


RESEARCH ARTICLES

The relationships between work intensity, workaholism, burnout, and self-reported musculoskeletal complaints

Gerhard J. Engelbrecht¹ | Leon T. de Beer¹  | Wilmar B. Schaufeli^{2,3}

¹WorkWell Research Unit, Faculty of Economic and Management Sciences, North-West University, South Africa

²Research Unit Occupational and Organizational Psychology and Professional Learning, Faculty of Psychology and Educational Sciences, KU Leuven, Belgium

³Department of Psychology, Utrecht University, The Netherlands

Correspondence

Leon T. de Beer, WorkWell Research Unit, North-West University, Potchefstroom, 2531, South Africa.
Email: DeBeer.Leon@nwu.ac.za

Abstract

Technological advances within the work environment have dynamically changed the tools with which work is done and the methods applied for performing it, with a large amount of modern work being fast-paced and sedentary in nature, that is, being done seated in front of a computer screen. This study investigated the relationship between work intensity, workaholism, burnout, and musculoskeletal complaints (MSCs). The results of this study could assist organizations in gaining a clearer understanding of how each of these constructs influences the other, promoting a healthier, and ultimately more productive workforce. A cross-sectional research design was adopted and implemented by means of a survey amongst office employees within a large engineering services organization ($n = 398$). Structural equation modeling methods were applied to analyze the data. The results revealed that work intensity was positively related to workaholism and that workaholism was, in turn, also positively related to employees' burnout and MSCs. Finally, burnout was also shown to be significantly related to MSCs. Awareness of these phenomena and the promotion of effort recovery is important to obviate the effects on employee health and well-being in the long term.

KEYWORDS

burnout, musculoskeletal complaints, work intensity, workaholism

1 | INTRODUCTION

Organizations are profit-driven. This directly relates to how productive employees can be for an organization, and as such employees are expected to provide the maximum amount of input without the necessary consideration as to what effects these strenuous working tasks and hours may have on the employees' health and well-being. Some organizations simply consider human capital to be a means to an end, until these employees eventually burnout and/or turnover in search of a more meaningful and less demanding career (Malik & Rowley, 2015; Romano, Catalfo, &

Nicotra, 2014). Organizations do not always realize the tremendous costs associated with this continual process of turnover, recruitment, and training for a position that had already been filled (Loquercio, 2006). The technological innovations and advances that have developed, despite the goal which is to make our lives more comfortable, can have an adverse effect in the sense that advances in technology have made us more capable of completing multiple tasks at the same time or have increased our capacity to work after normal labor hours, and organizations have taken advantage of this fact by placing more demands on employees (Boucekkine, Core, Hritonenko, & Yatsenko, 2014). This tendency to overextend the capacity of employees can lead to detrimental consequences for both the employee—in the form of burnout and musculoskeletal conditions—and the organization—in the form of productivity/performance loss, resulting from employees being unable to work efficiently or at all, as a result of chronically debilitating physical

Significance of work: The study contributes, from an Industrial and Organizational Psychological perspective, to the limited research available on the relationship between work intensity, work-related motivational factors (workaholism, burnout) and musculoskeletal complaints of employees in engineering services.

pains of Musculoskeletal complaints (MSCs) or due to suffering from burnout (Armon, Melamed, Shirom, & Shapira, 2010; Maslach, Schaufeli, & Leiter, 2001). In addition, employees who consistently work strenuously long hours, for extended periods of time and are rewarded for such behaviors can become conditioned which will only serve to reinforce those workaholic type tendencies (Ng, Sorensen, & Feldman, 2007).

The severity of this problem is further highlighted by the fact that the most technologically advanced countries, with the United States of America and Japan being the top two (Khan, 2016), have found that 21.3% of Japanese and 10–15% of United States employees are working 49 hr or more per week. This high percentage has detrimental consequences for employees' health in the form of strokes, heart attacks, and suicides, all originating from excessive work demands. This pandemic was termed "*karoshi*," which translates to death from overwork, and claimed 2,159 victims resulting from suicides in 2015 (The Guardian, 2016).

The importance of employee health and well-being cannot be disputed as research has shown that it directly impacts an organization's efficiency and productivity. For example, when employees are negatively affected it will lead to less engaged staff and more absenteeism amongst workers (Merrill et al., 2013). Work overload has been shown to lead to work-related stress, which causes workers to become affected (e.g., stress-related ill health; De Beer, Pienaar, & Rothmann, 2016a) with the eventual need to seek medical attention if the distress does not abate (cf., De Beer, Pienaar, & Rothmann Jr., 2013; Kim & Park, 2006). Work overload is an aspect of work intensity and can be described as having more work to do than what is realistically possible within a certain time frame (Boxall & Macky, 2014). Work intensity has a large negative influence on the work–life balance of employees and leads to increased exhaustion and levels of stress (Boekhorst, Singh, & Burke, 2017; Boxall & Macky, 2014). According to Burke, Singh, and Fiksenbaum (2010), work intensity is an underdeveloped construct in research literature in general. For the current study, work intensity was considered in line with the conceptualization of Franke (2015) which states that "work intensity describes a state of one's work, that is, the extent to which employees have to deal with *high work demands* that force them to make use of their mental and emotional resources" (p. 18). It should be noted that no matter the position of an employee within an organization, if they experience disproportionate work intensity, it can cause harm to their well-being (Boxall & Macky, 2014), for example, MSC.

MSC can be described as conditions that are associated with pain or discomfort, felt in the bones, muscles, joints, tendons, cartilage and/or nerves, specifically in the areas of the back, arms, neck or legs due to elements at work (Aghilinejad, Mousavi, Nouri, & Ahmadi, 2012; Taden & Richards, 2013; Van Tulder, Malmivaara, & Koes, 2007). Musculoskeletal disorders specifically pertaining to the lower back and upper extremities are considerable health risks for western industrialized societies (IJzelenberg, Molenaar, & Burdorf, 2004). When employees experience pain they are more likely to be absent from work causing the organization to lose productivity (Merrill et al.,

2013). The evidence also suggests that interventions for MSC only alleviate pain but do not necessarily cure it. The reason for this low recovery success rate could be attributed to the difficulties in the diagnostic processes—even though some interventions may relieve pain, there is a lack of evidence-based knowledge of the effectiveness of those interventions over the long term, as such the extent to which employees take less sick leave and return to work faster are minimal (Van Tulder et al., 2007).

Furthermore, MSC is a widespread concern around the world and has repercussions for the individual and society as a whole. The severity of MSC can be emphasized by the rate at which it is growing, as the MSC costs of 1992 were \$149 billion US dollars (Yelin & Callahan, 1995). The economic cost associated with MSC has destructive consequences for developed and developing countries; in the USA, the costs accumulated to 3% gross domestic product (GDP) in 1995, which can be converted to \$215 billion US dollars, and \$240 billion US dollars in 1998 (Yelin, 2003). More recently the projected cost of the musculoskeletal disease was 7.7% of the GDP in the USA, which converts to \$849 billion dollars in 2004 (cf., Oh, Yoon, Seo, Kim, & Kim, 2011). Furthermore, MSC not only contributes to loss in productivity in the form of absenteeism but also in the form of presenteeism in those employees who are not at optimal health and suffering from MSC are also not functioning at optimal productivity levels (De Beer, 2014; Schultz & Edington, 2007). A study conducted by Jhun, Cho, and Park (2004) showed that the workload was connected to musculoskeletal symptoms, especially back complaints. Engels, van der Gulden, Senden, and van't Hof (1996) found that work intensity was also positively associated with most MSC, that is, back, leg, arm, and neck symptoms. Musculoskeletal diagnoses account for the majority of reduced work capacity cases; however, employees who are less exhausted have the best prognosis for recovery compared to workaholics (Schultz, Mostert, & Rothmann, 2012).

Workaholism has become a prevalent phenomenon within organizations that needs to be managed more effectively due to its damaging effects on employee health and productivity (Horton, 2011). According to Oates (1971) workaholism is defined as "the compulsion or uncontrollable need to work incessantly" (p. 11), workaholism is also described as an extraordinary amount of time that is spent on work and work-related tasks; more than what is sensibly expected by an organization (Schaufeli, Taris, & Van Rhenen, 2008). Burke et al. (2010) found that work intensity was unrelated to the three different components of workaholism (work involvement, driven to work, and work enjoyment), but that it was related to stress. However, Schaufeli et al. (2008) state that "workaholism is related to excess working time, job demands, positive work outcomes, poor quality of social relations and health problems" (p. 181)—indicating a contradiction in that work intensity may well be related to workaholism. Indeed, Piasna (2018) presents findings that working long days with changes in hours imposed by employers is associated with more intense work. Noteworthy associations have been established between workaholism, absenteeism, psychological ill health, physical ill health, and specifically back pain (Matsudaira et al., 2013). MSC have been correlated with

perceived stress along with computer usage on average equal or greater to 4 hr per day (Hess, 1997), and it is safe to assume that workaholics work long hours in front of their computers, thus limiting the time they have for rest and recovery. Moreover, Horn (2015) found a large effect positive correlation between workaholism and burnout.

Maslach (1986) proposed that burnout consists of three components namely, emotional exhaustion, depersonalization, and reduced personal accomplishment. Emotional exhaustion is a feeling of being beleaguered and worn out by those emotional stressors that one's workplaces on you, depersonalization refers to having a general contemptuous and disconnected outlook towards those you work for and/or with, and reduced personal accomplishment is a negative feeling that a person has towards their effectiveness, the quality of their work or their capacity to fulfill their job roles. When employees are consistently faced with high work demands, their energy gets depleted faster and they subsequently need longer periods of rest to recover back to normal functionality, if the recovery process is not sufficient or interrupted by work demands, it causes employees to spiral down into a space of constantly needing more rest but never truly recovering all the energy expended which would eventually lead to burnout (Schultz et al., 2012). A longitudinal study conducted by Armon et al. (2010) concluded that burnout is a significant predictor of MSC and that this relationship is unidirectional, that is, MSC did not increase burnout.

Summarily, the aim of this study was to investigate a conceptual model testing the relationships between work intensity, workaholism, burnout and MSC. What this study proposes is that when employees are experiencing high levels of work intensity it should increase workaholism levels and employees will also experience increased burnout levels which will have detrimental consequences for employee health in the form of MSC.

2 | LITERATURE REVIEW

2.1 | The relationship between work intensity and MSCs

For the purpose of this study, the conceptualization of work intensity as per Franke (2015) was acknowledged, depicting work intensity as having too much work to perform for the amount of time given; thus a form of role or work overload, coupled with time demands placed on the employee. Wergeland et al. (2003) established that MSC could be combatted by reducing the time spent at work, by lowering the length of time employees are expected to be at work, and thereby giving employees more time to recover from their strenuous tasks. Evidence also exists that if the workload of a normal 8-hr day is completed within a 6-hr day, it actually increases reports of MSC; thus the element of workload plays an important role in perceived MSC alongside time demands (Wergeland et al., 2003). Thus, if such intervention is to be effective, the volume of workload and the time demands should be reduced to reflect a true 6-hr working day.

Higher levels of psychological distress are meaningfully related to MSC within the upper back, neck, and shoulder regions, and MSC shows a higher prevalence within the area of the lower back when people are exposed to higher levels of workload (Cho, Hwang, & Cherng, 2012). Cho et al. (2012) found no significant difference between groups of employees experiencing MSC due to working more than 3 hr seated in front of a computer (but less than 7 hr) and the group that spent more than 7 hr seated in front of a computer. However, at less than 3 hr of working in front of a computer, the risk for MSC is significantly lowered. Moreover, in a study by Sprigg, Stride, Wall, Holman, and Smith (2007), it was found that when employees experience high workload their likelihood of developing MSC increased due to the employees' inability to rest because they are constrained to their desks requiring them to perform repetitive actions. This then specifically affects the areas of the upper body and lower back because one position is held for lengthy periods of time.

Hypothesis 1a: *Work intensity has a positive relationship with MSCs.*

2.2 | The relationship between work intensity and workaholism

Work intensity has been shown to be positively and significantly related to longer working hours along with higher perceived workload, but not to the components of workaholism (conceptualized as consisting of the factors of work involvement, feeling driven to work and work enjoyment; Burke et al., 2010). Workaholism correlates positively with the number of hours spent working per week (Andreassen, Hetland, Molde, & Pallesen, 2011).

When employees have intense work demands in terms of role overload and time demands they are placed in a state that is conducive for the development of workaholic tendencies, and as previously discussed, workaholism consists of two components, namely compulsive and excess (Tabassum & Rahman, 2012). When an organization fosters a culture that praises, rewards and values employees that work intensely, the employees start adopting this culture, which systematically increases the excess to which they work, because employees start placing additional value on working harder and longer hours through incentives and castigations (Griffiths & Karanika-Murray, 2012; Liang & Chu, 2009; Schaufeli, 2016). When this culture becomes the norm within organizations, employees are more likely to start portraying addictive tendencies because their negative behaviors are being reinforced with rewards and are seen to be appropriate behavior; peer competition occurs; and the satisfaction from reaping rewards (monetary and personal excitement) for completed tasks further compels the employees to become addicted. Such organizations are directly responsible for reinforcing the behavioral component of workaholism (Liang & Chu, 2009). Once these two components have set in it becomes more likely that employees will start obsessing about work (Tabassum & Rahman, 2012).

Within the South African context, the construct of workaholism has shown evidence of being positively correlated with aspects of work intensity, that is, work overload and time demands (Horn, 2015). Hence, it is argued and expected in this study that work intensity will exacerbate or contribute to workaholic behavior in employees.

Hypothesis 1b: *Work intensity has a positive relationship with workaholism.*

2.3 | The relationship between work intensity and burnout

When employees experience high job demands (e.g., work overload and time demands) their levels of burnout increase (Hakanen, Bakker, & Schaufeli, 2006). Horn (2015) found that burnout is positively related to both work overload and hours of work, thus related to work intensity. Time demands and work overload relate to emotional exhaustion which is one of the core elements of burnout (Schaufeli & Bakker, 2004). Therefore, the more time employees spend on strenuous work tasks, the less time they will have to recover all of their energy, which will result in eventual burnout for the employee (Bakker & Demerouti, 2007). Time demands, as well as work overload, also correlate positively with burnout (Hakanen et al., 2006; Schaufeli & Bakker, 2004; Skaalvik & Skaalvik, 2008).

Time demands, as well as role overload, are job demands, and when these demands become too taxing they eventually lead to exhaustion, which causes burnout (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). In a study undertaken by Skaalvik and Skaalvik (2010) it was established that time demands were the strongest predictor of emotional exhaustion among teachers. When time demands lead to stress it reduces the incumbent's attitude towards others due to a lack of emotional resources. This stress correlates highly with depersonalization and negatively with personal accomplishments, which are the final constructs of *burnout* (Abel & Sewell, 1999).

Hypothesis 1c: *Work intensity has a positive relationship with burnout.*

2.4 | The relationship between workaholism and MSCs

Workaholism has been shown to be related to MSC, specifically to the experience of back pains (Matsudaira et al., 2013). When employees become over-engaged in their work-life for extended periods of time it may lead to higher levels of exhaustion, resulting from the loss of effort-recovery time, missing breaks or ignoring the pain, which further leads to psychological and physical distress, in turn, heightening their experiences of MSC symptoms (Schultz et al., 2012).

A study performed by Andreassen et al. (2011) found significant correlations between MSC and two of their three workaholism

components (work involvement, drive, work enjoyment)—those that reported experiencing lower work enjoyment and higher work drive also reported more MSC. Workaholics have the tendency to overload themselves with unnecessary work by creating or taking on additional tasks, such as re-evaluating already completed work and/or striving for unrealistic perfection (Horn, 2015; Stoeber & Damian, 2016). This additional workload leads to the workaholic experiencing additional negative psychosocial factors such as anxiety and depression, which subsequently leads to them experiencing MSC (Sprigg et al., 2007).

MSC have become a more prevalent disease in the last few decades as employees' responsibilities are mainly found behind a computer screen. These physically static and repetitive computer-based tasks have led to an increased prevalence of MSC (Sharan et al., 2011). It can thus be inferred that MSC is related to workaholism because workaholics place greater job demands on themselves and tend to spend more time working seated in front of a computer, which could cause MSC.

Hypothesis 2: *Workaholism has a positive relationship with MSCs.*

2.5 | The relationship between workaholism and burnout

Literature states that a positive relationship exists between workaholism and burnout in that individuals who exhibit workaholic behavior are inclined to overwork and thus work themselves into an eventual state of burnout (Schaufeli et al., 2008). Within the South African context, it has also been found that workaholism and burnout are highly correlated (Horn, 2015). Workaholics tend to place excessive work demands on themselves due to their incapacity to detach from the work environment, their obsessive nature and their addiction, and when employees are working at consistently high levels of work demands it may lead to burnout (Schaufeli et al., 2008). The workaholic is incapable of managing time- and work demands effectively, which leads to an imbalance in the process of recovering personal resources or energy leading to burnout. However, due to their monotonous activities and addictive personality, their behaviors exhaust their physical and mental resources (Bakker & Oerlemans, 2011).

Furthermore, workaholics tend to strive for perfection in their work, which leads them to recheck and redo their work over and over again, never truly being satisfied with the end product, subsequently placing additional demands on themselves (Horn, 2015; Stoeber & Damian, 2016). This process of incessant inclination to place unexpected demands upon themselves leads to exhaustion (Molino, Bakker, & Ghislieri, 2016). When placed in such a state of consistent stress it becomes problematic for the workaholic to recover the lost energy; this is when exhaustion leads to burnout (Bakker & Demerouti, 2007; Sonnentag, 2001).

Hypothesis 3: *Workaholism has a positive relationship with burnout.*

2.6 | The relationship between burnout and MSCs

Burnout increases the risk of developing MSC by as much as twofold (Armon, et al. 2010; Jaworek, Marek, Karwowski, Andrzejczak & Genaidy, 2010; Langballe, Innstrand, Hagtvet, Falkum, & Gjerløw Aasland, 2009). Research on MSC indicates that there is a moderate to a strong relationship with all the dimensions of burnout (Langballe et al., 2009). However, it is unclear what the exact cause is behind the increased experience of MSC when a person is suffering from burnout, but research has shown that burnout is correlated with increased cortisol levels and that burnout invokes somatic responses in the body that disturb metabolic processes (i.e., catabolic and anabolic; Ekstedt, 2005; Ekstedt et al., 2006; Melamed et al., 1999). Moreover, burnout has also been shown to disturb the hypothalamic-pituitary-adrenal-axis which is implicated in various illnesses and could be a potential explanation for the link as well (Mommersteeg, Heijnen, Verbraak, & van Doornen, 2006). Static working positions or lifting heavy objects increases the risk of developing MSC due to the strain placed on the affected areas through microtraumas, while those suffering from burnout already have trouble recuperating from the exhaustion of their mental and physical resources due to ineffective effort recovery (Langballe et al., 2009).

Hypothesis 4: *Burnout has a positive relationship with MSCs.*

3 | METHOD

3.1 | Research participants

Convenience sampling was used to collect the data in a large South African engineering services organization due to the study being voluntary and quantitative in nature. Participants acquired were 398 ($n = 398$). The engineering sector was an appropriate target population due to the nature of the work and the targeted participants being only white-collar employees (office workers) falling within the criteria of spending extended hours seated in front of a computer screen. Due to the industry's tough work demands it was expected that the intensity of work, along with burnout, workaholism and MSC would be prevalent among the participants (Frankson, 2015). The participants were diverse in terms of the departments in which they work, gender, age, and ethnicity.

The average (mean) age of the participants was 39.82 years with a standard deviation of 10.57 years. The majority of the sample comprised female employees ($n = 216$; 54.27%) with the overall group consisting of mostly black ($n = 235$; 59.05%) and white ($n = 97$; 24.37%) employees. Table 1 below presents the frequency of the MSC reported by the participants.

As can be seen, the most prevalent complaint was eyestrain with the highest frequency in both Often ($n = 129$; 32.70%) and Almost always ($n = 95$; 24.20%). The least reported were complaints relating

TABLE 1 Frequency of MSC in the sample

MSC	Category	Frequency	Percentage (%)
Hands, wrists, fingers, forearms, or elbows	Almost never	129	32.90
	Sometimes	121	30.90
	Often	86	21.90
	Almost always	56	14.30
Upper back, shoulders, or neck	Almost never	89	22.70
	Sometimes	105	26.80
	Often	123	31.40
	Almost always	75	19.10
Eyestrain	Almost never	70	17.90
	Sometimes	99	25.30
	Often	128	32.70
	Almost always	95	24.20
Lower back	Almost never	103	26.30
	Sometimes	113	28.80
	Often	108	27.60
	Almost always	68	17.30

Abbreviation: MSC, musculoskeletal complaint.

to hands, wrists fingers, forearms or elbows with 32.90% ($n = 129$) of the sample reporting Almost never.

3.2 | Measuring instruments

Work intensity was measured as a latent variable indicated by a combined mean score of perceived role overload and time demands scores. This strategy is similar to Le Fevre, Boxall, and Macky (2015) who measured work intensity by combining the work pressure and role overload variables into a single scale." A 6-item scale was used for measuring *Role overload*, defined as "having too much work to do in the time available" (Beehr, Walsh, & Taber, 1976, p. 42; e.g., "It often seems like I have too much work for one person to do"). *Time demands* refers to management's expectations regarding an employee's time, which might interfere with nonwork activities, and was measured using a four-item measure developed by Thompson, Beauvais and Lyness (1999) (e.g., "To get ahead in my organization, employees are expected to work more than their contracted hours each week"). Responses were measured on 7-point Likert-type scales, bounded from 1 = Strongly disagree to 7 = Strongly agree.

Workaholism was measured using the Dutch Work Addiction Scale (DUWAS-10; Schaufeli, Shimazu, & Taris, 2009). The scale includes a total of 10 items: two 5-item subscales measuring *working excessively* (e.g., "I spend more time working than on socializing with friends, on hobbies, or on leisure activities") and *working compulsively* (e.g., "I feel obliged to work hard, even when it is not enjoyable"). The DUWAS-10 is scored on a 4-point frequency rating scale, ranging from 1 (Almost never) to 4 (Almost always).

Burnout was measured as a single factor comprising the items of its core components *exhaustion* and *depersonalization* (De Beer & Bianchi, 2017) by using the Maslach Burnout Inventory (Maslach & Jackson, 1981). Therefore 14 items, scored on a 7-point frequency rating scale ranging from 0 (Never) to 6 (Every day), were used from

the scale, specifically: *Exhaustion* (9 items, e.g., “I feel emotionally drained from my work”) and *Depersonalization/Cynicism* (5 items, e.g., “I worry that this job is hardening me emotionally”).

MSC was measured by posing four questions based on the scale from the South African Employee Health and Wellness Survey (Rothmann & Rothmann, 2007) to determine the experience of eyestrain, muscle stiffness and neck, shoulders and/or lower and upper back pain, including “Over the last 3 months, how often did you experience pain and/or spasms in the upper back, shoulders, or neck?”; “Over the last 3 months, how often did you experience discomfort or stiffness in the hands, wrists, fingers, forearms or elbows?”; “Over the last 3 months, how often did you experience eyestrain?”; and “Over the last 3 months, how often did you experience pain and/or spasms in the lower back.” The items were rated on a 4-point frequency rating scale, ranging from 0 (Almost never) to 4 (Almost always).

3.3 | Research procedure

The human capital manager and other relevant managers of a large South African engineering organization were contacted to gain clearance to proceed with the research process within their working environment. The organization had seven departments, all of which were given questionnaires to enable them to participate in the study so that the researcher could gain insight into the organization as a whole. A total of 580 booklets were printed and distributed by hand to individual participants within all of the departments. A total of 398 booklets were completed and collected from the organization, indicating a response rate of 69%. Moreover, each department had at least one sealed box placed at common areas where participants were encouraged to submit their completed questionnaires once they had completed the questionnaire booklet. The data were captured in Microsoft Excel after which it was examined for potential errors. The statistical analysis then followed.

3.4 | Statistical analysis

The research hypotheses were inspected by employing Mplus 8.3 (Muthén & Muthén, 2019). The measurement model was created by utilizing confirmatory factor analysis (CFA) alongside structure equation modeling methods. The adequacy of the CFA model was established using the comparative fit index (CFI), Tucker–Lewis index (TLI), and root mean square error of approximation (RMSEA); the satisfactory values for the CFI and TLI were considered at 0.90 and higher. The RMSEA value of .08 or lower was deemed satisfactory (Van de Schoot, Lugtig, & Hox, 2012). The Cronbach’s alpha reliability coefficient displayed appropriate measurements for each of the constructs (see correlation table for values) and the composite reliability (CR) values were also calculated for the second-order factors with their average variance extracted (AVE). Furthermore, a correlation matrix was also created to study the relationships between all of the variables in this study, the effect sizes for these correlations were seen to be practically significant at $r \geq .30$ for a

medium effect, and $r \geq .50$ for a large effect (Cohen, 1992). Finally, a structural model was created as per Figure 1 to investigate the regression coefficients for the stated relationships in the hypotheses. The sizes and directions of the beta coefficients of this model were calculated, which proved the stated hypotheses. Bootstrapping was used to determine the existence and strength of the potential indirect relationships with 10,000 draws and 95% confidence intervals (CIs; Preacher & Hayes, 2008).

3.5 | Ethical considerations

Ethical clearance was provided by the University’s Faculty Research Committee to proceed with this study. All facets of this study were conducted in an ethical manner; participant identity was kept confidential; once participants had completed their anonymous questionnaires; they each sealed their questionnaire in an envelope and placed it in a securely sealed box. All data were analyzed and reported at the group level.

4 | RESULTS

4.1 | CFA measurement models: Workaholism (DUWAS-10)

A one- and two-factor model for workaholism was estimated due to the original scale consisting of two factors and the recent validation study of Horn (2015) in the South African context indicating that the scale is best operationalized as a one-factor structure due to a high correlation between working excessively and working compulsively within the South African context. This study found the same evidence for this correlation ($r = .90$), indicating problematic discriminant validity (Brown, 2015), and constituted the workaholism factor as a second-order latent variable based on the first-order latent components of working excessively and working compulsively. Furthermore, in line with Horn’s (2015) research, this study also found that the item “I feel that there is something inside of me that drives me to work hard” did not function adequately in the latent variable and was also excluded from further analysis in this study.

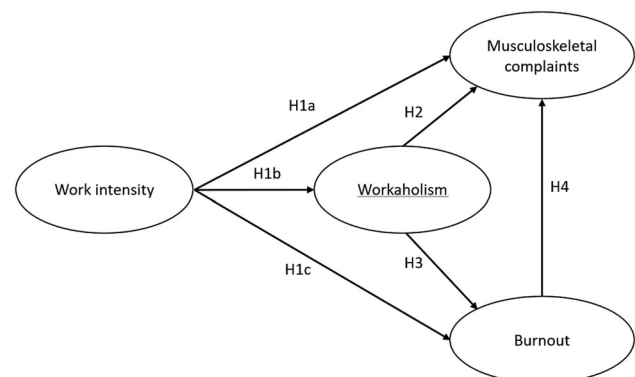


FIGURE 1 The structural model with the research hypotheses

4.2 | CFA measurement model: Factor structure and item loadings of the total model

The full measurement research model fits the data well (CFI = 0.94; TLI = 0.93; RMSEA = .06). It is important to note that work intensity was operationalized as a single latent variable based on a mean score of the role overload and time demands sum scores. Furthermore, second-order latent variables were created for workaholism and burnout based on their first-order latent variable indicators.

Table 2 below presents the factor loadings for the items for the latent variables.

All of the items loaded significantly on their respective factors and the latent factors explained a significant amount of variance in all of the corresponding items. The standard errors of the estimates were also relatively low, indicating the accuracy of the estimation process.

TABLE 2 Standardized loadings for the latent factors

Factor	Item	Loading	SE	p Value
Work intensity	Score	0.98	.01	.001
Working excessively	Excess 1	0.76	.04	.001
	Excess 2	0.56	.05	.001
	Excess 3	0.55	.05	.001
	Excess 4	0.43	.06	.001
	Excess 5	0.70	.04	.001
Working compulsively	Compulse 1	0.77	.04	.001
	Compulse 2	0.58	.06	.001
	Compulse 4	0.64	.05	.001
	Compulse 5	0.58	.05	.001
Workaholism ^a	Work excessively	0.97	.05	.001
	Working compulsively	0.90	.05	.001
Exhaustion	EE1	0.68	.04	.001
	EE2	0.70	.04	.001
	EE3	0.74	.03	.001
	EE4	0.50	.05	.001
	EE5	0.79	.03	.001
	EE6	0.81	.03	.001
	EE7	0.49	.05	.001
	EE8	0.59	.05	.001
	EE9	0.82	.03	.001
Depersonalization	DP1	0.48	.05	.001
	DP2	0.78	.03	.001
	DP3	0.89	.02	.001
	DP4	0.46	.06	.001
	DP5	0.65	.04	.001
Burnout ^a	Exhaustion	0.92	.03	.001
	Depersonalization	0.96	.03	.001
Musculoskeletal complaints	MSC1	0.80	.03	.001
	MSC2	0.94	.02	.001
	MSC3	0.75	.04	.001
	MSC4	0.88	.02	.001

Note: All $p < .001$.

Abbreviation: SE, standard error.

^aSecond-order factor.

4.3 | Reliability coefficients and correlation matrix for the study variables

Table 3 below displays the correlation matrix for the study variables.

As can be concluded from Table 3, all the variables were reliable ($\alpha \geq .70$), statistically significant and related positively to one another, as expected. The CR values for the second-order factors were also highly acceptable ($\rho > .90$). As can be seen, the first-order factors correlated highly with their corresponding second-order latent constructs (r 's $\geq .90$; large effects) supporting the use of second-order factors. In terms of the main constructs under study, work intensity (AVE = .96) was correlated positively with workaholism ($r = .44$; medium effect; AVE = .88), burnout ($r = .39$; medium effect; AVE = 0.87) and MSC ($r = .36$; medium effect; AVE = .71). Workaholism correlated positively with burnout ($r = .60$; large effect) and MSC ($r = .46$; medium effect). Lastly, burnout also correlated positively with MSC ($r = .54$; large effect). These results provided initial support for all of the research hypotheses.

4.4 | Structural model fit and regression results

Regression paths were added to the measurement model aligned with the study hypotheses, and the following was found: The model was a good fit to the data (CFI = 0.94; TLI = 0.93; RMSEA = .06). The results of the regressions are given in Table 4 and Figure 2.

The regression results showed that all of the hypotheses were supported, that is, all regressions were significant at the $p < .05$ level. Specifically work intensity showed significant positive path relationships to MSC ($\beta = .13$; SE = .05; supporting H_{1a}), workaholism ($\beta = .44$; SE = .05; supporting H_{1b}) and burnout ($\beta = .17$; SE = .06; supporting H_{1c}). Workaholism, in turn, showed positive path relationships to MSC ($\beta = .17$; SE = .08; supporting H_2) and burnout ($\beta = .52$; SE = .06; supporting H_3). Finally, burnout had a significantly positive path relationship to MSC ($\beta = .39$; SE = 0.07; supporting H_4).

Although mediation effects were not hypothesized because of the cross-sectional design, we nevertheless tested for indirect relationships, given the fact that all hypotheses were supported. Four potential indirect relationships were possible and warranted further investigation. The first potential mediating effect was the role of workaholism in the relationship between work intensity and MSC. Results from bootstrapping resampling (5,000 replications; cf., Rucker, Preacher, Tormala, & Petty, 2011) revealed that the first indirect relationship from work intensity to MSC through workaholism was indeed significant (Estimate = .07; SE = .04; $p = .04$; 95% CI [0.01, 0.15]) and, as the direct relationship from work intensity to MSC was also significant, it indicated a complimentary mediation model (Zhao, Lynch, & Chen, 2010), more traditionally known as a partial mediation. The second potential indirect effect was for burnout in the relationship between work intensity and MSC. The bootstrapping showed a significant indirect effect (Estimate = .06; SE = .03; $p = .02$; 95% CI [0.02, 0.13]) and this could then also be classified as a complementary mediation. The sum of the indirect effect in these relationships from

TABLE 3 Reliabilities and correlation matrix for the latent variables

Variables	1	2	3	4	5	6	7	8
1. Work intensity	(0.72)							
2. Exhaustion	0.36 ^a	(0.89)						
3. Depersonalization	0.38 ^a	0.88 ^b	(0.83)					
4. Burnout	0.39 ^a	0.92 ^b	0.96 ^b	(0.89)				
5. Working obsessively	0.43 ^a	0.54 ^b	0.56 ^b	0.58 ^b	(0.70)			
6. Working compulsively	0.39 ^a	0.50 ^b	0.51 ^b	0.54 ^b	0.88 ^b	(0.73)		
7. Workaholism	0.44 ^a	0.55 ^b	0.57 ^b	0.60 ^b	0.98 ^b	0.90 ^b	(0.80)	
8. Musculoskeletal complaints	0.36 ^a	0.50 ^b	0.52 ^b	0.54 ^b	0.45 ^b	0.41 ^b	0.46 ^a	(0.87)

Note: Cronbach's coefficients in brackets on the diagonal. All correlations $p < .001$.

^aMedium effect.

^bLarge effect.

work intensity to MSC through workaholism and burnout was 0.14 ($SE = .04$; $p < .001$; 95% CI [0.06, 0.21]).

The third potential indirect effect was for burnout in the relationship between workaholism and MSC. This was also found to be significant by means of the bootstrapping of the indirect relationship (Estimate = .20; $SE = .05$; $p < .001$; 95% CI [0.12, 0.31]). Finally, the indirect effect for work intensity to burnout through workaholism was also significant (Estimate = .23; $SE = .04$; $p < .001$; 95% CI [0.15, 0.31]). These last two standardized indirect effect values were also complementary mediation and were also the largest values, indicating their importance in the model.

5 | DISCUSSION

This study investigated the relationships between work intensity, workaholism, burnout, and self-reported MSC. Work intensity had a significant positive relationship with MSC (H_{1a} supported), indicating that having greater job demands in an unrealistic time frame increases the likelihood that employees will develop MSC. This is in line with literature that states that when employees experience high levels of work intensity it is expected that they will be more prone towards developing and reporting an increase in MSC (Cho et al.,

2012; Franke, 2015; Sprigg et al., 2007). Work intensity also displayed a significant positive relationship with workaholism (H_{1b} supported), indicating that employees who are working at heightened levels of intensity are more likely to increase their workaholic behavior, as opposed to employees whose work is less intense (Andreassen et al., 2011; Burke et al., 2010; Horn, 2015; Tabassum & Rahman, 2012). This partly contradicts the results of a past study, which showed that only one of the three components of workaholism (work involvement) significantly correlated with work intensity (Burke, Koyuncu, Fiksenbaum, & Acar, 2009). A possible reason for this may be that the current study conceptualized workaholism and work intensity (and therefore measurement) somewhat differently. The current study operationalized with workaholism and work intensity as single, one-dimensional constructs, whereas Burke et al. (2009) utilized a conceptualization of workaholism consisting of work involvement, feeling driven to work and work enjoyment and conceptualized work intensity as consisting of time demands, job demands, and emotional demands. Therefore, employees perceiving work to be more intense, coupled with strenuous hours, may adopt this study style and subsequently increase their workaholic behavior.

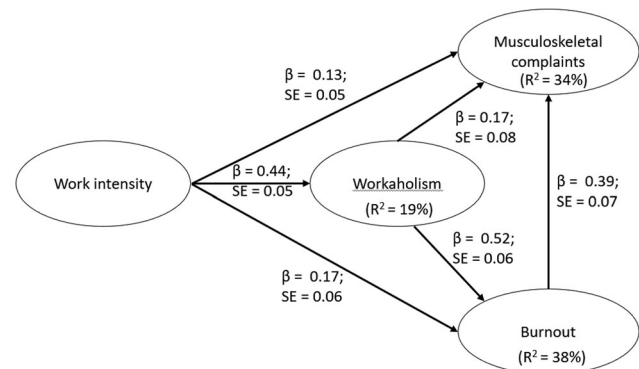
Moreover, work intensity showed a significant positive relationship with burnout (H_{1c} supported), which suggests that when employees are working intensely they are more likely to experience

TABLE 4 Regression results for the structural model

Structural path	β	SE	p Value	Result
Work intensity → Musculoskeletal complaints (MSC)	.13	.05	.015	Significant
Work intensity → Workaholism	.44	.05	.001	Significant
Work intensity → Burnout	.17	.06	.006	Significant
Workaholism → Musculoskeletal complaints (MSC)	.17	.08	.038	Significant
Workaholism → Burnout	.52	.06	.001	Significant
Burnout → Musculoskeletal complaints (MSC)	.39	.07	.001	Significant

Note: $p =$ Two-tailed statistical significance.

Abbreviations: β , beta coefficient; SE, standard error.

**FIGURE 2** The structural model with regression results and explained variances

higher burnout scores (Bakker & Demerouti, 2007; Hakanen et al., 2006; Horn, 2015; Schaufeli & Bakker, 2004). Recent research has shown that excessive job demands lead to burnout over time (De Beer, Pienaar, & Rothmann, 2016b) and that sufficient effort recovery is needed to offset this from occurring (Sonnentag, 2001). Thus, in line with current literature, when employees experience too high job and time demands they have less time to recover their spent energy, which will subsequently lead to burnout.

Workaholism had a significant positive relationship with MSC (H_2 supported), which indicates that employees who score high on workaholic behavior have a higher tendency to report MSC, which is in line with current literature (Andreassen et al., 2011; Matsudaira et al., 2013). In addition, workaholics overexert themselves over extended periods of time, leading to a lack of recovery time needed, which would otherwise prevent the development of MSC. It can be deduced that workaholics spend larger amounts of time seated in front of computer screens compared to nonworkaholics, and these static positions will cause eventual microtraumas in the various soft tissues, tendons, muscles, and/or cartilage, which subsequently may lead to a higher incidence of MSC (Blatter & Bongers, 2002). Further to this, workaholics are addicts in essence, therefore it can be ascertained that their behaviors will not reflect healthy habits such as taking regular body breaks, worrying about ergonomic impact on their health, or engaging in regular exercise (which could help combat the onset of MSC) as a result of the majority of their time is spent working (Aziz & Urich, 2014).

A positive significant relationship between workaholism and burnout was also found (H_3 supported). This indicates that employees with higher workaholism scores could be overexerting themselves by spending more time with work and thinking about work than is required, which causes exhaustion; consequently they do not fully recover the energy they spend daily, leading to the development of burnout (Bakker & Demerouti, 2007; Bakker & Oerlemans, 2011; Horn, 2015; Molino et al., 2016; Schaufeli et al., 2008; Stoeber & Damian, 2016). Burnout also showed a significant positive relationship with MSC (H_4 supported), implying that when employees suffer from burnout they are more likely to report MSC than employees who do not experience burnout. This could be due to the burnout sufferer being in such a state of impaired well-being that they participate in detrimental behaviors such as unhealthy work-life balance, static positions, irregular sleep patterns, not being able to recover enough of their physical energy, which further increases their likelihood to develop MSC (Armon et al., 2010; Jaworek, Marek, Karwowski, Andrzejczak, & Genaidy, 2010; Langballe et al., 2009).

Finally, even though not an explicit objective of the study because a cross-sectional design precludes the proper testing of mediation effects, evidence of three potential (indirect) mediation relationships were investigated for thoroughness, utilizing bootstrapping (cf., Rucker et al., 2011). The results showed that workaholism had a complementary (previously referred to as partial) mediating effect in the relationship between work intensity and MSC (Zhao et al., 2010). In addition, workaholism also displayed a complementary mediating effect in the relationship between work intensity and burnout. Evidence also supported a complementary mediating effect in the relationship

between workaholism and MSC through burnout. This indicated that additional dynamics might be at work in the studied relationships, which may warrant longitudinal investigation in future research.

5.1 | Practical implications

Awareness of the detrimental consequences resulting from high-intensity work could help organizations reduce future costs that would otherwise be unavoidable if no such actions are taken to help protect their employees from the outcomes of MSC, burnout, and workaholism (Andreassen et al., 2011; Bakker & Demerouti, 2007; Burke et al., 2010; Cho et al., 2012; Franke, 2015; Hakanen et al., 2006; Horn, 2015; Schaufeli & Bakker, 2004; Stride et al., 2007; Tabassum & Rahman, 2012). Rather than promoting long and intense work hours as a part of organizational culture, emphasis should be placed on a growth climate and working efficiently, that is, utilizing resources effectively to obtain the best possible results with the least amount of effort expended in the process and by sufficient effort recovery (Sonnentag, 2001). Employees should be made aware of the dangers of workaholic behavior, and of burnout and the negative effects, it can have on their work/personal life/health. A better work-life balance should be encouraged and a culture established where employees try to relax and rest when not at work (Bakker & Demerouti, 2007; Bakker & Oerlemans, 2011; Horn, 2015; Molino et al., 2016; Schaufeli et al., 2008; Stoeber & Damian, 2016). This could be achieved by something as simple as giving employees flexitime at work, or as intricate as policies and organization-wide culture changes.

Finally, the long-term detrimental effects of MSC need to be brought to the attention of the employees by means of awareness campaigns and by encouraging employees to take short breaks to stretch their bodies as well as the possibility of establishing ergonomic training sessions to learn the correct posture and usage of computers, keyboards, mice, chairs and how to sit at their desks to minimize the MSC effects to which incorrect usage will ultimately lead (Barbe & Barr, 2006; Cho et al., 2012; National Research Council, 2001; Tinubu, Mbada, Oyeyemi, & Fabunmi, 2010; Zakerian & Subramaniam, 2009).

5.2 | Limitations and recommendations for future research

The first limitation of the study was that it was only conducted within a single organization within a single sector of South Africa, which should be noted as a concern in terms of the external validity of the results, that is, generalization. A recommendation for future research would be to replicate the study within different sectors of the South African market or different and/or multiple organizations. The study was also limited to white-collar workers, future studies could include blue-collar workers or could refrain from limiting participation to certain criteria at all. Future studies could also implement a longitudinal design to establish an average between responses to ensure that external factors of the first day did not influence the participants' responses and to provide evidence of causality (Taris & Kompier, 2003), and the

mediating effects. Furthermore, future studies within the South African context should include work intensification (Franke, 2015) a distinct concept from workaholism as a potential moderator in the relationships here (and potential) others in the future.

Employees may have reported pain which they mistakenly consider to be due to MSC from work, when in fact it could be simply due to aging, old sports, posture while performing hobbies, disabilities (such as scoliosis), or accident injuries. Future studies could include a section that poses a question concerning injuries or whether or not the participants attribute the complaints to work. A further concern is that the employees who are workaholics or working very intensely might have negatively affected the response rate, due to perceiving the questionnaire as a waste of time while having their own workloads to deal with—thus not participating and skewing the true picture—which may, in fact, paint a more serious picture. Another limitation of this study is that all of the questions were the participants' own subjective perceptions and no medical records were available to ascertain whether participants were afflicted by MSC or burnout. Hence, a future recommendation would be to include factual data gathered by means of medical diagnoses to obtain a more objective representation of the participants' conditions.

Future studies should also emphasize the creation, implementation, and effects of interventions in an attempt to decrease the prevalence of undue work intensity as well as the interventions to combat the experiences of burnout and MSC. Finally, this study was also limited because there are certain aspects that influence workaholism such as the individual's personality, culture, and social environment, and these individual factors were not explicitly measured (Tabassum & Rahman, 2012), that could be controlled for in future studies.

6 | CONCLUSION

The aim of this study was to determine the relationships between work intensity, workaholism, burnout, and MSC. After the conclusion of the research, evidence has been established that significant positive relationships exist amongst all of the factors. Organizations need to take into account that when employees consistently face higher levels of work intensity it could affect workaholic behavior, burnout, and musculoskeletal health. These factors need to be addressed within organizations as they will negatively impact employee health as well as the organization's performance and ultimately the organization's bottom line.

ORCID

Leon T. de Beer  <http://orcid.org/0000-0001-6900-2192>

REFERENCES

- Abel, M. H., & Sewell, J. (1999). Stress and burnout in rural and urban secondary school teachers. *The Journal of Educational Research*, 92(5), 287–293. <https://doi.org/10.1080/00220679909597608>
- Aghilinejad, M., Mousavi, S. A. J., Nouri, M. K., & Ahmadi, A. A. (2012). Work-related musculoskeletal complaints among workers of Iranian aluminum industries. *Archives of Environmental & Occupational Health*, 67(2), 98–102. <https://doi.org/10.1080/19338244.2011.586383>
- Andreassen, C. S., Hetland, J., Molde, H., & Pallesen, S. (2011). 'Workaholism' and potential outcomes in well-being and health in a cross-occupational sample. *Stress and Health*, 27(3), e209–e214. <https://doi.org/10.1002/smi.1366>
- Armon, G., Melamed, S., Shirom, A., & Shapira, I. (2010). Elevated burnout predicts the onset of musculoskeletal pain among apparently healthy employees. *Journal of Occupational Health Psychology*, 15(4), 399–408. <https://doi.org/10.1002/smi.1366>
- Aziz, S., & Uhrich, B. (2014). The causes and consequences of workaholism. In Burke, R. J., & Major, D. A. (Eds.), *Gender in organizations: Are men allies or adversaries to women's career advancement?* (pp. 171–174). Cheltenham, UK: Edward Elgar Publishing Limited.
- Bakker, A. B., & Demerouti, E. (2007). The Job Demands-Resources model: State of the art. *Journal of Managerial Psychology*, 22(3), 309–328.
- Bakker, A. B., & Oerlemans, W. G. M. (2011). Subjective well-being in organizations. In Cameron, K., & Spreitzer, G. (Eds.), *The Oxford handbook of positive organizational scholarship* (pp. 178–189). Oxford, UK: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199734610.013.0014>
- Barbe, M. F., & Barr, A. E. (2006). Inflammation and the pathophysiology of work-related musculoskeletal disorders. *Brain, Behavior, and Immunity*, 20(5), 423–429. <https://doi.org/10.1016/j.bbi.2006.03.001>
- Beehr, T. A., Walsh, J. T., & Taber, T. D. (1976). Relationships of stress to individually and organizationally valued states: Higher order needs as a moderator. *Journal of Applied Psychology*, 61(1), 41–47. <https://doi.org/10.1037/0021-9010.61.1.41>
- De Beer, L. T., Pienaar, J., & Rothmann Jr., S. (2013). Linking employee burnout with medical aid provider expenditure. *South African Medical Journal*, 103(2), 89–93.
- Blatter, B. M., & Bongers, P. M. (2002). Duration of computer use and mouse use in relation to musculoskeletal disorders of neck or upper limb. *International Journal of Industrial Ergonomics*, 30(4), 295–306.
- Boekhorst, J. A., Singh, P., & Burke, R. (2017). Work intensity, emotional exhaustion and life satisfaction: The moderating role of psychological detachment. *Personnel Review*, 46(5), 891–907.
- Boucekkine, R., Hritonenko, N., & Yatsenko, Y. (2014). Health, work intensity, and technological innovations. *Journal of Biological Systems*, 22(02), 219–233.
- Boxall, P., & Macky, K. (2014). High-involvement work processes, work intensification and employee well-being. *Work, Employment & Society*, 28(6), 963–984.
- Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). New York, NY: Guilford Press.
- Burke, R. J., Koyuncu, M., Fiksenbaum, L., & Acar, F. T. (2009). Work hours, work intensity, satisfactions and psychological well-being among Turkish manufacturing managers. *Europe's Journal of Psychology*, 5(2), 12–30.
- Burke, R. J., Singh, P., & Fiksenbaum, L. (2010). Work intensity: Potential antecedents and consequences. *Personnel Review*, 39(3), 347–360.
- Cho, C. Y., Hwang, Y. S., & Cherg, R. J. (2012). Musculoskeletal symptoms and associated risk factors among office workers with high workload computer use. *Journal of Manipulative and Physiological Therapeutics*, 35(7), 534–540. <https://doi.org/10.1016/j.jmpt.2012.07.004>
- Cohen, J. (1992). *Statistical power analysis for the behavioral sciences*. Orlando, FL: Academic Press. Rev. ed.
- De Beer, L. T. (2014). The effect of presenteeism-related health conditions on employee work engagement levels: A comparison between groups. *SA Journal of Human Resource Management*, 14(1), 1–9. <https://doi.org/10.4102/sajhrm.v12i1.640>
- De Beer, L. T., & Bianchi, R. (2017). Confirmatory factor analysis of the Maslach Burnout Inventory: A Bayesian structural equation

- modeling approach. *European Journal of Psychological Assessment*, 35(2), 217–224. <https://doi.org/10.1027/1015-5759/a000392>
- De Beer, L. T., Pienaar, J., & Rothmann, S., Jr. (2016a). Job burnout, work engagement and self-reported treatment for health conditions in South Africa: Self-reported health conditions in South Africa. *Stress and Health*, 32(1), 36–46. <https://doi.org/10.1002/smi.2576>
- De Beer, L. T., Pienaar, J., & Rothmann S, Jr, Jr (2016b). Work overload, burnout, and psychological ill-health symptoms: A three-wave mediation model of the employee health impairment process. *Anxiety, Stress, & Coping*, 29(4), 387–399.
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The Job Demands-Resources model of burnout. *Journal of Applied Psychology*, 86(3), 499–512. <https://doi.org/10.1037/0021-9010.86.3.499>
- Ekstedt, M. (2005). Burnout and sleep. <http://perski.se/pub/thesisMiriam.pdf>
- Ekstedt, M., Söderström, M., Akerstedt, T., Nilsson, J., Søndergaard, H. P., & Aleksander, P. (2006). Disturbed sleep and fatigue in occupational burnout. *Scandinavian Journal of Work, Environment & Health*, 32(2), 121–131. <https://doi.org/10.5271/sjweh.987>
- Engels, J. A., van der Gulden, J. W., Senden, T. F., & van't Hof, B. (1996). Work related risk factors for musculoskeletal complaints in the nursing profession: Results of a questionnaire survey. *Occupational and Environmental Medicine*, 53(9), 636–641. <https://doi.org/10.1136/oem.53.9.636>
- Franke, F. (2015). Is work intensification extra stress? *Journal of Personnel Psychology*, 14(1), 17–27. <https://doi.org/10.1027/1866-5888/a000120>
- Frankson, L. (2015). SA construction industry struggling. <http://www.infrastructurenews.com/2015/11/27/sa-construction-industry-struggling/>
- Griffiths, M. D., & Karanika-Murray, M. (2012). Contextualising over-engagement in work: Towards a more global understanding of workaholism as an addiction. *Journal of Behavioral Addictions*, 1(3), 87–95. <https://doi.org/10.1556/JBA.1.2012.002>
- Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology*, 43(6), 495–513. <https://doi.org/10.1016/j.jsp.2005.11.001>
- Hess, D. (1997). Employee perceived stress: Relationship to the development of repetitive strain injury symptoms. *AAOHN Journal*, 45(3), 115–123.
- Horn, J. (2015). *The validation of a workaholism scale within the South African banking industry* (Unpublished master's dissertation). North-West University, Potchefstroom, South Africa.
- Horton, T. E. (2011). *Workaholism and employee well-being* (Unpublished master's thesis). University of Waikato, Hamilton, New Zealand.
- Ijzelenberg, W., Molenaar, D., & Burdorf, A. (2004). Different risk factors for musculoskeletal complaints and musculoskeletal sickness absence. *Scandinavian Journal of Work, Environment & Health*, 30(1), 56–63. <https://doi.org/10.5271/sjweh.765>
- Jaworek, M., Marek, T., Karwowski, W., Andrzejczak, C., & Genaidy, A. M. (2010). Burnout syndrome as a mediator for the effect of work-related factors on musculoskeletal complaints among hospital nurses. *International Journal of Industrial Ergonomics*, 40(3), 368–375. <https://doi.org/10.1016/j.ergon.2010.01.006>
- Jhun, H. J., Cho, S. I., & Park, J. T. (2004). Changes in job stress, musculoskeletal symptoms, and complaints of unfavorable working conditions among nurses after the adoption of a computerized order communication system. *International Archives of Occupational and Environmental Health*, 77, 363–367. <https://doi.org/10.1007/s00420-004-0509-2>
- Khan, I. (2016). Top 10 most advanced technology countries in the world. <http://worldknowing.com/top-10-most-advanced-technology-countries-in-the-world/>
- Kim, A. E., & Park, I. (2006). Changing trends of work in South Korea. *Asian Survey*, 46(3), 437–456.
- Langballe, E. M., Innstrand, S. T., Hagtvet, K. A., Falkum, E., & Gjerløw Aasland, O. (2009). The relationship between burnout and musculoskeletal pain in seven Norwegian occupational groups. *Work*, 32(2), 179–188.
- Le Favre, M., Boxall, P., & Macky, K. (2015). Which workers are more vulnerable to work intensification? An analysis of two national surveys. *International Journal of Manpower*, 36(6), 966–983. <https://doi.org/10.1108/IJM-01-2014-0035>
- Liang, Y. W., & Chu, C. M. (2009). Personality traits and personal and organizational inducements: Antecedents of workaholism. *Social Behavior and Personality: An International Journal*, 37(5), 645–660. <https://doi.org/10.2224/sbp.2009.37.5.645>
- Loquercio, D. (2006). Turnover and retention. Retrieved from www.chsalliance.org/files/files/Resources/Articles-and-Research/turnover-and-retention.pdf
- Malik, A., & Rowley, C. (2015). *Business models and people management in the Indian IT industry: From people to profits*. New York, NY: Routledge.
- Maslach, C. (1986). Stress, burnout, and workaholism. In R. R. Killburg, P. E. Nathan, & R. W. P. Thoreson (Eds.), *Professionals in distress: Issues, syndromes, and solutions in psychology* (pp. 53–75). Washington, DC: American Psychological Association. <https://doi.org/10.1037/10056-004>
- Maslach, C., & Jackson, S. E. (1981). *Maslach burnout inventory*. Palo Alto, CA: Consulting Psychologists Press. <https://doi.org/10.1146/annurev.psych.52.1.397>
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52(1), 397–422.
- Matsudaira, K., Shimazu, A., Fujii, T., Kubota, K., Sawada, T., Kikuchi, N., & Takahashi, M. (2013). Workaholism as a risk factor for depressive mood, disabling back pain, and sickness absence. *PLoS One*, 8(9), e75140. <https://doi.org/10.1371/journal.pone.0075140>
- Melamed, S., Ugarten, U., Shirom, A., Kahana, L., Lerman, Y., & Froom, P. (1999). Chronic burnout, somatic arousal and elevated salivary cortisol levels. *Journal of Psychosomatic Research*, 46(6), 591–598. [https://doi.org/10.1016/S0022-3999\(99\)00007-0](https://doi.org/10.1016/S0022-3999(99)00007-0)
- Merrill, R. M., Aldana, S. G., Pope, J. E., Anderson, D. R., Coberley, C. R., Grossmeier, J. J., & Whitmer, R. W. (2013). Self-rated job performance and absenteeism according to employee engagement, health behaviors, and physical health. *Journal of Occupational and Environmental Medicine*, 55(1), 10–18. <https://doi.org/10.1097/JOM.0b013e31827b73af>
- Molino, M., Bakker, A. B., & Ghislieri, C. (2016). The role of workaholism in the Job-Demands Resources model. *Anxiety, Stress, & Coping*, 29(4), 400–414. <https://doi.org/10.1080/10615806.2015.1070833>
- Mommersteeg, P. M. C., Heijnen, C. J., Verbraak, M. J. P. M., & van Doornen, L. J. P. (2006). A longitudinal study on cortisol and complaint reduction in burnout. *Psychoneuroendocrinology*, 31(7), 793–804. <https://doi.org/10.1016/j.psyneuen.2006.03.003>
- Muthén, L. K., & Muthén, B. O. (2019). *Mplus user's guide* (8th ed.). Los Angeles, CA: Muthén & Muthén.
- National Research Council. (2001). *Musculoskeletal disorders and the workplace: Low back and upper extremities*. Washington, DC: National Academy Press. <https://doi.org/10.17226/10032>
- Ng, T. W. H., Sorensen, K. L., & Feldman, D. C. (2007). Dimensions, antecedents, and consequences of workaholism: A conceptual integration and extension. *Journal of Organizational Behavior*, 28(1), 111–136. <https://doi.org/10.1002/job.424>
- Oates, W. (1971). *Confessions of a workaholic: The facts about work addiction*. New York, NY: World Publishing Co.
- Oh, I. H., Yoon, S. J., Seo, H. Y., Kim, E. J., & Kim, Y. A. (2011). The economic burden of musculoskeletal disease in Korea: A cross sectional study. *BMC Musculoskeletal Disorders*, 12(1), 157–165. <https://doi.org/10.1186/1471-2474-12-157>
- Piasna, A. (2018). Scheduled to work hard: The relationship between non-standard working hours and work intensity among European workers (2005–2015). *Human Resource Management Journal*, 28(1), 167–181.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple

- mediator models. *Behavior Research Methods*, 40(3), 879–891. <https://doi.org/10.3758/BRM.40.3.879>
- Romano, M., Catalfo, P., & Nicotra, M. (2014). Science parks and intellectual capital. *Journal of Intellectual Capital*, 15(4), 537–553. <https://doi.org/10.1108/JIC-06-2014-0070>
- Rothmann, S., & Rothmann, J. C. (2007). *The South African Employee Health and Wellness Survey (SAEHWS). User manual* (4th ed.). Potchefstroom, ZA: Afriforté.
- Rucker, D. D., Preacher, K. J., Tormala, Z. L., & Petty, R. E. (2011). Mediation analysis in social psychology: Current practices and new recommendations. *Social and Personality Psychology Compass*, 5(6), 359–371. <https://doi.org/10.1111/j.1751-9004.2011.00355.x>
- Schaufeli, W. B. (2016). Heavy work investment, personality and organizational climate. *Journal of Managerial Psychology*, 31, 1057–1073.
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, 25(3), 293–315. <https://doi.org/10.1002/job.248>
- Schaufeli, W. B., Shimazu, A., & Taris, T. W. (2009). Being driven to work excessively hard: The evaluation of a two-factor measure of workaholism in the Netherlands and Japan. *Cross-Cultural Research*, 43(4), 320–348. <https://doi.org/10.1177/1069397109337239>
- Schaufeli, W. B., Taris, T. W., & Van Rhenen, W. (2008). Workaholism, burnout, and work engagement: Three of a kind or three different kinds of employee well-being? *Applied Psychology*, 57(2), 173–203. <https://doi.org/10.1111/j.1464-0597.2007.00285.x>
- Schultz, A. B., & Edington, D. W. (2007). Employee health and presenteeism: A systematic review. *Journal of Occupational Rehabilitation*, 17, 547–579. <https://doi.org/10.1007/s10926-007-9096-x>
- Schultz, G., Mostert, K., & Rothmann, I. (2012). Repetitive strain injury among South African employees: The relationship with burnout and work engagement. *International Journal of Industrial Ergonomics*, 42(5), 449–456. <https://doi.org/10.1016/j.ergon.2012.06.003>
- Sharan, D., Parijat, P., Sasidharan, A. P., Ranganathan, R., Mohandoss, M., & Jose, J. (2011). Workstyle risk factors for work related musculoskeletal symptoms among computer professionals in India. *Journal of Occupational Rehabilitation*, 21(4), 520–525. <https://doi.org/10.1007/s10926-011-9294-4>
- Skaalvik, E. M., & Skaalvik, S. (2008). Teacher self-efficacy: Conceptual analysis and relations with teacher burnout and perceived school context. In Craven, R., Marsh, H. W., & McInerney, D. (Eds.), *Self-processes, learning, and enabling human potential* (pp. 223–247). Charlotte, NC: Information Age Publishing. <https://doi.org/10.1016/j.tate.2009.11.001>
- Skaalvik, E. M., & Skaalvik, S. (2010). Teacher self-efficacy and teacher burnout: A study of relations. *Teaching and Teacher Education*, 26(4), 1059–1069. <https://doi.org/10.1016/j.tate.2009.11.001>
- Sonnentag, S. (2001). Work, recovery activities, and individual well-being: A diary study. *Journal of Occupational Health Psychology*, 6(3), 196–210. <https://doi.org/10.1037/1076-8998.6.3.196>
- Sprigg, C. A., Stride, C. B., Wall, T. D., Holman, D. J., & Smith, P. R. (2007). Work characteristics, musculoskeletal disorders, and the mediating role of psychological strain: A study of call center employees. *Journal of Applied Psychology*, 92(5), 1456–1466. <https://doi.org/10.1037/0021-9010.92.5.1456>
- Stoeber, J., & Damian, L. E. (2016). Perfectionism in employees: Work engagement, workaholism, and burnout. In F. M. Sirios, & D. S. Molnar (Eds.), *Perfectionism, health, and well-being* (pp. 265–283). Cham, Switzerland: Springer International Publishing. <https://doi.org/10.1007/978-3-319-18582-8>
- Tabassum, A., & Rahman, T. (2012). Gaining the insight of workaholism, its nature and its outcome: A literature review. *International Journal of Research Studies in Psychology*, 2(2), 81–92. <https://doi.org/10.5861/ijrsp.2012.167>
- Taris, T. W., & Kompier, M. (2003). Challenges in longitudinal designs in occupational health psychology. *Scandinavian Journal of Work, Environment & Health*, 29(1), 1–4. <https://doi.org/10.5271/sjweh.697>
- Thompson, C. A., Beauvais, L. L., & Lyness, K. S. (1999). When work–family benefits are not enough: The influence of work–family culture on benefit utilization, organizational attachment, and work–family conflict. *Journal of Vocational Behavior*, 54(3), 392–415. <https://doi.org/10.1006/jvbe.1998.1681>
- The Guardian. (2016). Japan: One fifth of employees at risk of death from overwork – report. <https://www.theguardian.com/world/2016/oct/08/japan-one-fifth-of-employees-at-risk-of-death-from-overwork-report>
- Tiaden, A. N., & Richards, P. J. (2013). The emerging roles of HTRA1 in musculoskeletal disease. *The American Journal of Pathology*, 182(5), 1482–1488. <https://doi.org/10.1016/j.ajpath.2013.02.003>
- Tinubu, B. M., Mbada, C. E., Oyeyemi, A. L., & Fabunmi, A. A. (2010). Work-related musculoskeletal disorders among nurses in Ibadan, Southwest Nigeria: A cross-sectional survey. *BMC Musculoskeletal Disorders*, 11(1), 12. <https://doi.org/10.1186/1471-2474-11-12>
- Van de Schoot, R., Lugtig, P., & Hox, J. (2012). A checklist for testing measurement invariance. *European Journal of Developmental Psychology*, 9(4), 486–492. <https://doi.org/10.1080/17405629.2012.686740>
- Van Tulder, M., Malmivaara, A., & Koes, B. (2007). Repetitive strain injury. *The Lancet*, 369(9575), 1815–1822. [https://doi.org/10.1016/S0140-6736\(07\)60820-4](https://doi.org/10.1016/S0140-6736(07)60820-4)
- Wergeland, E. L., Veiersted, B., Ingre, M., Olsson, B., Åkerstedt, T., Bjørnskau, T., & Varg, N. (2003). A shorter workday as a means of reducing the occurrence of musculoskeletal disorders. *Scandinavian Journal of Work, Environment & Health*, 29(1), 27–34. <https://doi.org/10.5271/sjweh.701>
- Yelin, E. (2003). Cost of musculoskeletal diseases: impact of work disability and functional decline. *The Journal of Rheumatology Supplement*, 68, 8–11.
- Yelin, E., & Callahan, L. F. (1995). Special article the economic cost and social and psychological impact of musculoskeletal conditions. *Arthritis & Rheumatism*, 38(10), 1351–1362. <https://doi.org/10.1002/art.1780381002>
- Zakerian, S. A., & Subramaniam, I. D. (2009). The relationship between psychosocial work factors, work stress and computer-related musculoskeletal discomforts among computer users in Malaysia. *International Journal of Occupational Safety and Ergonomics*, 15(4), 425–434. <https://doi.org/10.1080/10803548.2009.11076822>
- Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, 37, 197–206. <https://doi.org/10.1086/65125>

How to cite this article: Engelbrecht GJ, deBeer LT, Schaufeli WB. The relationships between work intensity, workaholism, burnout, and self-reported musculoskeletal complaints. *Hum Factors Man*. 2019;1–12. <https://doi.org/10.1002/hfm.20821>