health is adversely affected when rest periods are insufficient, because there is a progressive draining of resources, leading to the development of fatigue and exhaustion (Bongers et al., 1993; Bongers et al., 2002; Cahill, 1996; Collins & O'Sullivan, 2010; Conway, 1999; Devereux et al., 2002; Kompier & Van der Beek, 2008; Larsman & Hanse, 2008; Oldfield & Mostert, 2007;

Sauter & Swanson, 1996). Research suggests that engaged employees tend to demonstrate lower levels of exhaustion, good health, well-being and happiness (Hallberg & Schaufeli, 2006; Schaufeli et al., 2006; Sonnentag, Mojza, Binnewies & Scholl, 2008). Thus, if work-engaged individuals are showing vitality, they can be assumed to be replenishing their energy reserves sufficiently. However, those individuals experiencing exhaustion would be expected to have consistently not engaged in effective recovery periods, or to have been exposed to greater demands without sufficient supporting resources. Exhaustion has been recognised as a core symptom of burnout (Sonnenschein et al., 2007). Research on the impact of burnout (exhaustion and mental distance) has shown a relationship to numerous health conditions (anxiety, depression, sleep disturbances, gastro-intestinal problems, headaches, etc.). It is said to be negatively associated with absenteeism, drops in productivity, intention to leave, job satisfaction, commitment and turnover (Schaufeli & Bakker, 2004; Wright & Hobfoll, 2004). Research has also shown that burnout is associated with various circulatory, respiratory and musculoskeletal diseases as is seen in RSI (Toppinen-Tanner, Ojajarvi, Vaananen, Kalimo & Jappinen, 2005).

Although there is no literature available to link exhaustion with RSI, research on the role of stress has provided a base in understanding an individual's response to stress and how this can impact on a person's health. Studies indicate a strong relationship between work stress and RSI (Bongers et al., 1993; De Croon et al., 2004; Devereux et al., 2004; Haufler et al., 2000; Kompier & Van der Beek, 2008; Schaufeli & Greenglass, 2001; Sluiter et al., 2003, Smith & Carayon, 1996; Sprigg et al., 2007). Research in this area provided explanation for this in terms of high work demands that may exhaust employees' mental and physical resources, leading to health problems. Greater work-related strain is also related to an increase in the self report of RSI, particularly in the upper body and lower back (Ahlberg-Hulten, Theorell & Siagala, 1995; Heliovaara, Makela, Knekt, Impivaara & Aromaa, 1991; Shannon et al., 2001; Vasseljen, Holte & Westgaard, 2001). Pransky, Robertson and Moon (2002) state that stress can impact on an individual's posture, muscle tension, capacity to unwind and pain threshold. Stress can also hamper an individual's capacity to heal, further exacerbating health issues (Kompier & Van der Beek, 2008; Sprigg et al., 2007). Faucett and Rempel (1994) offered evidence to support the combined impact of job stress and ergonomic factors in the development of RSI. Thus, both physical (energetic workload, manual lifting, vibration, inadequate handgrips, static awkward postures, continuous repetitive work and extreme temperatures) and psychosocial risk factors at work (job demands, job variety, autonomy, social support, workplace design) can create the context for job stress, strain and RSI (Ariens, 2001; Devereux et al., 2004; Kompier & Van der Beek, 2008; Silman & Newman, 1996).

There are plausible links between the experience of high work demands, job stress, ill-health and RSI. Psychological strain has been seen to have an impact on the individual's musculature. However, the effect of exhaustion on RSI has rarely been tested (Pransky et al., 2002; Sprigg et al., 2007). Therefore, those individuals who experience vital exhaustion as a result of chronic work stress are expected to demonstrate the highest incidence of RSI compared to those who are engaged with exhaustion, and those who experience true work engagement (high levels of vitality and work devotion and low levels of exhaustion).

Potential value add

There is much research and investment in understanding RSIs and their impact internationally (Cahill, 1996; Da Costa & Vieira, 2010; Dunning et al., 2010; Pransky et al., 2002). However, little information exists within the South African context. RSIs place enormous strain on the employee, employer and the economy worldwide as they represent one of the leading health concerns affecting the quality and duration of an employees work life. Having statistics available to draw attention to the pervasiveness of RSI can bring about much needed awareness. The physical complications associated with the disorder, if not dealt with early, can have far-reaching effects on the individual, organisation and society.

Many employees may not recognise their own symptoms (fatigue, discomfort, cramps, stiffness, pain) as RSI, and are thus unaware of the potential serious and chronic nature of their symptoms. Individuals are inclined to continue working, regardless of their aches, pains or discomfort, in order to ensure sustained work quality or performance. Only when the symptoms progress to the point where it becomes difficult to continue working do they attend to the symptoms. However, by then permanent damage may already have been caused, leaving the individual with irreversible disabilities or injuries requiring ongoing medical attention (Compensation Commission, 2004). Consistent exposure to stress can also play a role in exacerbating the symptoms and further limiting the individual's capacity to function (Haufler et al., 2000).

Current and accurate awareness of the frequency of experience of RSI and the relationship with exhaustion and work engagement is vital. By focusing research on this issue, one can highlight the need for greater awareness and action. Organisations can be encouraged to target RSI through effective communication and the early detection, management and support of the symptoms. Knowledge on the impact of job stress and inefficient rest periods can aid in the design of more

conducive work environments, the promotion of effective effort-recovery, as well as a greater urgency and responsiveness to the emergence of RSI symptoms (Robertson & Stewart, 2004). As RSI is an organisational disease or disability, greater knowledge can contribute to healthier employees but also allow for reduced exposure to hefty compensation claims.

What will follow

The following research hypotheses will be tested:

Hypothesis 1: RSI symptoms (eyestrain, muscle stiffness, neck, shoulder and back discomfort) are frequently experienced amongst South African employees.

Hypothesis 2: RSI symptoms (eyestrain, muscle stiffness, neck, shoulder and back discomfort) are experienced more frequently amongst those who are vitally exhausted compared to those who are engaged with exhaustion and those who are truly engaged.

Hypothesis 3: There are significant differences between the three well-being groups, with vitally exhausted employees experiencing more RSI symptoms, followed by engaged employees with exhaustion. Truly engaged employees will experience significantly lower RSI symptoms compared to the first two groups.

RESEARCH DESIGN

Research approach

This study follows the quantitative non-experimental tradition with a cross-sectional field survey approach, as one aims to measure via a questionnaire the same RSI characteristics in representative samples of individuals at one point in time. A correlational approach was used for the analysis of data.

Research method

Research participants

An availability sample of 15 664 was utilised to reach the first objective (i.e. to determine the frequency of experience of RSI in a sample of South African employees). The characteristics of this sample are presented in Table 1.

Table 1

Characteristics of the Participants (N = 15 664)

Item	Category	Total	
		Frequency	Percentage
Language	English	4652	29,7
	Afrikaans	5982	38,2
	African languages	4908	32,5
	Other	121	31,3
Gender	Male	9697	61,9
	Female	5967	38,1
Marital status	Single	4498	28,7
	Engaged	289	1,8
	Married	9761	62,3
	Divorced	955	6,1
Race	Widowed	111	0,7
	African	4335	39,4
	White	5638	51,3
	Coloured	609	5,5
	Indian	395	3,6
Education	Other	12	0,1
	Grade 8	2003	12,8
	Grade 9	119	0,8
	Grade 10	679	4,3
	Grade 11	299	1,9
	Grade 12	7915	50,5
	3-Year Degree/Diploma	2842	18,1
	4-Year Degree/Diploma	1075	6,9
	5- to 7-Year Degree	213	1,4
	Master's Degree	446	2,8
	Doctoral Degree	70	0,4
Provinces	Gauteng	7390	47,3
	Mpumalanga	2294	14,7
	North West Province	3171	20,3
	Limpopo	143	0,9
	Free State	887	5,7
	Northern Cape	74	0,5
	Western Cape	691	4,4
	Eastern Cape	343	2,2
	KwaZulu-Natal	630	4,0
Sector	Academic	94	0,6
	Call centres	150	1,0
	Financial	6371	40,7
	Government	263	1,7
	Manufacturing	3467	22,1
	Mining	5197	33,2
	Other	122	0,8

Table 1 provides a breakdown of the sample ($N = 15\,664$). The sample comprised 9 697 (61,9%) males, and 5 967 (38,1%) females. The largest proportion of the sample consisted of White (51,3%) participants, followed by African (39,4%), Coloured (5,5%) and Indian (3,6%) participants. Generally, the participants were Afrikaans speaking (38,2%), followed by 32,5% speakers of indigenous African languages and 29,7% English speakers. Of the sample, 11 015 (70,3%) specified having a grade 12 education or lower, and 4 646 (29,6%) had a three-year degree or higher. Participants from several sectors in South Africa were utilised, the greatest number being from the financial sector (40,7%), mining (33,2%), and manufacturing sectors (22,1%). All nine provinces in South Africa were sampled, the majority being represented by Gauteng (47,3%) and the North West (20,3%), followed by Mpumalanga (14,7%).

To reach the second and third objective (i.e. to determine the frequency of experience of RSI for three well-being groups and to evaluate whether there are significant RSI differences between these three well-being groups), participants were selected based on their experience (compared to the South African norm, see Rothmann & Rothmann, 2006) of vitality, work devotion and exhaustion. Individuals who experience high levels of vitality and work devotion and low levels of exhaustion formed the truly engaged group. Individuals who have high levels of vitality and work devotion but also average to high levels of exhaustion formed the second group – the engaged but exhausted group. Those who experienced low vitality and work devotion (lack of work engagement) and very high levels of exhaustion formed the vitally exhausted group. Table 2 provides an indication of the characteristics of the participants included in this sample ($n = 4\,411$).

Table 2

Characteristics of the Participants (n = 4 411)

Item	Category	Total	
		Frequency	Percentage
Language	English	1242	28,2
	Afrikaans	1701	38,6
	African languages	1442	32,5
	Other	25	0,6
Gender	Male	2666	60,4
	Female	1745	39,6
Marital status	Single	1263	28,6
	Engaged	90	2,0
	Married	2737	62,0
	Divorced	271	6,1
	Widowed	32	0,7
Race	African	1268	41,6
	White	1493	49,0
	Coloured	179	5,9
	Indian	103	3,4
	Other	4	0,1
Education	Grade 8	533	12,1
	Grade 9	28	0,6
	Grade 10	191	4,3
	Grade 11	74	1,7
	Grade 12	2337	53,0
	3-Year Degree/Diploma	790	17,9
	4-Year Degree/Diploma	265	6,0
	5- to 7-Year Degree	60	1,4
	Master's Degree	111	2,5
	Doctoral Degree	70	0,4
Provinces	Gauteng	2065	46,9
	Mpumalanga	632	14,4
	North West Province	924	21,0
	Limpopo	40	0,9
	Free State	232	5,3
	Northern Cape	21	0,5
	Western Cape	216	4,9
	Eastern Cape	98	2,2
	KwaZulu-Natal	173	3,9
Sector	Academic	34	0,8
	Call centres	42	1,0
	Financial	1886	42,8
	Government	68	1,5
	Manufacturing	877	19,9
	Mining	1480	33,6
	Other	24	0,5

This sample of ($n = 4\,411$) participants from several sectors (call centres, academic, financial, government, manufacturing and mining sectors) in South Africa was utilised. The largest portion being represented by the financial sector 1 886 (42,8%), the mining sector 1 480 (33,6%) and the manufacturing sector 877 (19,9%). The sample comprised participants from all nine provinces in South Africa and covered all eleven official languages. In total, 1 701 (38,6%) of the sample were Afrikaans speaking, 1 242 (28,2%) were English speaking, and 1 433 (32,5%) spoke indigenous African languages. The majority of the participants were male (60,4%). White participants made up almost half (49%) of the total sample, African participants 41,6%, Coloured participants 5,9%, Indian participants 3,4% and other ethnic groups 0,1%. Various age groups (between the ages of 20 and 60) were represented and most (62%) of the participants were married. In terms of educational distribution, 3 163 (71,7%) possessed a grade 12 certificate or lower and 1 248 (28,3%) indicated an education higher than grade 12.

Table 3 indicates the characteristics of the participants across the three well-being groups (truly engaged, engaged with exhaustion, and vitally exhausted). The most relevant biographical characteristics were selected for the breakdown between groups.

Table 3

Characteristics of the Participants across the Three Well-being Groups (n = 4 411)

Item	Category	True Engagement	Engaged with Exhaustion	Vitally Exhausted
Language	English	21,9	25,3	36,9
	Afrikaans	37,3	36,5	41,5
	African languages	40,2	37,3	21,2
	Other	0,60	0,80	0,40
Gender	Male	72,2	65,4	44,4
	Female	27,8	34,6	55,6
Race	African	48,1	46,3	22,1
	White	43,6	43,1	68,1
	Coloured	5,30	6,70	5,80
	Indian	3,00	3,60	3,90
	Other	0,00	0,30	0,1
Education	Grade 8	15,4	16,1	5,60
	Grade 9	0,70	0,80	0,40
	Grade 10	4,60	3,90	4,30
	Grade 11	2,10	2,40	0,70
	Grade 12	50,9	53,1	55,1
	3-Year	17,4	16,8	19,2
	Degree/Diploma			
	4-Year	4,90	3,60	9,00
	Degree/Diploma			
	5- to 7-Year	1,20	0,90	1,80
	Degree			
	Master's Degree	2,50	2,10	2,90
	Doctoral Degree	0,30	0,30	0,80
Sector	Academic	0,4	0,7	1,3
	Call centres	0,7	0,5	1,6
	Financial	28,6	35,5	63,1
	Government	1,3	1,4	1,8
	Manufacturing	23,3	20,9	15,5
	Mining	45,2	40,6	16,1
	Other	0,6	0,4	0,6

This sample ($n = 4\,411$) indicates that 72,2% of males experienced true engagement when compared to females (27,8%). Females demonstrated a higher incidence of vital exhaustion (55%) than males (44,4%). In terms of race, differences were noted between African and White participants. More African participants indicated experiencing true work engagement (48,1%) than

vital exhaustion (22,1%), whereas White participants demonstrated a greater frequency of vital exhaustion (68,1%) than true engagement (43,6%). Across the sectors, the mining sector showed a greater frequency of individuals experiencing work engagement (45,2%) over those individuals showing vital exhaustion (16,1%). In the financial sector, more individuals reported vital exhaustion (63,1%) than those indicating work engagement (28,6%).

Measuring instrument(s)

The South African Employee Health and Wellness Survey (SAEHWS) was used to measure the study variables. The SAEHWS is a self-report instrument and is rooted in the assumption that employees' perceptions and experiences represent imperative information regarding their work-related well-being. The SAEHWS measures several aspects related to the health and wellness status of employees. It is supported by a predictive model (i.e. the dual-process model of work-related well-being developed by Demerouti, Bakker, Nachreiner, and Schaufeli (2001), which allows for human capital risk prediction and the proactive management of risks and work-related well-being of employees, teams and areas of operations. The SAEHWS is a valid and reliable tool to measure work-related well-being, and has been proven to be equivalent for different ethnic groups and organisations (Rothmann & Rothmann, 2006). It is objective, comparative and culturally sensitive, with no bias against any cultural group. South African norms were also developed, so individual and group scores can be compared against a national benchmark.

Repetitive strain injury. To determine if the participants experienced RSI symptoms, three questions (one for each RSI symptom) were asked to determine the experience of eyestrain, muscle stiffness and neck, shoulders and upper back pain, including "How often do you experience eyestrain?"; "How often do you experience discomfort or stiffness in the hands, wrists, fingers, forearms or elbows?"; and "How often do you experience pain and/or spasms in the upper back, shoulders, or neck?". The items were rated on a four-point Likert scale, ranging from 0 (never) to 4 (often).

Work-related well-being. Three dimensions were used to measure work-related well-being, including exhaustion (five items, e.g. "I feel tired before I arrive at work"); vitality (five items, e.g. "I am full of energy in my work") and work devotion (five items, e.g. "I am passionate about my job"). The items were rated on a seven-point Likert rating scale, ranging from 0 (never) to 6 (always). Rothmann and Rothmann (2006) reported acceptable Cronbach alpha coefficients above the cut-off point of 0,70: exhaustion: 0,84; vitality: 0,84; and work devotion: 0,83.

Research procedure

The method of data collection was through self-administered self-report questionnaires that were completed online on a secure website. Respondents were provided with a detailed description of the purpose of the study and were assured of the confidentiality of their responses prior to completing the questionnaire. The respondents gave informed consent and were allowed twenty to thirty minutes to complete the questionnaire. Authorisation from the respective organisations to utilise the data for research purposes was given via the general managers. Fair and ethical research was imperative to the success of this project, therefore issues such as voluntary participation, informed consent, doing no harm, confidentiality and privacy were taken into account (Devous, 2002).

Statistical analysis

The statistical analysis was carried out with the help of the SPSS program (SPSS Inc. 2009). Descriptive statistics (e.g. means, standard deviations) were used to analyse the data. Cronbach alpha coefficients were used to assess the reliability of the constructs included in the study (Clark & Watson, 1995). Pearson product-moment correlation coefficients were used to specify the relationship between the variables. In terms of statistical significance, it was decided to set the value at a 95% confidence interval level ($p \leq 0,05$). Effect sizes were used to decide on the practical significance of the findings (Steyn, 1999). Cut-off points of 0,30 (medium effect), and 0,50 (large effect) were set for the practical significance of correlation coefficients (Cohen, 1988).

Frequencies were used to determine the incidence of RSI symptoms for the total sample and in the three well-being groups. ANOVA was used to determine differences between the groups. ANOVA reflects the expression of the hypothesis tests of interests in terms of variance estimates (Muller & Fetterman 2002). Levene's test of homogeneity of variance was used to test that variances across difference groups were equal. When the variances were different, and the assumptions of homogeneity of variance were violated, the Welch F test was utilised to test for the equality of means. A Bonferroni-type adjustment was made for inflated Type 1 error. The Games-Howell procedure was used to determine if the differences between groups were statistically significant.

RESULTS

Descriptive statistics, internal consistencies and correlations

Table 4 provides the descriptive statistics, internal consistencies (Cronbach alpha coefficients) and correlations for vitality, work devotion and exhaustion.

Table 4

Descriptive Statistics, Cronbach Alpha Coefficients and Correlation Coefficients of the SAEHWS

Dimension	<i>M</i>	<i>SD</i>	α	Vitality	Work Devotion	Exhaustion
Vitality	22,30 (22,99)	5,45 (7,24)	0,80 (0,91)	1,00 1,00	- -	- -
Work Devotion	23,27 (24,11)	6,04 (7,75)	0,86 (0,95)	0,76** (0,93**)	1,00 1,00	- -
Exhaustion	13,15 (13,87)	6,38 (8,00)	0,83 (0,89)	-0,53** (-0,76**)	-0,37** (-0,71**)	1,00 1,00

** Correlation is statistically significant at the 0,01 level

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

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

Note. Values without parentheses indicate larger sample $N = 15\ 664$, values in parentheses represent smaller sample $n = 4\ 411$

Inspection of Table 4 shows acceptable Cronbach alpha coefficients for all the scales, with all the alpha coefficients higher than the guideline of $\alpha > 0,70$ (Nunnally & Bernstein, 1994). It therefore appears that the measuring instrument has acceptable levels of internal consistency. All correlations were statistically significant at the 0,01 level and practically significant with large effects ($r \geq 0,50$). This implies a strong positive relationship between vitality, work devotion and exhaustion.

Frequency of experience of RSI (eyestrain, muscle stiffness, neck, shoulder and back discomfort) in the total sample

Frequencies have been utilised to determine the frequency of experience of RSI (eyestrain, muscle stiffness, neck, shoulder and back discomfort) within the total sample of South African employees.

Table 5

The Frequency of Experience of RSI in the Total Sample (N = 15 664)

Item	Category	Frequency	Percentage
Eyestrain	Never	5 098	32,5
	Seldom	3 970	25,3
	Sometimes	4 300	27,5
	Frequently	2 295	14,7
	Total	15 663	100,0
Muscle stiffness	Never	8 814	56,3
	Seldom	3 011	19,2
	Sometimes	2 742	17,5
	Frequently	1 096	7,00
	Total	15 663	100,0
Neck, shoulder and back discomfort	Never	4 719	30,1
	Seldom	3 517	22,5
	Sometimes	4 522	28,9
	Frequently	2 905	18,5
	Total	15 663	100,0

It can be seen in this sample ($N = 15\,664$) that 14,7% of the participants indicated experiencing eyestrain frequently, while 27,5% experienced it sometimes. With regard to muscle stiffness, 7% indicated that they experienced it frequently, while 17,5% experienced it sometimes. Participants also indicated that they experienced neck, shoulder and back discomfort, with 18,5% of the participants experiencing it frequently and 28,9% experiencing it sometimes. Those who indicated never experiencing eyestrain, muscle stiffness, neck, shoulder and back discomfort accounted for 32,5%, 56,3% and 30,1% respectively. When combining the frequency of those experiencing RSI symptoms sometimes and frequently, it emerges that 42,1% of the sample experienced eyestrain, 24,5% muscle stiffness and 47,4% neck, shoulder or back discomfort. Hypothesis 1 is therefore accepted, as RSI symptoms are prevalent among this South African population sample.

Frequency of experience of RSI (eyestrain, muscle stiffness, neck, shoulder and back discomfort) for the three well-being groups

Frequencies have been utilised to indicate differences in frequency of experience of RSI symptoms among the three well-being groups (i.e. truly engaged, engaged with exhaustion, and vitally exhausted participants).

Table 6

The Frequency of Experience of RSI for Three Well-being Groups (n = 4 411)

Item	Category	True Engagement	Engaged with Exhaustion	Vitally Exhausted	Frequency	Percentage
Eyestrain	Never	54,1	35,7	11,7	1500	34,0
	Seldom	24,3	24,7	19,9	1008	22,9
	Sometimes	17,9	27,3	32,4	1129	25,6
	Frequently	3,70	12,4	36,0	774	17,5
	Total	100,0	100,0	100,0	4411	100,0
Muscle stiffness	Never	77,3	59,4	30,3	2457	55,7
	Seldom	12,7	16,1	23,2	765	17,3
	Sometimes	8,40	18,6	27,4	791	17,9
	Frequently	1,60	5,90	19,1	398	9,00
	Total	100,0	100,0	100,0	4411	100,0
Neck, shoulder and back discomfort	Never	53,1	30,4	10,1	1396	31,6
	Seldom	22,9	20,2	13,2	825	18,7
	Sometimes	18,7	32,0	31,1	1180	26,8
	Frequently	5,30	17,4	45,5	1010	22,9
	Total	100,0	100,0	100,0	4411	100,0

Table 6 indicates that the frequent experience of RSI symptoms (eyestrain, muscle stiffness, neck, shoulder and back discomfort) increased as exhaustion increased. This can be seen in the participants who experienced frequent eyestrain, as 36% indicated being vitally exhausted, 12,4% were engaged yet exhausted and only 3,7% of work-engaged individuals reported frequent eyestrain. Similar patterns are seen with muscle stiffness: 19,1% indicated vital exhaustion, 5,9% were engaged yet exhausted, and 1,6% showed work engagement. The frequent experience of neck, shoulder and back discomfort followed a similar pattern, where 45,5% of the participants indicated vital exhaustion, 17,4% were engaged yet exhausted, and 5,3% showed work engagement. It is thus evident that RSI symptoms (eyestrain, muscle stiffness, neck, shoulder and back discomfort) are experienced more frequently amongst those who are vitally exhausted compared to those who are engaged with exhaustion and those who are truly engaged. Therefore, Hypothesis 2 is accepted.

RSI Differences between the three well-being groups

A one-way ANOVA was used to test for RSI differences among the three well-being groups. Table 7 displays the ANOVA results.

Table 7

ANOVA – Differences in RSI for the Three Well-being Groups

Item	True Engagement	Engaged with Exhaustion	Vitally Exhausted	<i>p</i>
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	
Eyestrain	1,71 (0,87) ^a	2,16 (1,05) ^b	2,93 (1,01) ^{bc}	0,00*
Muscle stiffness	1,34 (0,70) ^a	1,71 (0,97) ^b	2,35 (1,10) ^{bc}	0,00*
Neck, shoulder and back discomfort	1,76 (0,94) ^a	2,36 (1,09) ^b	3,12 (0,99) ^{bc}	0,00*

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

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

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

The three well-being groups differed significantly with regard to eyestrain, $F(2, 2739.50) = 656.60$, $p = 0,00$; muscle stiffness, $F(2, 2618.76) = 477.05$, $p = 0,00$; and neck, shoulder and back discomfort $F(2, 2741.85) = 795.48$, $p = 0,00$. The results indicate that those individuals who were work engaged with exhaustion were experiencing significantly more eyestrain, muscle stiffness, neck, shoulder and back discomfort than those who were truly work engaged. Those who were vitally exhausted were experiencing significantly greater RSI symptoms than those who were truly work engaged, and engaged with exhaustion. Thus, truly work-engaged employees experienced the lowest incidence of RSI symptoms, followed by those who were engaged with exhaustion, and those who were vitally exhausted. These results confirm Hypothesis 3.

DISCUSSION

Internationally, research has indicated that RSI is the most common form of work-related ill-health, representing at least half of all occupational-related diseases. There is also an increasing interest in the combined impact of psychosocial and ergonomic factors (Haufler et al., 2000). Although much research has been done in terms of the effects of psychosocial factors on the incidence of RSI, not much is known about the relationship of RSI with work engagement and exhaustion. The objectives of this study were therefore to determine the frequency with which RSI symptoms are experienced among South African employees, to examine the frequency of experience of RSI across three well-being groups and to evaluate if there were significant RSI differences between truly engaged employees, engaged employees with exhaustion, and vitally exhausted employees.

Of the total sample ($N = 15\ 664$) of the employees who indicated that they experienced RSI symptoms sometimes and frequently, 47% indicated experiencing neck, shoulder and back pain, followed by 42% reporting eyestrain, and 24% experiencing muscle stiffness. This is comparable to Great Britain, where countrywide surveys indicated 42% suffering from a disorder mainly affecting their back and 40% from a disorder mainly affecting their upper limbs or neck (Health and Safety Executive, 2009). The RSI incidence of South African employees is also in alignment with occupational illness/diseases reported in New Zealand, where employees who experience RSIs (back, neck, arm and knee injuries) experience 40% to 63% of reported musculoskeletal pain (Harcombe et al., 2009). These results showed that a relatively large percentage of South African employees experience RSIs, which could have an alarming impact on employees. This should draw attention to the potential impact of RSIs on employees and employers in South Africa. The hypothesis was thus accepted that RSI symptoms are frequently experienced amongst South African employees, more specifically between 30% and 50% of employees experienced RSI in the form of eyestrain, muscle stiffness, neck, shoulder and back discomfort in a sample of South African employees.

The subsequent objectives of the study were to compare the three well-being groups (truly engaged employees, engaged employees with exhaustion, and vitally exhausted employees) in order to identify whether there were differences in the frequency of RSI symptoms across the three well-being groups and to evaluate whether these differences were significant. Firstly, the results indicate that the experience of RSI symptoms does indeed differ across the three well-being groups. These findings suggest that RSI (eyestrain, muscle stiffness, neck, shoulder and back discomfort) is more

prevalent in the well-being group that demonstrates vital exhaustion when compared to those who are work engaged yet exhausted, and those who are truly work engaged. Secondly, the results clearly revealed statistically significant differences between all of these groups. Thus, those individuals who were vitally exhausted experienced significantly greater RSI symptoms (eyestrain, muscle stiffness, neck, shoulder and back discomfort) than those who were truly work engaged or engaged with exhaustion. In addition, those individuals who were work engaged with exhaustion demonstrated significantly more RSI symptoms than those who were truly work engaged.

The significant differences between the three well-being groups can be substantiated by previous research. Work-engaged individuals, as demonstrated by our results, experienced the lowest incidence of RSI. This is consistent with previous research. Work-engaged individuals are assumed to expend large amounts of energy at work as a result of high work demands, yet they are less inclined to demonstrate adverse health problems (Rook & Zijlstra, 2006; Schaufeli et al., 2009; Schaufeli et al., 2006). This can be attributed to their experience of vitality, which involves them having available energy and the capability to invest this energy into the required tasks (Rothmann, 2008). Recovery periods or opportunities for energy recuperation, according to the E-R model, are suggested to be the mechanism behind work-engaged individuals not experiencing adverse health problems, particularly RSI (Meijman & Mulder, 1998; Rook & Zijlstra, 2006; Sonnentag, 2003).

Those individuals who were engaged but who were also experiencing exhaustion showed a significantly higher incidence of RSI than the work engaged group. These individuals see themselves as devoted, committed and enthused by their work (work engaged), yet they experience drained energy (Rothmann, 2008). The experience of exhaustion could be attributed to either an increase in demands without the appropriate resources to support this or to inadequate rest periods, both increasing the experience of work-related stress. Chronic stress, according to the literature, can bring about fatigue, exhaustion, and physical, psychological, or behavioural problems (Le Blance, De Jonge & Schaufeli, 2000; Quick et al., 2006). Stress and strain can also elicit the emergence of RSI, as these factors contribute to increased tension in the muscles and soft tissues – when they tense up, they are more likely to be injured. Consistent tensing of muscles (neck and shoulder) can also elicit changes in work behaviour as seen in avoidance of rest breaks, unusual postures, or excessive forces placed on the muscles further increasing the risk for RSI (Devereux et al., 2004). The significant differences in RSI symptoms as seen between the work engaged and engaged with exhaustion group are therefore hypothesised to be attributed to the experience of exhaustion.

If exhaustion persists without relief in terms of effort recovery, individuals are unable to sustain the energy required to be devoted and committed to their work, and thus they are likely to withdraw from their work. As shown by the results, those individuals who were vitally exhausted experienced significantly greater RSI symptoms than those who were truly work engaged and those who were engaged with exhaustion. The literature suggests that chronic job stress and strain hamper the capacity for an individual to unwind, further interrupting recovery periods as well as possibly reducing the responsiveness of the individual to the symptoms, thus allowing these to worsen without proper treatment or behaviour change (Bongers et al., 2002; Kompier & Van der Beek, 2008; Sauter & Swanson, 1996). Consistent effort expenditure without recovery can result in chronic health problems such as prolonged fatigue, chronic tension, persistent sleep problems, and musculoskeletal disorders such as RSI. Stress and inadequate recuperation can also impede the healing process, further impacting the severity of pain or discomfort and the potential for full recuperation (Geurts & Sonnentag, 2006; Haufler et al., 2000; Meijman & Mulder, 1998).

The key findings of this study are that the experience of RSI among the South African workforce is of equivalent severity when compared to data obtained internationally. Secondly, by finding significant differences in the experience of RSI across the three well-being groups, one can highlight the potential role that the experience of exhaustion may play in developing RSI. Based on the results, it is proposed that the experience of exhaustion could play a role in the development of RSI. Literature also supports the suggested impact of exhaustion on the development of RSI. Various international studies indicate that job stress and strain play a role in the emergence and exacerbation of adverse health complaints such as RSI (Conway, 1999; Haufler et al., 2000; Pransky et al., 2002; Smith & Carayon, 1996). Thus, this study suggests the potential role of exhaustion in the development of RSI and encourages further research with regard to these possible causal links between exhaustion and RSI.

Limitations of this study should be noted. The first limitation of this study was that the research design was cross-sectional in nature. While the utilisation of a cross-sectional methodological design has its advantages, a definite weakness is the fact that a cross-sectional survey does not allow the measurement of changing variable values over time. These factors limit the understanding of the development of RSI over a period of time. Prospective longitudinal studies are needed to further studies concerning the development of RSI.

Secondly, the results were obtained exclusively through self-report questionnaires. Self-report measures sample an individual's perceptions about the constructs and not necessarily the constructs themselves. Self-report symptom reporting, as seen in the measurement of the presence of RSI symptoms, could be regarded by some as subjective in comparison to an objectively verifiable diagnosis. However, current literature available on RSI does not distinguish between the presence of self-reported symptoms or risk factors for RSI and the exacerbation or maintenance of those symptoms. The assumption is made that the experience of symptoms, whether self-report or not, has the potential to progress to more severe forms of RSI – and would thus benefit from further investigation (Bongers et al., 2002; Marcus & Gerr, 1996).

Thirdly, in exploring the process behind the development of exhaustion, job demands and resources were shown to have an impact on the experience of stress (Demerouti et al., 2001). Previous research has shown that excessive job demands and a lack of resources lead to fatigue and distress; therefore, although this study did not measure job demands and resources directly, it assumed, based on previous research, that high job demands and a lack of job resources was contributing to the experience of stress (Haufler et al., 2000; Kompier & Van der Beek, 2008; Smith & Carayon, 1996). Future research regarding the impact of job demands and resources on the experience of stress and the subsequent emergence of RSI is therefore suggested.

Fourthly, the Effort-Recovery (E-R) model of Meijman and Mulder (1998) was utilised to indicate the potential mechanisms behind the experience of stress, and the development of strain and exhaustion. When faced with work demands, the individual expends effort and depletes energy resources in order to achieve results. Periods of recovery are required in response to this effort expenditure in order to recuperate the energy depletion. It was suggested that those individuals who were work engaged, and thus demonstrated vitality, were likely to experience appropriate recovery, whereas those individuals demonstrating exhaustion were not. However, a limitation of this study is that it did not measure recovery experiences directly, but rather assumed this link between poor recovery and exhaustion based on previous research (Geurts & Sonnentag, 2006; Meijman & Mulder, 1998; Sluiter et al., 2003).

The final limitation relates to the measurement of the experience of RSI symptoms (eyestrain, muscle stiffness, neck, shoulder and back discomfort). It was measured with one question per injury only. Single items can be easier and cheaper to administer, as well as less of a burden for respondents to answer, yet they can also be less reliable and fail to capture the complexity of the

construct. If the question is able to capture the point of view of the individual's experience and perceptions, it can be considered to adequately tap into the intention of the question (Aday & Cornelius, 2006).

The limitations mentioned were managed cautiously and did not have a detrimental effect on the results and recommendations emanating from the findings of the study. This study has certain strengths. Firstly, it is based on a large representative sample of South African employees, and secondly, it contributes to gaps in the available literature, particularly with regard to exhaustion, work engagement and the incidence of RSI.

These results have implications for individuals, organisations and researchers wishing to conduct further research in this field. Current statistics on the frequency of experience of RSI among South African employees, as provided by this study, can assist in drawing attention to the pervasiveness of the disorder, increasing awareness for both the organisation and the individual. Employees need to be more cognisant of the warning signs of RSI symptoms, and of their implications for more chronic injury. Chronic manifestations of the RSI symptoms can severely affect the quality and duration of a person's working life and lead to physical, psychological, societal and financial losses. This research can serve to highlight the potential impact of exhaustion and appropriate effort-recovery on the development and maintenance of RSI. Previous studies offer support in linking high work demands and insufficient recovery with strain, fatigue, exhaustion and associated adverse health issues. Further research is however, encouraged in this regard, as the individual stands to benefit from an increased awareness of the potential impact stress, strain, exhaustion and efficient recovery can have on the emergence and exacerbation of RSI.

RSIs also place enormous strain on the employer and the economy as they represent one of the leading health concerns affecting the quality and duration of an employees work life. The physical complications associated with the disorder can have far-reaching effects on productivity, absenteeism and early retirement. RSIs are classified as an organisational injury or disease. Therefore, greater knowledge can contribute to healthier employees, but also allow for reduced exposure to hefty compensation claims. Organisations need to acknowledge their role in ensuring that the working environment is conducive to employee well-being. Through the results of this research, organisations can be encouraged to be more active in targeting RSI as suggested through effective communication and the early detection, management and support of RSI symptoms.

The findings of this research emphasise the need and form the groundwork for further RSI research within South Africa. More in-depth research is necessary in order to provide the theoretical backing required for the development of effective preventative interventions or support programmes for those individuals suffering from RSI. It is suggested that exhaustion and recovery may play an important role in the incidence of RSI. Further empirical research is required in order to measure the continuous influence of recovery on the experience of work engagement and exhaustion, as well as to explore the impact of exhaustion in the emergence and maintenance of RSI. This can contribute to greater knowledge regarding the long-term influence of job stress, effort-recovery and exhaustion on the emergence of RSI symptoms (Robertson & Stewart, 2004).

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CHAPTER 3

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

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

3.1 CONCLUSIONS

The general objective of this research was to ascertain the frequency of experience of Repetitive Strain Injury (RSI) in South Africa and to investigate the relationship with work engagement and exhaustion among South African employees. Based on the empirical results of the previous chapter, the following recommendations can be made:

The first objective was to conceptualise Repetitive Strain Injury (RSI) and its relationship with work engagement and exhaustion from the literature. RSI is conceptualised as “a collective term for a group of occupational diseases that comprise musculoskeletal disorders caused by exposure in the workplace affecting the muscles, tendons, nerves, blood vessels, joints and bursae of the hand, wrist, arm and shoulder” (Compensation Commission, 2004, p. 2). It often manifests as tension, and symptoms include stiffness, cramps, pain, fatigability and muscle weakness. However, if not addressed, more serious and chronic manifestations of the symptoms can emerge, severely affecting the quality and duration of a person’s working life (Compensation Commission, 2004; Harcombe, McBride, Derrett & Gray, 2009).

In general, the more physically demanding or strenuous occupations were known to be the primary source of RSI, as seen in tasks that require repetition, excessive force or awkward postures (Sprigg, Stride, Wall, Holman & Smith, 2007). There is, however, a greater interest internationally in the potential impact of psychosocial factors in the development of RSI (Ariens, Van Mechelen, Bongers, Bouter & Van der Wal, 2001; Devereux, Rydstedt, Kelly, Weston & Buckle, 2004; Kompier & Van der Beek, 2008; Silman & Newman, 1996). Psychosocial factors are those conditions within the work environment or person that can affect the employee’s experience of stress and well-being (Kompier & Van der Beek, 2008).

High work demands can act as a psychosocial stressor, as it can contribute to the experience of stress, and work-related strain by exhausting an employee's mental and physical resources, which can lead to adverse health problems (Sprigg et al., 2007).

According to Schaufeli, Salanova, González-Romá and Bakker (2002, p. 74), "work engagement is a positive, fulfilling, affective-emotional state of work-related well-being". Through the conceptualisation of the engaged worker, it was assumed that these individuals would be putting themselves at risk for RSI through their exposure to high work demands, their tendency to drive themselves quite hard, and to work over and above what is required of them (Bakker & Schaufeli, 2008; Bakker, Schaufeli, Leiter & Taris, 2008; Schaufeli & Salanova, 2008). According to Taris et al. (2006), employees who expend large amounts of energy at work, as a result of high work demands, are inclined to experience and demonstrate health problems in time. Yet, this was not supported by previous literature, mainly because individuals with high levels of work engagement show high energy, resilience and a low risk for adverse health problems (Rook & Zijlstra, 2006; Schaufeli, Bakker & Van Rhenen, 2009; Schaufeli, Taris & Bakker, 2006). It was therefore proposed that the experience of exhaustion, and not high levels of work engagement, could be a major source of developing RSI.

Exhaustion is conceptualised as the draining of resources, namely being emotionally overextended by one's work (Schaufeli et al., 2002). The Effort-Recovery (E-R) model conceptualised by Meijman and Mulder (1998) can offer some insight into the underlying mechanism concerning the development of exhaustion, ill-health and RSI. This model proposes that, when faced with high work demands, individuals expend effort and deplete their energy resources in order to achieve results. If the employee is unable to experience the recovery required to replenish his or her energy sources, the individual will begin to experience stress. The experience of chronic stress without the necessary supplementary resources or appropriate periods of recovery can bring about fatigue and exhaustion. Ongoing mental or emotional fatigue can, over an extended period of time, result in severe energy depletion. This is seen when the individual is no longer able to respond to normal periods of rest and begins to mentally distance him/herself from all tasks (Demerouti, Bakker, Nachreiner & Ebbinghaus, 2002; Rothmann & Rothmann, 2006; Sonnenschein, Sorbi, Doornen & Maas, 2006). Chronic stress and the related fatigue and exhaustion can impact on an individual's posture, muscle tension, capacity to unwind and pain threshold. It can also lead to unusual postures, hamper an individual's capacity to heal or place excessive force on

the muscles, further increasing the risk for RSI (Devereux et al., 2004; Kompier & Van der Beek, 2008; Le Blance, De Jonge & Schaufeli, 2000; Quick et al., 2006; Sprigg et al., 2007). Although research was not available to suggest the direct impact of exhaustion on the development of RSI, research on adverse responses to stress points to the relationship between exhaustion and RSI symptoms.

The second objective of this study was to determine the frequency with which South African employees experience RSI. The empirical research suggests that of the total sample ($N = 15\,664$) of the employees who indicated that they experienced RSI symptoms sometimes and frequently, 47% indicated experiencing neck, shoulder and back pain, followed by 42% reporting eyestrain, and 24% experiencing muscle stiffness. This is comparable to Great Britain, where countrywide surveys indicated 42% suffering from a disorder mainly affecting their back and 40% from a disorder mainly affecting their upper limbs or neck (Health and Safety Executive, 2009). The RSI incidence of South African employees is also in alignment with occupational illness/diseases reported in New Zealand, where employees who experience RSIs (back, neck, arm and knee injuries) experience 40% to 63% of reported musculoskeletal pain (Harcombe et al., 2009). These results showed that a relatively large percentage of South African employees experience RSIs, which could have an alarming impact on employees. This should draw attention to the potential impact of RSIs on employees and employers in South Africa. The hypothesis was thus accepted that between 30% and 50% of employees experienced RSI in the form of eyestrain, muscle stiffness, neck, shoulder and back discomfort in a sample of South African employees.

The third objective of this study was to determine the frequency of experience of RSI for the three well-being groups (i.e. truly engaged employees, engaged employees with exhaustion, and vitally exhausted employees). The results showed that the frequency of experience of RSI symptoms increased as exhaustion increased. Thus, those individuals who indicated being vitally exhausted demonstrated the highest incidence of eyestrain (36%), muscle stiffness (19,1%), and neck, shoulder and back discomfort (45,5%), whereas the group that indicated work engagement with exhaustion displayed lower frequencies of eyestrain (12,4%), muscle stiffness (5,9%), and neck, shoulder and back discomfort (17,4%). Lastly, the work-engaged group displayed the lowest incidence of RSI symptoms, namely eyestrain (3,7%), muscle stiffness (1,6%), and neck, shoulder and back discomfort (5,3%). It is thus evident that the incidence of RSI symptoms (eyestrain, muscle stiffness and neck, shoulder and back

discomfort) was greater in the well-being groups who experience more exhaustion. Previous research supports the role of persistent stress in the onset of exhaustion and RSI. Stress makes muscles tense up, increasing the likelihood of injury. Consistent tensing of muscles (neck and shoulder) can also elicit changes in work behaviour as seen in avoidance of rest breaks, unusual postures, or excessive forces placed on the muscles (Devereux et al., 2004; Smith & Carayon, 1996). According to Geurts and Sonnentag (2006), sustained activity without recovery can ultimately lead to fatigue, exhaustion and RSI. Additionally, Sprigg et al. (2007) reveal psychological strain as being the mechanism between high workload and the experience of RSI. The hypothesis is therefore accepted that the frequency of experienced RSI was different for the three well-being groups, where individuals who experienced higher levels of exhaustion also experienced increased RSI symptoms.

The fourth objective was to evaluate whether there were significant differences between truly engaged employees, engaged employees with exhaustion, and vitally exhausted employees. ANOVA revealed statistical differences between the three well-being groups. The results thus indicate that those who were vitally exhausted were experiencing significantly greater RSI symptoms than those who were truly work engaged or engaged with exhaustion. Therefore, those who were work engaged with exhaustion were experiencing significantly more eyestrain, muscle stiffness and neck, shoulder and back discomfort than those who were truly work engaged. It can be concluded that those employees who were truly work engaged experienced the lowest incidence of RSI symptoms, followed by those who were engaged with exhaustion, and those who were vitally exhausted. Demerouti et al. (2001) propose that when an individual experiences high work demands, he or she exerts additional energy in order to sustain his or her work performance, thus without appropriate recovery. This could lead to overtaxing, stress, fatigue and mental exhaustion. Work-engaged employees have a low incidence of adverse health complaints. This could be because of their high vitality levels, implying that work-engaged individuals engage in appropriate energy recovery in order to counteract their experience of high work demands (Bakker et al., 2008). As supported by the Effort-Recovery (E-R) model, without appropriate recovery periods to counteract the high effort expended, an individual is likely to experience greater fatigue and exhaustion. Thus, based on previous findings, it is suggested that as exhaustion increases, the incidence of RSI will increase (Geurts & Sonnentag, 2006; Meijman & Mulder, 1998; Sprigg et al., 2007). The hypothesis can therefore also be accepted, as the results indicated significant differences

between truly engaged employees, engaged employees with exhaustion, and vitally exhausted employees.

This study serves to highlight the frequency of experience of RSI among South African employees in order to draw attention to the impact of this highly researched international dilemma on the South African workforce of today. Secondly, by exploring the frequency of experience of RSI across three well-being groups (i.e. truly engaged employees, engaged employees with exhaustion, and vitally exhausted employees) and confirming significant differences between these groups, the possible link between exhaustion and the experience of RSI is suggested.

3.2 LIMITATIONS OF THIS RESEARCH

It is necessary to note some limitations of the current study. The first limitation of this study was that the research design was cross-sectional in nature. Cross-sectional methodological design is commonly used in research to estimate the prevalence of an outcome of interest, for a given population at a specific point in time. There are some limitations associated with this design, as these studies are carried out at one point in time and give no indication of the sequence of events, namely whether exhaustion occurred before, after or during the increase in RSI symptoms. This being so, a cross-sectional survey also does not allow the measurement of variable values over time. These factors can limit the understanding of the development of RSI over a period of time. Prospective longitudinal studies are needed to further studies concerning the development of RSI.

Secondly, the results were gathered exclusively through self-report questionnaires. This could result in an increase in the common method variance problem. Despite not being able to test the strength of this type of variance, research has suggested that common method variance is not as troublesome as might be expected (Semmer, Zapf & Grief, 1996; Spector, 1992). Self-report measures can provide meaningful information, and offer a practical, cost-effective means of data collection. Yet, self-report measures sample an individual's perceptions about the constructs and not necessarily the constructs themselves. Self-report symptom reporting is sometimes seen as subjective in comparison to an objectively verifiable diagnosis. However, current literature available on RSI does not distinguish between the presence of self-reported

symptoms for RSI and the exacerbation or maintenance of those symptoms. The assumption is therefore made that the experience of symptoms, whether self-report or not, has the potential to progress to more severe forms of RSI – and would thus benefit from further investigation (Bongers, Kremer & Ter Laak, 2002; Marcus & Gerr, 1996).

Thirdly, in exploring the source of stress, high job demands and low resources were said to contribute to strain and exhaustion. According to Sprigg et al. (2007), job demands or a high workload can be linked with psychosocial stress, sleeping problems, exhaustion, ill health and repetitive strain and job resources with greater job learning, work engagement and work commitment (Bakker & Demerouti, 2007; Demerouti et al., 2001; Duraisingam & Dollard, 2005; Hakanena, Schaufeli & Aholaa, 2008). Studies have shown the impact that high job demands and low resources can have on the stress process. However, this study did not measure the job demands or resources directly, but rather assumed that these factors were contributing to the experience of exhaustion (Haufler, Feuerstein & Huang, 2000; Kompier & Van der Beek, 2008; Smith & Carayon, 1996).

Fourthly, the Effort-Recovery (E-R) model of Meijman and Mulder (1998) was utilised to demonstrate the potential link between the experience of high work demands, and the subsequent development of strain and exhaustion. Recovery periods are suggested to be the means through which an individual can recuperate the energy reserves lost through effort expenditure. Thus, it was suggested that those individuals who were work engaged and thus demonstrated vitality, were likely to experience appropriate recovery, whereas those individuals demonstrating exhaustion were not. However, our study did not measure recovery experiences directly, but rather assumed this link between poor recovery and exhaustion based on previous research (Geurts & Sonnentag, 2006; Meijman & Mulder, 1998; Sluiter, De Croon, Meijman & Frings-Dresen, 2003).

The final limitation concerns the use of a single question per injury (eyestrain, muscle stiffness and neck, shoulder and back discomfort) in the measurement of the experience of RSI symptoms. Single items can be easier and cheaper to administer, as well as less of a burden for respondents to answer, yet they can also be less reliable and fail to capture the complexity of the construct. According to Wanous, Reichers and Hudy (1997), if the type of research and research questions supports the use of a single-item question it can be considered

acceptable. Secondly, if the item represents and measures the construct and is able to capture the point of view of the individual's experience and perceptions, it can be understood as adequately measuring the intention of the question (Aday & Cornelius, 2006). Considering that this research is epidemiological in nature, and is concerned with the incidence of disease in populations, the single item per injury can be deemed appropriate.

3.3 RECOMMENDATIONS

Notwithstanding these limitations, the current study has important implications for organisations and future research.

3.3.1. Recommendations for the organisation

The purpose of this study was to confirm the incidence of RSI across a sample of South African employees. It is clear from the results that organisations and employees need to be more cognisant of RSIs in the workplace, as it does indeed affect South African employees. RSIs can have severe consequences if prompt action is not taken. This is seen in drops in productivity because of pain and increased fatigue, lost production because of increased absenteeism or sick leave, and early retirement linked to an inability to continue working. RSIs associated with an individual's work environment can lead to costly compensation claims for organisations.

The recommendations made from this research entail encouraging greater awareness for the employer and employee regarding the impact of RSIs within the South African context. Employers in response to these findings are urged to introduce RSI awareness and prevention training for all their staff, and as far as is reasonably practical to analyse and address the ergonomic risk factors within the work context. A climate of health and safety is encouraged where there is increased awareness of the impact of stress and strain on health, as well as support and encouragement for appropriate rest and recovery periods. Open and up-to-date communication regarding RSI and its implications for an employee's health can encourage early symptom detection and reporting. If there is a supportive culture of well-being, employees will be more open to acknowledging the early signs of RSI, and thus be more inclined to seek treatment before it impacts on their work environment more severely.

Moreover, in understanding the differences in RSI frequency across the three well-being groups (i.e. employees who experience high work engagement, employees who are engaged, but with high levels of exhaustion, and employees who are vitally exhausted with low levels of work engagement) and in identifying statistically significant differences, this study serves to encourage further research into the potential impact of poor recovery and exhaustion on the development of adverse health complaints, such as RSI. Organisations are becoming increasingly aware of the role that stress plays in their employees' overall well-being. Consistent with international research indicating the impact of psychosocial factors on the incidence of RSI, it is hoped that by highlighting the fact that individuals who experience greater exhaustion show a significantly greater frequency of RSI, further research within the South African context will be conducted to explore the causal links between stress, effort-recovery, exhaustion and RSI. Studies such as these can promote more comprehensive and effective prevention and management programmes.

3.3.2. Recommendations for future research

Although certain limitations exist in the study, the findings may have some important implications for future research within the field of I/O psychology. Recommendations include the use of longitudinal designs. These designs can be used to evaluate the changes in a construct over time. This can be particularly valuable in measuring effort-recovery and its impact on the experience of vitality among work-engaged individuals, as well as the effect of poor recovery in the emergence of fatigue and exhaustion. Moreover, suggestions include research into the impact of the recovery process on both psychosocial factors and ergonomic factors in the emergence of RSI. A greater understanding is needed in terms of the causal mechanisms linking psychosocial factors with RSI. More in-depth investigation into the impact of non-work-related variables and their possible association with RSI is also required.

Research concerning the impact of job demands and resources was used to support the development of work-related stress and strain, yet this was not measured directly in this study (Demerouti et al., 2002). Future studies regarding the health impairment and motivational process of the Job-Resources-Demands model and its impact on exhaustion and RSI are encouraged. The E-R model (Meijman & Mulder, 1998) was used as a theoretical model to explain the underlying mechanisms by which exhaustion develops in response to high work demands. Future studies could include measures of recovery and investigate how different

types of recovery influence the stress-strain process (Rook & Zijlstra, 2006, Sonnentag & Zijlstra, 2006). International literature exists on the mediating role of psychological strain in the relationship between workload and RSI (Sprigg et al., 2007), yet more research is needed within the South African context. Thus, the move towards more sophisticated theoretical models and structural equation modelling can be useful in testing the impact of psychosocial factors in the emergence of RSI.

Lastly, suggestions can be made in terms of the identification of RSI symptoms according to severity-duration-disablement, as this can offer greater insight into the progression of the symptoms. In understanding the progression of RSI, one can identify interventions that can more appropriately address the severity of the symptoms. Additionally, the self-report approach to gathering data on the symptoms could be supplemented by more objective evaluations, such as medical examinations (Kasl & Amick, 1996). The number of questions detailing the experience of RSI could be expanded to scales that measure the diversity of the construct more comprehensively. Overall, further research should continue to explore the impact of stress, effort recovery and exhaustion on health, as well as determine whether preventative and management interventions have the desired impact on the incidence of RSI within the organisation.

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