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The moderating role of personality in the job strain process: A latent interaction approach

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Orientation: Most stress models emphasise the impact of adverse work conditions on psychological strain. Despite considerable support for these additive models, the role of personal characteristics moderating the stress–strain sequence is under-researched.

Research purpose: The study investigated the indirect and curvilinear effects of personal resources on the stress–strain sequence.

Motivation for the study: Personal agency may play an important role in changing work conditions, through job crafting and other pro-active work activities. This study's results may enhance popular work strain models through the incorporation of personal characteristics

Research approach/design, and method: The study made use of a cross-sectional and *ex post facto* research design and convenience sampling of 879 South African employees across various industries and job levels. The data were collected through a quantitative survey and analysed using latent interaction analysis.

Main findings: Broad support was found for the buffering role of sense of coherence on the relationship between job demands and cynicism, and between job demands and exhaustion.

Practical/managerial implications: The results suggest that the existence of resource-rich environments alone may not be enough to guarantee thriving and engaged employees. The motivating potential of resources is enhanced when employees experience a certain degree of challenge in their work.

Contribution/value-add: The study makes a theoretical contribution by highlighting the importance of personality traits as buffers in the stress–strain sequence. Moreover, latent interaction analysis is seldom used in structural equation modelling, despite holding numerous benefits compared to moderated regression analysis.

Keywords: stress; job demands; work engagement; sense of coherence; personality; conscientiousness; moderators; curvilinear effects.

Introduction

The changing nature of work has led to increased job stress for employees worldwide (Bakker & Derks, 2009; Blustein, 2008; Jetha et al., 2021). Employees have had to adapt to new skill requirements, changing work conditions, the effects of the coronavirus disease 2019 (COVID-19) pandemic, and altered psychosocial dynamics in the workplace. The staggering economic and social costs of strain-related pathologies stemming from demanding work conditions have ignited renewed interest in the study of work-induced stress (Bakker et al., 2010; Jex & Yankelevich, 2008). According to the American Psychological Association (APA) (2021), 79% of workers in the United States of America (US) have experienced burnout, with the number steadily increasing in recent years and likely exacerbated by the COVID-19 pandemic.

Numerous theoretical models of occupational strain and stress have been proposed, including the Job Demands–Control (JD-C) Model (Karasek, 1979), the Conservation of Resources Model (Hobfoll, 2002), and the Job Demands–Resources (JD-R) Model (Demerouti et al., 2001), with the latter the most widely cited. Although most of these models are useful in stress-related research, many suffer methodological and substantive shortcomings. In addition, many of the major theoretical models are either too narrow in scope and neglect explicitly considering the role of

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personal disposition in the strain–stress process, or are too broad and complex and lack predictive validity (Kain & Jex, 2010; Mark & Smith, 2010; Wang et al., 2016).

The goal of this study was to empirically examine the role of personality variables in the job stress–strain sequence by extending the JD-R Model (Demerouti et al., 2001). We argue that incorporating personality variables will strengthen our understanding of work-related strain and wellness.

'Third variable' extensions: The role of personality in the job strain–stress process

Various studies have endorsed the importance of job characteristics to employee well-being (Bakker et al., 2010; Johari et al., 2019; Lesener et al., 2019; Shamsi et al., 2021). Although these studies have produced comprehensive 'laundry lists' of possible antecedents of employee well-being, integrated theoretical perspectives are limited. The risk of this approach is that it does not take into account the complex interactions between the factors that influence employee wellness.

Despite shortcomings, Karasek's (1979) JD-C Model has acquired a prominent position because of its theoretical simplicity and practical relevance to job design (Bakker & Demerouti, 2007; Lesener et al., 2019). However, substantive support for the model is mixed, especially in relation to the hypothesis that job control (decision latitude) enhances employee well-being (De Lange et al., 2003; Hausser et al., 2010). The lack of empirical support for this model has been attributed to its oversimplicity in comparison to the highly complex modern-day work environment (Bakker & Demerouti, 2007; Lesener et al., 2019; Mark & Smith, 2010). There is also an argument to be made that more resources may not offset the adverse impact of acute and constant job demands.

The JD-R Model (Demerouti et al., 2001) holds that all job characteristics can be broadly classified as either job demands or job resources (Bakker & Derks, 2009; Demerouti et al., 2001; Mazzetti et al., 2021). The JD-R Model extends the JD-C Model by acknowledging that several job resources (e.g. skills variety, performance feedback, and decision latitude) interact with job demands (e.g. time pressure, work–life balance, and work overload) in shaping employee well-being (Bakker et al., 2010; Lesener et al., 2019; Schaufeli & Salanova, 2007; Xanthopoulou et al., 2007). The JD-R Model also incorporates a wide range of theoretical concepts from related models, including the Conservation of Resources Model (Hobfoll, 2002) and Effort–Reward Imbalance Model (Siegrist, 2002).

The JD-R Model also expands the JD-C Model by underscoring the motivating role of job resources as antecedents of salutogenic work outcomes (e.g. work engagement and commitment), and as buffering moderators in the job stress–strain process (Kain & Jex, 2010; Schaufeli & Bakker, 2003; Schaufeli & Salanova, 2007). The JD-R Model has received more support than the JD-C, primarily because empirical studies have carefully considered different combinations of work characteristics in examining work well-being (Kain & Jex, 2010; Lesener et al., 2019; Mazzetti et al., 2021). Despite support for the JD-R Model, the fact that it is based on a tradition of research using the JD-C Model resulted in the majority of research using the JD-R Model only considering the influence of work characteristics on job strain (Mark & Smith, 2010; Xanthopoulou et al., 2007a, 2009). Karasek (1979, p. 280) and emphasised the possibility that so-called 'third variable' constructs could influence strain perceptions in the JD-C Model.

Karasek (1979) also observed that variables such as education, age, and income are bound to affect the demands–control interaction, but did not specifically explain this presumed dynamic. Furthermore, research using the JD-C Model has rarely included individual differences (Kain & Jex, 2010). Similarly, the JD-R Model does not explicitly consider the moderating role of personal resources in the stress–strain sequence, although voluminous research has been conducted on the role of job resources in the motivation process (Lesener et al., 2019; Xanthopoulou et al., 2009). Neither model includes the moderator or main-effect role of personality. We propose that personality traits interact with job demands and resources, with the outcome being perceived strain. The fact that personality traits are not consistently included in the JD-R Model may, in part, be responsible for the mixed results of predictive studies of job strain. This study was thus aimed at addressing this gap in literature by specifically examining the role of personality in the stress–strain sequence, utilising the JD-R Model as theoretical base.

Personality and the stress–strain sequence

A relationship between job strain and employee stress has not enjoyed universal support in the occupational stress literature (Van den Heuvel et al., 2010; Wang et al., 2016). Briner et al. (2004) argued that stressors are not actually stressors if the individual does not perceive them as such. This viewpoint has been echoed in many transactional models. Some research found a positive relationship between job demands (job challenges) and vigour, but no relationship with exhaustion, the main component of burnout (Van den Broeck et al., 2010). Research attention has therefore shifted to potential intervening variables in the stress–strain process, such as personal resources (Van den Heuvel et al., 2010; Xanthopoulou et al., 2009). In the wellness literature, personal resources are defined as personal predispositions linked to resilience, coping, and personal fulfilment (Hobfoll et al., 2003). Many interrelated yet distinct concepts (e.g. psychological resources, psychological capital, personal coping resources, and general resistance resources) have been classified under the broad umbrella term 'personal resources' (Van den Heuvel et al., 2010).

According to Hobfoll (1986), 'personal' necessarily implies dynamic interaction between individual characteristics and features of the context in which the individual functions. The interplay between individual predisposition and environment is also widely acknowledged in personality research (Mischel, 2004; Van den Heuvel et al., 2010). This line of research

suggests that personal resources are often activated in the face of adversity, or when goal attainment is threatened (Bakker et al., 2007b; Hakanen et al., 2005; Hobfoll, 2002; Wang et al., 2016). Personal resources can be temporary states or more permanent traits; however, most studies consider them stable (Van den Heuvel et al., 2010). Gist and Mitchell (1992) argued that personal resources should be regarded as lower-order, malleable elements of personality. Personality may therefore be the foundation upon which personal resources are developed (Seligman, 1991). For example, it seems plausible that someone with more optimistic personality traits (such as extraversion and agreeableness) would be more likely than someone with low extraversion to develop optimistic coping tendencies (Van den Heuvel et al., 2010). Occupational health studies have focussed largely on the influence of work characteristics on perceptions of work stress, with little attention to the role of employees' personality attributes. This poses a gap in the literature, as employees' personality attributes can be important determinants of their adaptation to their work environment (Xanthopoulou et al., 2009). Research has focussed on lower-level traits such as Type A personality, locus of control, core self-evaluations, and dispositional optimism, but the role of traits proposed in the Five-Factor Model (McCrae & Costa 2003) is still not well understood (Code & Langan-Fox, 2001).

Antecedent, mediating, or moderating role of personality in the stress–strain sequence

In using a direct effects model, personality and stress are additively related to strain (Parkes, 1994). Research has consistently linked neuroticism with negative health outcomes, whereas extraversion, conscientiousness, agreeableness, and openness to experience are associated with enhanced perceived health and work well-being (Grant & Langan-Fox, 2009). Meta-analytical studies focussing on the reported relationship between personality and subjective well-being found moderate relationships between tested personality factors and life satisfaction, with neuroticism and conscientiousness having the strongest associations (Grant & Langan-Fox, 2009). It has also been proposed that personality might mediate the relationship between stress and strain (Grant & Langan-Fox, 2009; Xanthopoulou et al., 2009), and sense of coherence has been found to mediate the relationship between organisational climate and occupational well-being (Feldt et al., 2000). While features of the work environment could shape personal dispositions, it seems equally plausible that personal resources dictate people's perceptions and adaptation to their environment (Bandura, 2000). It is thus proposed that personality traits may function as either moderators or mediators in the relationship between environmental factors and employee well-being.

Previous empirical studies have generally supported the triple role of personality – moderator, mediator, or predictor – in the stressor–strain relationship (Xanthopoulou et al., 2009). In terms of the JD-R Model, it is arguable that the effects of job demands, burnout, and work engagement are moderated by cognitive coping resources (e.g. sense of coherence and self-efficacy) and moderated by personality traits (e.g. conscientiousness and extraversion).

In contrast to the traditional models of work well-being, transactional models regard employees as active sculptors rather than mere passive recipients of contextual stimuli (Bakker & Derks, 2009; Blustein, 2006, 2008; Parker & Ohly, 2008; Swider & Zimmerman, 2010; Tims & Bakker, 2010). The process of self-regulation lies at the heart of self-leadership and job crafting, with employees regarded as goal-striving entities that shrewdly monitor progress towards desired states or goals (Vancouver & Day, 2005). Employees are thus likely to actively change and redesign their vocational tasks by negotiating job characteristics and assigning meaning to their jobs (Parker & Ohly, 2008).

Although the general stress literature contains some research that suggests that personality traits play an important role in experiencing stress, cognitive appraisal, coping and health, the majority of research has focussed on the roles of neuroticism and extraversion (Grant & Langan-Fox, 2007). Conscientiousness, in particular, has received little attention, probably because of the limited role that work performance plays in models of occupational stress. However, current thinking in this domain has revived interest in organisational effectiveness and the *conscientiousness* construct (Grant & Langan-Fox, 2007). Schmutte and Ryff's (1997) meta-analysis of the relationship between personality and psychological well-being found that conscientiousness is strongly related to purpose in life, agreeableness and positive relations, as well as personal growth. Based on these findings, we expected conscientiousness to have a significant buffering effect on work strain through job crafting.[1] Specifically, individuals with high conscientiousness will actively change their work role and characteristics in such a way as to mitigate the strenuous influence of excessive job demands on the three facets of burnout – emotional exhaustion, cynicism, and reduced efficacy:

H1: The positive relationship between job demands and burnout is moderated (buffered) by conscientiousness:

> Sub-hypothesis (SH)1.1: Higher levels of conscientiousness buffers the positive relationship between job demands and cynicism.
>
> SH1.2: Higher levels of conscientiousness buffers the positive relationship between job demands and emotional exhaustion.
>
> SH1.3: Higher levels of conscientiousness buffers the positive relationship between job demands and reduced efficacy.

The literature on coping provides empirical support for the moderating role of conscientiousness, neuroticism, and extraversion (Deary et al., 1996; O'Brien & DeLongis, 1996). There is, however, limited empirical evidence of the role of

1. Neuroticism, agreeableness, and extraversion strongly correlate with psychological well-being, but the average correlation is the strongest for conscientiousness. Conscientiousness has also been found in other meta-analyses to be strongly correlated with task performance and extra-role behaviours (Barrick & Mount, 2001; Dalal, 2005).

agreeableness and openness to experience (Grant & Langan-Fox, 2007). Antonovsky's (1978) theory of salutogenic functioning holds that personal resources shape individuals' perceptions of stressors through encoding and appraisal of life stressors. Therefore, general resistance resources, found in psychological, social, and cultural resources, should be considered a coping resource that either facilitates the avoidance of stressors or the resolution of tension generated by stressors (Antonovsky et al., 1967). Sense of coherence, a key concept in the salutogenic paradigm, is a disposition that engenders, enhances, and sustains health and strengths (Antonovsky, 1978, 1984, 1986; Strümpfer, 2005), with the use of appropriate coping responses buffering the effect of burnout (Antonovsky, 1984). Sense of coherence can therefore be regarded as an overarching resource, in that it is an indicator of the availability of, and willingness to use, adaptive coping resources (Antonovsky, 1978, 1984, 1987):

H2: The positive relationship between job demands and burnout is moderated (buffered) by sense of coherence:

SH2.1: Higher levels of sense of coherence buffers the positive relationship between job demands and cynicism.

SH2.2: Higher levels of sense of coherence buffers the positive relationship between job demands and emotional exhaustion.

SH2.3: Higher levels of sense of coherence buffers the positive relationship between job demands and reduced efficacy.

The JD-R Model incorporates two different (and often conflicting) psychological processes that influence the development of job strain and motivation (Mazzetti et al., 2021; Xanthopoulou et al., 2007a). In the first process, health impairment is viewed as a function of poorly designed jobs or chronic job demands that exhaust employees' mental and physical resources and result in lowered well-being (Demerouti et al., 2001), referred to as 'the health impairment hypothesis' (Bakker et al., 2003a). In the second process, job resources are viewed as playing a motivational (intrinsic and extrinsic) role, ultimately manifesting in high work engagement and low cynicism (Bakker & Demerouti, 2007; Bakker & Derks, 2009). Job resources can thus promote intrinsic motivation by fostering opportunities for learning and personal growth, or play an extrinsic motivational role through the attainment of valued goals at task level (Demerouti et al., 2001; Hakanen et al., 2005), a health-promoting process referred to as 'the motivational hypothesis' (Bakker et al., 2003a).

Job resources also play an extrinsic motivational role. Workplaces that offer many resources, including supportive colleagues and proper feedback, are likely to promote the attainment of work goals (Bakker & Demerouti, 2007; Xanthopoulou et al., 2007b). Goal attainment may be instrumental in gratifying the need for achievement, power, and affiliation (McClelland, 1985). Congruently, Meijman and Mulder's (1998) Effort–Recovery Model postulates that employees would be willing to dedicate their efforts and abilities to the work task in an environment with many contingent resources. The presence of job resources is thus likely to lead to valued motivational outcomes such as job satisfaction, commitment, and work engagement (Bakker & Demerouti, 2007; Bakker et al., 2010; Schaufeli et al., 2009), while their absence might elicit a cynical attitude towards work (Bakker & Demerouti, 2007; Schaufeli et al., 2009).

We further expected that the personal attributes of sense of coherence and conscientiousness would moderate the relationship between job resources and work engagement:

H3: The positive relationship between job resources and work engagement is moderated (amplified) by a sense of coherence.

H4: The positive relationship between job resources and work engagement is moderated (amplified) by conscientiousness.

Research suggests that the health implications of job demands are not universally pathological (Lepine et al., 2005; Van den Broeck et al., 2010). For example, in contrast to the negative relationship between job demands and work engagement proposed by the JD-R Model, research has found positive relationships between workload and cognitive demands with vigour and dedication (Bakker et al., 2005, 2006; Hallberg et al., 2007; Van den Broeck et al., 2008). These results challenged the widely held belief that all job demands are health-impairing (Van den Broeck et al., 2008, 2010).

Moderating effect of job characteristics

Previous research has consistently found that exhaustion is related to job demands (e.g. time pressure, role conflict, work overload); however, recent research suggests that the relationship between job demands and strain may not be linear and positive (Van den Broeck et al., 2008). The relationship between job demands and burnout can also be understood as a function of loss and gain cycles, as proposed by conservation of resources theory (Hobfoll et al., 2003; Hobfoll & Shirom, 2000). The theory holds that people are motivated to obtain, retain, and protect things they value, collectively referred as 'resources', which include tangible assets (e.g. house and car), social conditions (e.g. collegial support), personal characteristics (e.g. benevolence and self-efficacy), and emotional states (e.g. vigour) (Hobfoll et al., 2003; Schaufeli et al., 2009). Individuals respond to job stress (the implication that resources are lost or threatened) by attempting to limit the impact of strain on resources through energy conservation (Shirom et al., 2005). These attempts require additional resource expenditure (e.g. utilising a cognitive-perceptual coping mechanism to mitigate harmful effects) that might eventually deplete employees' energy stores and culminate in burnout (Hobfoll et al., 2003; Shirom et al., 2005). Shirom et al. (2005) referred to this escalating spiral of losses as a 'loss cycle'.

Bakker et al. (2005b) argued that the relationship between certain job demands and work engagement may be inversely U-shaped. Such curvilinear relationships imply that moderate

levels of job demands enhance work engagement, whereas fairly low or very high levels result in lower levels of work engagement. However, there is relatively limited empirical support for this curvilinear relationship, leading to numerous scholars concluding that potential quadratic interactions are myths not deserving of research (Taris, 2006).[2]

However, the theoretical existence of a curvilinear relationship between job demands and work engagement makes sense in relation to the main proposition of Hockey's (1997) Compensatory Model of Work Stress and Deci and Ryan's (1985) self-determination theory. Although the health-impairing role of job demands is well-established in the occupational stress literature, much less attention has been paid to the health-promoting potential of job demands (Van den Broeck et al., 2008, 2010). Van den Broeck et al. (2010) argue that some job demands may be both energy-depleting and -stimulating, although stimulation is normally associated with job resources. These job characteristics are known as 'job challenges', require amplified levels of energy investment, but they also have the potential for wellness gains (Cavanaugh et al., 2000). Some job demands activate employees' curiosity and competence, and are likely to contribute to the achievement of work goals (Cavanaugh et al., 2000). These demands may yield opportunities for professional growth and development, and are thus relevant to goal achievement and need-satisfaction (Lepine et al., 2005). Job demands may thus relate positively to both ill health (e.g. stress and burnout) and well-being (e.g. job satisfaction, motivation, and work engagement) (Van den Broeck et al., 2010):

H5: There is a curvilinear relationship between job demands and burnout, such that the relationship changes from negative to positive across the range of job demands.

H6: There is a curvilinear relationship between job demands and work engagement, such that the relationship changes from positive to negative across the range of job demands.

Research design

Research approach and design

Following a quantitative approach, an *ex post facto* correlational research design was employed, using convenience sampling to collect sectional data by means of online questionnaire-type surveys. The target population was working adults in South Africa with at least a Grade-12 education and 1 year's work experience. Participants were recruited across job levels in various industries and organisations. After cleaning the data and taking into account missing values, the final sample was $N = 879$. A summary of the demographic characteristics of the sample is presented in Table 1–A1 (Appendix 1).

2.While some studies have reported small curvilinear associations, the findings are not universal, and effect sizes remain small. A study by Rydstedt et al. (2006), using a large sample from the Whitehall-II study, found little evidence to support curvilinear relationships. The robustness of their sample, data quality, and thorough analyses cast doubt on the validity of curvilinear effects. This led Taris (2006) to question the prevalence of non-linearity in work characteristics in relation to work stress.

Of the 879 respondents, 399 (45.35) were non-white (73 mixed race, 56 Indian, and 270 black African) and 426 (48.4%) were white. With respect to gender, 59.9% of the respondents were women and 27.6% were men.

Measures

To operationalise the latent variables in the structural model, we used the following instruments:

Work engagement: The Utrecht Work Engagement Scale (UWES-9) short version (Schaufeli & Bakker, 2001) conceptualises engagement as a positive, fulfilling, work-related state of mind, characterised by vigour, dedication, and absorption. Each dimension is measured by three items using a seven-point scale ranging from *1* (*Strongly agree*) to *7* (*Strongly disagree*). The UWES-9's Cronbach's alphas vary from 0.85 to 0.92 (Schaufeli et al., 2006).

Burnout: The Maslach Burnout Indicator – Generalised Survey (MBI-GS) (Schaufeli et al., 1996) measures burnout on three dimensions. *Exhaustion* is measured using five items (e.g. 'I feel used up at the end of the workday'), as is *Cynicism* (e.g. 'I have become less enthusiastic about my work'), and six items measure *Professional efficacy* (e.g. 'In my opinion, I am good at my job'). All items are scored on a seven-point frequency scale ranging from *1* (*Never*) to *7* (*Daily*). The MBI-GS has shown satisfactory internal consistency across diverse occupational groups, with coefficient alphas ranging from 0.73 (*Cynicism*) to 0.91 (*Exhaustion*) (Leiter & Schaufeli, 1996). However, some doubt remains regarding the internal structure of the measure. Although the three-factor structure has been successfully replicated across various national samples, in some studies, the Cynicism and Emotional Exhaustion scales formed a general factor (Schutte et al., 2000).

Job demands: The Job Content Questionnaire (JCQ) (Karasek & Theorell, 1990) has three sub-scales: Psychological Demands (9 items), Decision Latitude (9 items), and Social Support (11 items). The first nine items of the JCQ measure job demands (i.e. workload) both quantitatively and qualitatively (e.g. work under time pressure, job complexity, role conflict). The questionnaire uses a four-point Likert scale ranging from *Strongly disagree* to *Strongly agree* (Karasek, 1979). The internal consistency of the scale is satisfactory, with alpha coefficients surpassing the recommended 0.70 cut-off (Karasek et al., 1998).

Job resources: The second dimension of the JCQ (Karasek, 1979) was used in this study. Nine items were used to measure two sub-dimensions, namely *Decision authority* and *Skill discretion*. In a longitudinal study on the health sector, Sale and Kerr (2002) found support for the one-factor structure of the *Decision authority* dimension of the JCQ, as proposed by Karasek (1979). The internal consistency of the scale is satisfactory, with alpha coefficients surpassing the recommended 0.70 cut-off (Karasek et al., 1998; Sale & Kerr, 2002).

Conscientiousness: The NEO-FFI-R (Costa et al., 1991) was used to measure *Conscientiousness*, a component of the Five-Factor Model of Personality Traits. The psychometric properties of the NEO-FFI-R in general, and the Conscientiousness sub-scale in particular, are well established (McCrae & Costa, 2003). *Conscientiousness* is measured by 12 items using a five-point Likert-type scale ranging from *1* (*Strongly agree*) to *5* (*Strongly disagree*). McCrae and Costa (2003), using confirmatory factor analysis (CFA) with structural equation modelling (SEM), found *Conscientiousness* to be unidimensional, and two longitudinal studies reported Cronbach's alpha coefficients for the sub-scale as ranging between 0.82 and 0.86 (McCrae & Costa, 2003).

Sense of coherence: The Orientation to Life Questionnaire (Antonovsky, 1987) uses a seven-point rating scale. Eriksson and Lindström (2005), in a systematic review of 124 studies using the SOC-13, reported Cronbach's alpha coefficients ranging from 0.70 to 0.95. Both a unidimensional and a multidimensional factor structure have been found for the SOC-13.

Latent interaction analysis

Estimating the interaction between variables is a particularly important theoretical, substantive, and empirical issue in the social sciences, and numerous substantive theories in education and psychology call for the analysis of non-linear models (Bakker et al., 2003a). The influence of interaction effects in psychological models is so pervasive that Cohen et al. (2003, p. 313) proclaimed: '[*I*]t is safe to say that the testing of interactions is at the very heart of theory testing in the social sciences'.

Despite the incidence of non-linear influences in general, and interaction effects in particular, empirical support for predicted interactions has been disappointingly limited (Klein & Muthén, 2007; Marsh et al., 2004; Moulder & Algina, 2002). Although substantial research studies have tested interaction effects with multiple regression analysis, the reported effect sizes were relatively small (between 3% and 8%), and did not provide accurate estimates of true interaction effects (Champoux & Peters, 1987; Chaplin, 1991; Moulder & Algina, 2002). These weak effect sizes for interaction terms could be partially attributable to independent variables contaminated by measurement error (Moulder & Algina, 2002).

With the proliferation of covariance latent models in applied research, considerable research has been dedicated to the specification and estimation of latent interactions (e.g. Algina & Moulder, 2001; Jaccard & Wan, 1995; Klein & Moosbrugger, 2000; Marsh et al., 2004; Ping, 1995; Wall & Amemiya, 2001). Initially, specifying the latent interaction models was cumbersome and involved numerous complex constraints. In addition, most models suffered from admissibility and convergence issues because of the dependence between the main effects and interaction terms. Some of the most important models included the unconstrained approach (March et al., 2004) and the two-step approach (Ping, 1995). Fortunately, most software packages include latent interactions in their user-interface or standard analyses options. A comprehensive discussion on latent interaction specifications and interpretation falls beyond the scope of the current study, and interested readers are directed to the study by Brandt et al. (2020). However, two observations are relevant here: (1) latent interactions estimations are less bias compared with moderated regression and (2) most latent interaction techniques are relatively immune to misspecification when measurement models are reliable. Thus, the judicious selection of measures is important in latent interaction analysis.

In this study, we used a variety of statistical techniques, but focussed on the results of the latent moderated structural (LMS) approach available in Mplus, which uses a non-linear structural equation mixture model (NSEMM) approach as estimator.

Specification of interaction and curvilinear effects

Prior to specifying the interaction effects, the data were screened for violations of SEM.[3] The correlations between latent variables are reported in Table 1.

Results from Table 1 suggested that none of the dimensions were excessively highly correlated. This instilled confidence that the latent interaction analysis would not be influenced by high collinearity between independent variables included in the model.

A random allocation strategy was used to allocate items to parcels, to simplify the latent interaction model. Little et al. (2002) argue that parcelling is appropriate when scales are unidimensional. Compared with individual items, parcels have greater reliability, have more scale points, follow a more multivariate normal distribution, and are more likely to have linear relations with each other and with relevant latent factors (Comrey, 1984; Little et al., 2002). In total, two parcels were created for cynicism, emotional exhaustion, and reduced professional e*fficacy*. Three parcels were created for *Work engagement*, *Job demands*, and *Job resources*.[4] Mardia's normalised coefficient indicated that most items violated multivariate normality assumptions. As a result, robust maximum likelihood estimates were used to estimate the SEM models. Statistical outliers were estimated

3.The following analyses were performed on the data: assessment of internal consistency using Statistical Package For The Social Sciences (SPSS) Version 28, CFA (Mplus 8), and SEM (Mplus 8). Prior to analysis, it was ensured that the SEM models were empirically identified. Data testing and preparation are needed before conducting SEM. This typically involves: (1) considering the sample size and dealing with missing data, (2) assessing univariate and multivariate normality, (3) dealing with statistical outliers, (4) assessing multicollinearity and singularity, (5) considering the adequacy of covariances, and (6) item parcelling and mean centring. All the data transformation and screening tests were conducted prior to specifying the moderated SEM models.

4.Items UWES8, UWES9, MB13 (Cynicism sub-scale), MBI11R (Reduced Efficiency sub-scale), CONS1, CONS2, CONS3R, CONS5, CONS6R, and CONS9R (Conscientiousness sub-scale) were deleted because of low standardised factor loadings.

Items JCQ4R, JCQ5R (Job Control sub-scale), JCQ14R, JCQ18, and JCQ16 (Job Demands sub-scale) were deleted because of low reliability and standardised factor loadings.

Items SOC2, SOC3, SOC4, SOC10R, SOC11R, SOC12, and SOC13 (Sense of Coherence sub-scale) were deleted because of low alpha reliability and standardised factor loadings, with evidence suggesting a secondary latent factor.

TABLE 1: Latent variable correlation matrix.

	CYN	EE	RED	JD	JC	CONS	SOC	UWES
CYN	-	-	-	-	-	-	-	-
EE	0.71**	-	-	-	-	-	-	-
RED	0.41**	0.32**	-	-	-	-	-	-
JD	0.08*	0.32**	-0.08*	-	-	-	-	-
JC	-0.40**	-0.27**	-0.43**	0.15**	-	-	-	-
CONS	-0.26**	-0.15**	-0.40**	0.14**	0.17**	-	-	-
SOC	-0.29**	-0.26**	-0.37**	-0.02	0.15**	0.41**	-	-
UWES	-0.59**	-0.56**	-0.59**	-0.05	0.54**	0.24**	0.28**	-

CYN, cynicism; EE, exhaustion; RED, reduced professional efficacy; JD, job demands; JC, job control; CONS, conscientiousness; UWES, work engagement; SOC, sense of coherence.
*, $p < 0.05$; **, $p < 0.001$.

TABLE 2: Dimensionality of measures.

Scale	Number of items	Range of item loadings on factor	Mean item loading	Eigenvalue ratio		Omega reliability
				Fact 1	Fact 2	
CYN	4	0.68–0.93	0.80	2.67	0.22	0.89
EE	5	0.82–0.89	0.84	3.51	0.13	0.92
RED	5	0.66–0.78	0.72	2.60	0.16	0.84
JD	6	0.39–0.69	0.55	1.87	0.34	0.72
JC	7	0.57–0.70	0.64	2.89	0.40	0.83
CONS	6	0.47–0.71	0.62	2.33	0.13	0.78
SOC	6	0.45–0.70	0.61	2.28	0.14	0.77
UWES	7	0.67–0.88	0.77	4.20	0.26	0.91

CYN, cynicism; EE, exhaustion; RED, reduced professional efficacy; JD, job demands; JC, job control; CONS, conscientiousness; UWES, work engagement; SOC, sense of coherence.

by means of boxplots. A few z-scores with values greater than 3 were detected, but it was decided not to delete these because of their relatively small number.

The dimensionality of the scales included in the study was evaluated by means of exploratory factor analysis (EFA). Specifically, Cattell's scree-plot method, combined with Kaiser Guttman rule and Horn's parallel analyses, was used to assess the dimensionality of the scales. A summary of the results is presented in Table 2.

Results suggested that most of the scales could be regarded as unidimensional. Most of the scales reported a single dominant eigenvalue, which was supported by the results of the parallel analyses.

Proposed interaction and curvilinear effects were assessed individually, using the two-step approach. As observed by Little et al. (2006), the LMS specifies both the main and interaction effects in a single step; however, as most readers may be familiar with the two-step approach advanced by Cohen et al. (2003), we decided to present the results in a similar fashion.

Similar to the conventional notation used by Cohen et al. (2003), the predictor variable was denoted by *X*, the criterion variable by *Y*, and the moderator by *Z*. The interaction term is the product of X and Z, denoted by *X***Z*. The moderator has a significant interactive effect on the relationship between X and Y when the product terms explain additional variance in a model that already contains the main effects (i.e. X and Y). The main effect model is depicted by Equation 1, and the interaction model by Equation 2.

$$Y = b_0 + b_1X + b_2Z + e \quad \text{[Eqn 1]}$$

$$Y = b_0 + b_1X + b_2Z + b_3XZ + e \quad \text{[Eqn 2]}$$

When working with latent models, the same equation can be written as Equation 3 (main effect model) and Equation 4 (interaction model):

$$\eta_1 = \tau + \gamma_1[\xi_1] + \gamma_2[\xi_1] + \zeta \quad \text{[Eqn 3]}$$

$$\eta_1 = \tau + \gamma_1[\xi_1] + \gamma_2[\xi_1] + \gamma_3[\xi_1 * \xi_2] + \zeta \quad \text{[Eqn 4]}$$

In total, eight interaction effects and two curvilinear effects were proposed. The independent (main), moderator, and dependent (outcome) variables constituting the interaction and curvilinear effects are summarised in Table 3.

The relative contribution of the interaction or quadratic term in explaining additional variance in the endogenous outcome variable in a model that already contained the constituent main effects was assessed via the change in fit indices (χ^2; comparative fit index [CFI]; root mean square error of approximation [RMSEA]) and R^2-values (cf. Bakker et al., 2007b). The two-step approach advocated by Mathieu et al. (1992) was utilised to evaluate the interaction effects empirically. Moderated structural equation modelling (MSEM) is used to establish whether a specified interaction effect ($\xi_1 * \xi_2$) significantly explains additional unique variance in the endogenous latent variable (i.e. η_1) in a model that already contains the relevant main effects (ξ_1 and ξ_2).

Ethical considerations

When the research study was conducted, the host research institution did not have a formalised ethical review process or committee. For this reason, the researcher did not apply for ethical clearance. However, the researchers followed the Ethical Principles and Code of Conduct (2010):

- Informed consent: All participants had to provide written informed consent that they understood the goals of the study.
- Participation and Withdrawal: All participants could decline to participate or withdraw from the research.

- Potential Risk and Harm: Explain all foreseeable risks in participating in the study such as discomfort and adverse impact.
- Benefits: Disclose any prospective research benefits.
- Confidentiality: Explain and disclose the limits of confidentiality.
- Incentives of participation: Explain to participants that participation is voluntary and no incentives or rewards will be available for participation.

The principles of non-maleficence were followed, and participants were provided with the opportunity to ask questions prior to providing consent. The research team also took all possible steps to protect prospective participants from adverse consequences of declining or withdrawing from the study. No financial or other incentives were provided to induce participation.

Results

The statistical and substantive research hypotheses depicting the proposed latent interaction and curvilinear effects are specified in TABLE 1–A2 (Appendix 2). As shown in TABLE 1–A2, the main effect models (depicted by *A*) for all hypothesised interactions and curvilinear effects were just-identified, and therefore displayed a perfect model fit. However, since the interaction effect models were over-identified, the tenability of the proposed interaction and curvilinear relationships could be assessed by way of goodness-of-fit indices and model parameters. Each of the proposed curvilinear and interaction effects is discussed next:

> SH1.1: Higher levels of conscientiousness buffers the positive relationship between job demands and cynicism.

The SEM model fit for the main effect model (A) signified a just identified model (S-Bχ^2 = 0; CFI = 1; RMSEA = 0). A statistically significant positive effect (β = 0.214; $p < 0.01$) was found between *Job demands* and *Cynicism*, and a moderately strong negative relationship was found between *Conscientiousness* and *Cynicism* (β = -0.308; $p < 0.01$). *Job demands* and *Conscientiousness* were jointly responsible for explaining 12% of the true variance in *Cynicism.*

TABLE 3: Proposed interaction and curvilinear effects.

Hypothesis no.	Main effect	Moderator	Outcome variable
Interaction effects			
SH1.1	Job demands (ξ_1)	Conscientiousness (ξ_3)	Cynicism (η_1)
SH1.2	Job demands (ξ_1)	Conscientiousness (ξ_3)	Exhaustion (η_2)
SH1.3	Job demands (ξ_1)	Conscientiousness (ξ_3)	Reduced efficacy (η_3)
SH2.1	Job demands (ξ_1)	Sense of coherence (ξ_4)	Cynicism (η_1)
SH2.2	Job demands (ξ_1)	Sense of coherence (ξ_4)	Exhaustion (η_2)
SH2.3	Job demands (ξ_1)	Sense of coherence (ξ_4)	Reduced efficacy (η_3)
H3	Job resources (ξ_2)	Sense of coherence (ξ_4)	Work engagement (η_4)
H4	Job resources (ξ_2)	Conscientiousness (ξ_3)	Work engagement (η_4)
Curvilinear effects			
H5	Job demands (ξ_1)	Job demands (ξ_1)	Burnout (η_1)
H6	Job demands (ξ_1)	Job demands (ξ_1)	Work engagement (η_4)

The model fit for the SEM model with the interaction effect was slightly poorer (S-Bχ^2 = 8.70; CFI = 0.86; RMSEA = 0.06), but could still be regarded as acceptable. In the interaction model (B), the interaction between *Conscientiousness* and *Job demands* did not significantly ($p > 0.05$) contribute to explaining additional variance in *Cynicism* when included in a model that already contained the constituent main effects of *Job demands* and *Conscientiousness*. Stated differently, the strength of the relationship between *Job demands* and *Cynicism* was not contingent upon the value of *Conscientiousness*. Thus, SH1.1 is not supported:

> SH1.2: Higher levels of conscientiousness buffers the positive relationship between job demands and emotional exhaustion.

The SEM model fit for main effect model signified a just-identified model (S-Bχ^2 = 0; CFI = 1; RMSEA = 0). Thus, it was not possible to draw conclusions about the model fit of the main effect model. A statistically significant (β = 0.400; $p < 0.01$) positive relationship was found between *Job demands* and *Exhaustion*, whereas a significant negative (β = –0.275; $p < 0.01$) relationship was found between *Conscientiousness* and *Exhaustion*. In the just-identified main effect model (A), the R^2-value indicated that *Job demands* and *Conscientiousness* jointly explained 19.7% of the variance in *Exhaustion*.

The overall fit of the interaction model could be regarded as satisfactory (S-Bχ^2 = 8.70; CFI = 0.86; RMSEA = 0.07). The interaction model (B) of *Conscientiousness* with *Job demands* did not significantly ($p > 0.05$) contribute towards explaining additional variance in *Exhaustion* when included in a model that already contained the constituent main effects of *Job demands* and *Conscientiousness*. Thus, SH1.2 is not supported:

> SH1.3: Higher levels of conscientiousness buffers the positive relationship between job demands and reduced efficacy.

A negative relationship was found between *Conscientiousness* and *Reduced professional efficacy* (β = -0.490; $p < 0.01$) in the main effect model (A), but the relationship was statistically non-significant (β = –0.047; $p > 0.05$). The overall fit of the interaction model (B) could be regarded as satisfactory (S-Bχ2 = 8.70; CFI = 0.84; RMSEA = 0.09). The interaction of *Conscientiousness* with *Job demands* did not significantly ($p > 0.05$) contribute to explaining additional variance in *Reduced professional efficacy* when included in a model that already contained the constituent main effects. Thus, SH1.3 is not supported.

Considering the foregoing results collectively, no support was found for H1 or any of its sub-hypotheses. The main effect was significant in the relationship between *Job demands* and the sub-dimensions of *Burnout*, and support was found for the buffering hypotheses of *Conscientiousness*:

> SH2.1: Sense of coherence buffers the positive relationship between job demands and cynicism

In line with initial theorising, statistically significant ($p < 0.01$) first-order effects were found for the relationship between *Job*

demands and *Cynicism*, as well as *Sense of coherence* and *Cynicism*, in the main effects model (A). The overall fit of the interaction model (B) was satisfactory (S-Bχ^2 = 3.51; CFI = 0.97; RMSEA = 0.03). The interaction of *Sense of coherence* and *Job demands* contributed significantly ($p < 0.01$) towards explaining additional variance in *Cynicism* when included in a model that already contained the constituent main effects ($\beta = 0.100$; $p < 0.01$). Thus, SH2.1 is supported. The interaction effect explained an additional 2% true variance when the influences of the main effects were taken into consideration. In total, the interaction effect model explained 21.6% of the total variance in *Cynicism*.

The simple slopes suggest that the influence of job demands on cynicism is most pronounced for individuals with a relatively low sense of coherence. It could therefore be argued that sense of coherence significantly ($p < 0.01$) buffers the relationship between job demands and cynicism:

> SH2.2: Higher levels of sense of coherence buffers the positive relationship between job demands and emotional exhaustion.

A significant positive relationship ($\beta = 0.424$; $p < 0.01$) was found between *Job demands* and *Exhaustion*, whereas a moderate negative relationship ($\beta = –0.257$; $p < 0.01$) was found between *Sense of coherence* and *Exhaustion* in the main effect model (A). The main effects model explained 23.9% of the true variance in *Exhaustion*.

In the interaction model (B), the interaction of *Sense of coherence* with *Job demands* contributed significantly ($p < 0.01$) towards explaining additional variance in *Exhaustion* when included in a model that already contained the constituent main effects. Thus, SH2.2 is supported. The model fit of the interaction effect model was acceptable (S-Bχ^2 = 14.69; CFI = 0.85; RMSEA = 0.08). The interaction effect explained an additional 6.3% of the true variance. In total, the interaction effect model (B) explained 30.2% of the total variance in *Exhaustion*:

> SH2.3: Sense of coherence buffers the positive relationship between job demands and reduced efficacy.

In the main effect model (A), *Job demands* and *Sense of coherence* were jointly responsible for explaining 14.6% of the true variance in *Reduced professional efficacy*. In the interaction model (B), the interaction of *Sense of coherence* with *Job demands* did not contribute significantly ($p > 0.05$) to explaining additional variance in *Reduced professional efficacy*. Thus, SH2.3 is not supported:

H3: The positive relationship between job resources and work engagement is moderated by a sense of coherence.

A significant positive relationship ($\beta = 0.621$; $p < 0.01$) was found between *Job control* and *Work engagement*, whereas a moderate positive relationship ($\beta = 0.218$; $p < 0.01$) was found between *Sense of coherence* and *Work engagement* in the main effect model.

In the interaction model, the interaction of *Sense of coherence* with *Job control* did not significantly ($p > 0.05$) contribute to explaining additional variance in *Work engagement*. Thus, H3 is not supported:

H4: The positive relationship between job resources and work engagement is moderated (amplified) by conscientiousness.

In the main effect model, a moderately strong and statistically significant ($\beta = 0.559$; $p < 0.01$) relationship was found between *Job control* and *Work engagement*. In addition, a weak but statistically significant ($\beta = 0.219$; $p < 0.01$) relationship was found between the first-order effect of *Conscientiousness* on *Work engagement*. *Job control* and *Conscientiousness* were jointly responsible for explaining 44.3% of the true variance in *Work engagement.*

In the interaction model, the interaction of *Conscientiousness* with *Job control* did not significantly ($p > 0.05$) contribute to explaining additional variance in *Work engagement*. Thus, H4 is not supported:

H5: There is a curvilinear relationship between job demands and burnout, such that the relationship changes from negative to positive across the range of job demands.

In the just-identified main-effect model, a statistically significant ($p < 0.01$) positive relationship was found between *Job demands* and *Cynicism*. However, when the first-order effect of *Job demands* was included with the higher-order curvilinear effect of *Job demands* in a single model (B), the linear relationship between *Job demands* and *Cynicism* was statistically non-significant.

The significant ($\beta = 0.219$; $p < 0.01$) standardised gamma coefficient suggested that the slope of *Cynicism* on *Job demands* varied across levels of job demands. Thus, H5 is supported. The curvilinear effect of *Job demands* explained 1.2% additional variance in *Cynicism*. Jointly, *Job demands* and its squared term explained 3.7% of the variance in *Cynicism*. However, the goodness-of-fit indices somewhat eroded confidence in the estimated main and curvilinear effects of the relationship (S-Bχ^2 = 28.74; CFI = 0.50; RMSEA = 0.180).

Figure 1 shows a curvilinear U-shaped relationship between *Job demands* and *Cynicism*, which implies that an increase in *Job demands* initially results in a decrease in *Cynicism* as employees allocate greater resources and effort to dealing with growing demands. However, once a certain tolerance point is reached, cynical coping mechanisms are primed. The shape of the curvilinear relationship supports our hypothesis:

H6: There is a curvilinear relationship between Job demands and Work engagement such that the relationship changes from positive to negative across the range of job demands.

In the main effect model, the relationship between *Job demands* and *Work engagement* was not statistically significant

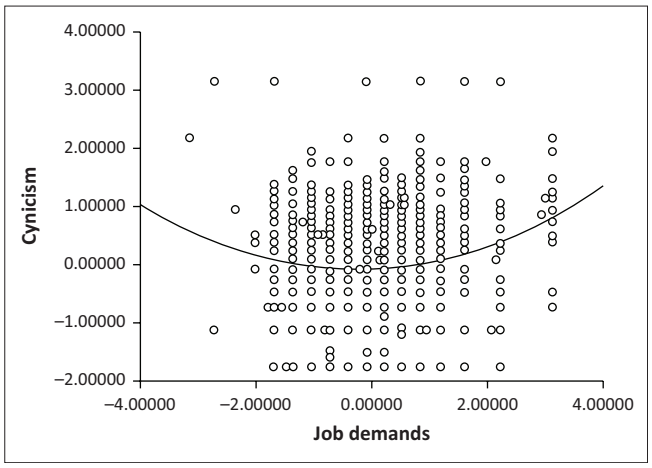

FIGURE 1: Curvilinear effect of *Job demands* on *Cynicism*.

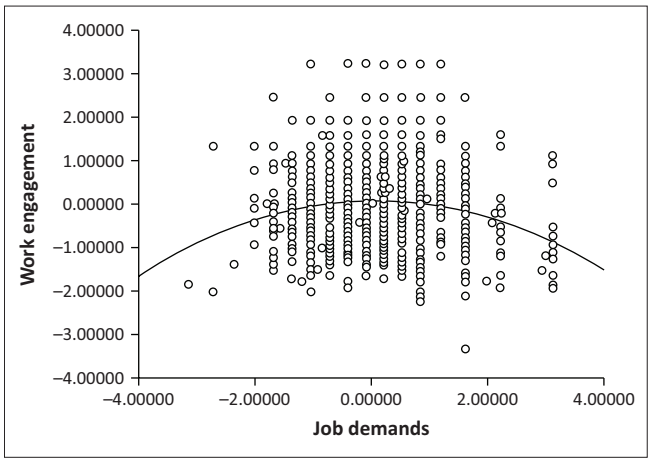

FIGURE 2: Curvilinear effect of *Job demands* on *Work engagement.*

($p > 0.05$). In the curvilinear model, the significant ($p < 0.01$) gamma coefficient of the *Job demands* curvilinear effect implied that the relationship between *Job demands* and *Work engagement* differed across the range of *Job demands* values. Thus, H6 is supported.

The R^2-values showed that 4.5% additional variance was explained by the curvilinear effect in a model that already contained the *Job demands* main effect. In total, the *Job demands* curvilinear effect explained 6.1% of the variance in *Work engagement* when controlling for the constituent main effect (see Figure 2). However, the fit of the interaction model was poor, and the significant interaction effects should be interpreted with caution (S-Bχ^2 = 48.85; CFI = 0.38; RMSEA = 0.205).

The curvilinear relationship between *Job demands* and *Work engagement* suggested that job demands may be both energy-depleting and -stimulating. Thus, moderate levels of job demands would enhance work engagement, whereas fairly low or very high levels would result in lower levels of work engagement (Van den Broeck et al., 2010). The shape and direction of the curvilinear effect of *Job demands* on *Work engagement* corroborate H6 empirically.

Discussion

Briner et al. (2004) argued that stressors are not actually stressors if the individual does not perceive them as such. This viewpoint has been echoed by many proponents of the transactional models. Some research found a positive relationship between job demands (job challenges) and vigour, and no relationship with emotional exhaustion, the main component of burnout (Van den Broeck et al., 2010). Research attention has therefore shifted to potential intervening variables in the stress–strain process, such as personal resources (Van den Heuvel et al., 2010; Xanthopoulou et al., 2009).

The goal of this study was to investigate if third-variable extensions of the popular JD-R Model could: (1) enhance prediction of workplace wellness and (2) explain some of the inconsistent findings. Finally, we used latent interaction effects to test for interaction effects, in an effort to rule out methodological artefacts associated with moderated regression analyses. Although main, interaction, and quadratic effects were assessed, the focus of the study was the interaction and curvilinear effects, because much has been written about the direct effects. Although many scholars have called for personality variables to be included in the JD-R Model, to our knowledge only a few studies have included these as moderators, and no studies in the South African context could be found.

We argue that personality plays an important role in how job demands are perceived. Briner et al. (2004) even argued that stressors are not actually stressors if the individual does not perceive them as such. Broadly speaking, we found support for a curvilinear relationship between job demands and burnout (H5), and job demands and work engagement (H6). Similar to the curvilinear relationship found between job demands and cynicism, Bakker et al. (2005) argued that the relationship between selected job demands and work engagement may be inversely U-shaped. The existence of a curvilinear relationship between job demands and work engagement suggests that job demands could be both energy-depleting and -stimulating (Van den Broeck et al., 2010). This curvilinear relationship can be linked to Selye's (1956) theory of positive (eustress) and negative (distress) feelings of stress. This result has important implications for occupational wellness practitioners, as it suggests that strain is not linearly related to increasing job demands. Thus, 'optimal' levels of job demands might be necessary to keep employees engaged.

Van den Broeck et al. (2010) further argued that one should differentiate between job hinderances and job challenges. Job hinderances present as obstacles at work that drain employees' energy (e.g. role ambiguity, job insecurity, and interpersonal conflict), while job challenges (e.g. workload, time pressure, and cognitive demands) require energy, but may also lead to wellness gains (e.g. curiosity, learning, and competence). Typically, curvilinear relationships between job demands and health outcomes may be indicative of job

challenges. In this study, job demands were operationalised to measure workload, which is categorised under job challenges. Thus, the curvilinear relationship found in this study is congruent with the finding of Van den Broeck et al. (2010).

In addition, sense of coherence buffers the relationship between job demands and cynicism, and between job demands and exhaustion. Thus, given the same work conditions, employees with a higher sense of coherence may be less prone to exhaustion and cynicism than employees with lower levels of this latent trait. Given the financial, psychological, and social costs associated with burnout, this suggests that organisations should strive to strengthen the sense of coherence of their employees and prioritise it as an important selection criterion for positions that are exposed to high demands. It is also important to build general resistance resources. Salutogenic outcomes are only likely in the long term if work is manageable and meaningful. In this regard, Antonovsky (1987) emphasised a balance between work underload and overload and participation in decision making as key determinants of building a sense of coherence in the workplace. Practically, the implication is that employees are unlikely to build general resistance resources and salutogenic outcomes in demoralising and insecure workplaces.

None of the other interaction effects were statistically significant. Specifically, no empirical support was found for the buffering effect of job control on the relationship between job demands and the dimensions of burnout. These results are congruent with findings of the meta-analyses conducted by De Lange et al. (2003) and Hausser et al. (2010). The iso-strain hypothesis advanced by Karasek (1979), which suggests that the adverse effects of job demands are partially offset by high levels of job control, is therefore not supported by our data.

In relation to the additive hypothesis of Karasek's (1979) theory, job demands was the only variable consistently related to burnout. The additive relationships between *Job demands* and the dimensions of *Burnout* were mixed. However, congruent with theorising, a statistically significant negative relationship was found between *Job demands* and *Cynicism*, while the relationship between *Job demands* and *Reduced professional efficacy* was not statistically significant. Empirical support was also found for the proposed curvilinear effect of job demands on cynicism. Thus, job demands are related to burnout, although in a curvilinear manner, rather than in a linear, additive manner. Considered collectively, the results of this study provide only limited support for Karasek's (1979) JD-C Model. However, we are encouraged by the quadratic effects found in the study, as these demonstrate a more nuanced approach to the job demands versus job resources debate in occupational health literature.

The results suggest that job resources in the absence of some job challenges will unlock only some health outcomes. Job demands, in turn, should be classified as job challenges or job hinderances. Job hinderances, although unavoidable in most workplaces, should be limited as far as practically possible, while job challenges should, within reason, be part of most jobs. The energy needed to respond to job challenges exceeding the wellness benefits will likely lead to energy depletion and burnout. However, as long as the ratio between energy input and salutogenic outcomes is balanced, workplace wellness, commitment, and even learning may be likely outcomes.

The results concerning the moderating role of conscientiousness were unsatisfactory. Process-based theories of information exchange suggest that the encoding of environmental stimuli is a function of the particular individual's dispositional blueprint (Mischel & Shoda, 1998). However, individuals are not merely passive recipients of contextual stimuli; they are sense-seeking and goal-striving entities motivated to actively shape their work environments in order to reach valued goals (Vancouver & Day, 2005). However, no statistical support was found for any of the buffering hypotheses (SH1.1, SH1.2, SH1.3), and no statistical support was found for the amplifying effect of conscientiousness (H4). The results did show that conscientiousness has a strong direct (negative) effect on cynicism, exhaustion, and work engagement. Thus, conscientiousness has a strong direct effect on work engagement and burnout, but not as a moderator variable.

The lack of empirical support for the buffering role of conscientiousness could be related to the high need for achievement inherent to individuals with high conscientiousness. It is possible that highly conscientious employees take on extra-role behaviours to satisfy their high need for achievement (e.g. voluntarily serving on committees). Conscientiousness might therefore amplify the relationship between job demands and strain. No substantive evidence for this argument could be found in the occupational wellness literature.

Although empirical support was found for the buffering hypotheses of sense of coherence on the relationships between job demands and the dimensions of burnout, the relationship between *Sense of coherence* and *Reduced professional efficacy* was non-significant. This lack of empirical support could be partially attributable to the weak measurement quality of the Reduced Professional Efficacy Sub-scale. Thus, the lack of support for H2.3 might stem from methodological rather than substantive inconsistencies.

Finally, the hypothesis of an amplifying effect of a sense of coherence on the relationship between job control and work engagement (H3) was not empirically supported. Given the strong additive effect of sense of coherence on work engagement, it appears that sense of coherence has a substantial main effect, rather than a moderating effect. Little consensus exists regarding the exact position of personal dispositions in the stress–strain sequence (Grant & Langan-Fox, 2007). In the most complex scenario, some authors argue, personal dispositions act in the capacity of moderated mediators in this

sequence (Xanthopoulou et al., 2009). More research is needed on the exact position of sense of coherence in the strain sequence. It may also be that senses of coherence is an effective buffer of strain, but not a major promoter of wellness.

Implications for practice

Modern organisations face rapid and continuous changes, and are being forced to move away from traditional organisational structures that emphasise control, a hierarchical chain of command, and top down decision-making. Organisations are increasingly making use of structures that emphasise innovation, creativity, and the management of human capital (Schaufeli et al., 2008), characterised as increased 'psychologisation' of the workplace. The practical challenge for organisations in future is therefore not only to counteract the adverse impact of highly demanding work environments on employee health (i.e. burnout), but also to promote wellness at work (i.e. work engagement).

Findings from this study suggest that the mobilisation of job resources in the workplace is necessary for employees to thrive (Xanthopoulou et al., 2009). Employees not only utilise resources to deal with job demands, resources also are important in their own right (Hobfoll, 2002). Recent research suggests that resource-rich environments alone may not be enough to guarantee thriving and engaged employees. The motivating potential of resources is enhanced when employees experience a certain degree of challenge (Schaufeli et al., 2009). This suggests that the right combination of job challenges and job resources is needed to promote well-being. In this regard, our results suggest that it is important to differentiate between job hinderances and job challenges. Job hinderances should be reduced as far as possible, while job challenges could have positive outcomes. The curvilinear relationship between job demands and cynicism suggests that low to medium levels of job challenges (e.g. workload, cognitive complexity, and time pressure) may boost wellness outcomes while promoting key performance outcomes for the organisation.

More importantly, we did not find support for the buffering role of job resources on the relationship between job demands and strain. This finding is consistent with that of the meta-studies of De Lange et al. (2003) and Hausser et al. (2010). Thus, job resources should be regarding as valuable contextual inputs for employees for reasons other than counteracting work stress. Stated differently, organisations should provide job resources because they promote employee well-being, and not because they reduce work strain.

Finally, we did find that sense of coherence is effective in reducing the impact of job demands on cynicism and emotional exhaustion. However, it does not meaningfully amplify the positive relationship between job resources and work engagement. This suggests that sense of coherence is more effective in buffering the adverse impact of job demands than in amplifying the salutogenic outcomes of job resources.

The implication of the findings for the JD-R Model is that the role of personality variables in the stress–strain sequence is complex. First, some personality variables lead to agentic behaviour, which has a direct impact on well-being. Conscientiousness is a good example from this study. Although conscientiousness was not found to moderate the stress–strain relationship, it had a strong direct effect on work engagement and burnout. On the other hand, sense of coherence was shown to be a significant buffer between job demands and burnout, but not between job resources and work engagement. The pattern of relationships suggests that understanding the role and impact of personality factors in the greater JD-R Model is likely to lead to the most nuanced and impactful interventions.

Limitations and areas for future research

Conceptually, this study makes a valuable contribution to understanding employee wellness. It was shown that conscientiousness and sense of coherence are not the only individual-level predictors of employee well-being. It is likely that a multitude of individual differences (e.g. values, virtues, general mental ability) play a role in the appraisal of wellness (Hough & Oswald, 2008). It would be encouraging to see a more systematic inclusion of the Big Five personality dimensions in the JD-R Model, or even the psychological capital variables that are often used to examine wellness outcomes.

Although this study predominantly investigated the influence of personal dispositions as main and moderator variables, it is possible that traits actually act as mediators, or even moderated mediators, between contextual work features and well-being (Swider & Zimmerman, 2010). This has important implications for workplace interventions. For example, one may ask whether neurotic individuals would perceive a given work environment as more stressful than less neurotic individuals would, or whether the amplified strain experienced by neurotic individuals could be attributed to their pessimistic attitude towards co-workers, resulting in less collegial support with which to brace against high job demands (Swider & Zimmerman, 2010). If the first hypothesis is correct, then the placement of neurotic individuals in the workplace should be managed by the organisations' recruitment and selection function. However, if the second hypothesis is correct, organisational development initiatives should be launched to support neurotic individuals in adjusting their work-related attitudes and behaviours. Theories that acknowledge the dynamic interaction between individual dispositions and contextual features (e.g. conservation of resources theory, self-determination theory, and person–environment fit theory) could shed light on the personality prototypes that are most likely to flourish in certain positions.

In this study, Karasek's (1979) JD-C Model was extended through the inclusion of *Conscientiousness* and *Sense of*

coherence as potential moderator variables in the stress–strain sequence. This extension was both specific and overall. Thus, it was expected that certain personality dispositions, such as sense of coherence, would consistently buffer stressful work stimuli in a wide variety of organisational contexts, due to the pervasive and general nature of the construct (Antonovsky, 1978). However, it is also possible that some narrower dispositions may be more effective as buffers in specific work environments where their presence is directly related to coping with stressful stimuli (i.e. extraversion in customer-facing positions). Based on the results, Karasek's (1979) theoretical model seems too simplistic to account for the myriad job resources and job demands that may shape perceptions of well-being at work. Karasek's (1979) original model could easily be augmented through the inclusion of additional job demands and resources that are more relevant in certain occupational contexts.

The data used in this study consisted entirely of self-report measures, and the inherent common method bias has been shown to inflate the strength of observed relationships (Bakker et al., 2010). Future research should attempt to replicate the findings of this study through a combination of subjective and objective measures.

This study followed a strong quantitative approach. Cordes and Dougherty (1993) argue that qualitative research designs have the ability to supplement quantitative research findings by focussing specifically on measuring employees' appraisal of stressful work situations. Thus, qualitative research may provide a greater understanding of employee wellness. More specifically, the appraisal of work stressor is an under-researched topic. We are of the opinion that personality is a critical theoretical lens with which to examine the encoding of a work stressor, even its eventual appraisal.

The majority of hypothesised interaction effects were not statistically corroborated. Even with the use of a sophisticated latent interaction approach, empirical support was found for only four of the proposed 13 (31%) non-linear effects. Latent interaction approaches offer many advantages in comparison to the traditional moderated regression methodology. Although comparative results were not reported in this study, the latent interaction approach utilised greatly outperformed traditional method in terms of effect sizes and statistical significance. This study thus makes a methodological contribution by demonstrating the successful application of a latent variable approach to the study of interaction effects. The study can be used as a framework by other applied researchers who are interested in using latent variable approaches to test non-linear effects.

Conclusion

For most organisations, the modern work environment is ever-changing and continuously in flux. Traditional managerial models emphasising efficacy, control, and a hierarchical chain of command have proven to be ineffective in the highly volatile global business context. In addition, traditional sources of competitive advantage are becoming less influential as developing countries increasingly become global economic players. Creativity, innovation, and intangible capital are fast becoming the new currency of the global economy, making human capital one of the last sources of competitive advantage.

Organisations that wish to thrive will have to make an extraordinary effort to harness the creative energy of their workforce. Promoting employees' physiological health is not sufficient to inspire them to contribute wholeheartedly to the success of the organisation. The overall well-being of employees needs to be prioritised if organisations are to thrive. It is thus critical that the causal nomological network of personal and environmental variables that shape well-being is identified.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

J.R.B. conceptualised the study and wrote the manuscript. A.B. assisted with the analyses and visualisation of the results. J.R. assisted with writing the article and edited the manuscript. C.G. assisted with the conceptualisation of the broader study. C.M. assisted with proofreading the article and making editorial inputs. D.d.B. assisted with the conceptualisation of the study.

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Data availability

Anonymised data are available on request from the authors. Request for data should include a motivation and intended

use of the data. J.R.B., A.B., J.R., C.G., K.M. and D.d.B. reserves the right to control access to the original data.

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Appendices starts on the next page →

Appendix 1

TABLE 1–A1: Descriptive statistics (N = 879): Age, level of education, and home language across race and gender.

Demographic variables		Race				Gender	
		White people	Black people	Mixed race people	Indian people	Male	Female
Age (years)	19–33	221	215	54	34	213	328
	34–49	120	53	17	17	85	129
	50+	93	12	4	4	53	60
	Total count	434	280	75	55	351	517
	Total %	**51.4%**	**33.2%**	**8.9%**	**6.5%**	**40.4%**	**59.6%**
Education	Grade 12	106	77	26	19	90	146
	Certificate	42	48	3	5	45	61
	Diploma	94	59	11	10	82	95
	Bachelor's	85	65	15	14	65	116
	Honours	69	27	15	4	42	74
	Master's	22	3	2	3	17	13
	Doctorate	1	0	0	0	1	0
	Total count	419	279	72	55	342	505
	Total %	**50.8%**	**33.8%**	**8.7%**	**6.7%**	**40.4%**	**59.6%**
Home language	Afrikaans	226	1	12	1	99	151
	English	198	25	60	54	152	200
	Tswana	0	58	1	0	19	40
	Sepedi	0	28	0	0	9	18
	Tshivenda	0	8	0	1	5	4
	Swati	0	5	0	0	0	5
	Sesotho	0	35	0	0	14	21
	Tsonga	0	10	0	0	4	6
	Ndebele	0	6	0	0	4	2
	Zulu	0	67	0	0	26	40
	Xhosa	2	27	0	0	8	21
	Total count	426	270	73	56	340	508
	Total %	**51.6%**	**32.7%**	**8.8%**	**6.8%**	**27.6%**	**59.9%**

Note: South African sample.

Appendix 2

TABLE 1–A2: Evaluation of proposed latent interaction and curvilinear effects.

Model			Statistical hypothesis	Measurement component			Structural component				Model fit		
Predictor	**Outcome**			**Standardised lambda parameter (λ_{ij})**	**95% CI (Lower)**	**95% CI (Upper)**	**Standardised gamma parameter (γ_{ij})**	**95% CI (Lower)**	**95% CI (Upper)**	R^2	**S-Bχ^2**	**CFI**	**RMSEA**
Interaction effect of *Conscientiousness* on the relationship between *Job demands* and *Cynicism* [H1.1] ($E[\eta_1 \mid \xi_1, \xi_3, \xi_1*\xi_3] = \tau + \gamma_1[\xi_1] + \gamma_2[\xi_1] + \gamma_3[\xi_1*\xi_3] + \zeta$)													
JD (ξ_1)		[A]	H_{024}: $\gamma_1[\xi_1]; \gamma_2[\xi_3] = 0 \mid \gamma_3[\xi_1*\xi_3] \neq 0$	0.874	-	-	0.214	-	-	0.120**	0.00	1.00	0.00
CONS (ξ_3)			H_{a24}: $\gamma_1[\xi_1]; \gamma_2[\xi_3] \neq 0 \mid \gamma_3[\xi_1*\xi_3] \neq 0$	0.861	-	-	-0.308	-	-	-	-	-	-
	CYN (η_1)			0.898	-	-	-	-	-	-	-	-	-
JD (ξ_1)		[B]	H_{024}: $\gamma_3[\xi_1*\xi_3] = 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_3] \neq 0$	0.874	0.858	0.891	0.215	0.110	0.321	0.120**	8.686	0.855	0.063
CONS (ξ_3)			H_{a24}: $\gamma_3[\xi_1*\xi_3] \neq 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_3] \neq 0$	0.861	0.843	0.880	-0.307	-0.404	-0.209	-	-	-	-
JD x *CONS*				0.690	0.618	0.762	-0.022	-0.147	0.103	-	-	-	-
	CYN (η_1)			0.898	0.888	0.909	-	-	-	-	-	-	-
Interaction effect of *Conscientiousness* on the relationship between *Job demands* and *Exhaustion* [H1.2] ($E[\eta_2 \mid \xi_1, \xi_3, \xi_1*\xi_3] = \tau + \gamma_1[\xi_1] + \gamma_2[\xi_1] + \gamma_3[\xi_1*\xi_3] + \zeta$)													
JD (ξ_1)		[A]	H_{025}: $\gamma_1[\xi_1]; \gamma_2[\xi_3] = 0 \mid \gamma_3[\xi_1*\xi_3] \neq 0$	0.847	-	-	0.400	-	-	0.197**	0.00	1.00	0.00
CONS (ξ_3)			H_{a25}: $\gamma_1[\xi_1]; \gamma_2[\xi_3] \neq 0 \mid \gamma_3[\xi_1*\xi_3] \neq 0$	0.841	-	-	-0.275	-	-	-	-	-	-
	EE (η_2)			0.917	0.908	0.926	-	-	-	-	-	-	-
JD (ξ_1)		[B]	H_{025}: $\gamma_3[\xi_1*\xi_3] = 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_3] \neq 0$	0.847	0.824	0.869	0.394	0.301	0.486	0.197**	12.184	0.866	0.079
CONS (ξ_3)			H_{a25}: $\gamma_3[\xi_1*\xi_3] \neq 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_3] \neq 0$	0.841	0.826	0.856	-0.276	-0.368	-0.184	-	-	-	-
JD x *CONS*				0.692	0.618	0.766	0.043	-0.068	0.155	-	-	-	-
	EE (η_2)			0.917	0.908	0.926	-	-	-	-	-	-	-
Interaction effect of *Conscientiousness* on the relationship between *Job demands* and *Reduced efficacy* [H1.3] ($E[\eta_3 \mid \xi_1, \xi_3, \xi_1*\xi_3] = \tau + \gamma_1[\xi_1] + \gamma_2[\xi_1] + \gamma_3[\xi_1*\xi_3] + \zeta$)													
JD (ξ_1)		[A]	H_{026}: $\gamma_1[\xi_1]; \gamma_2[\xi_3] = 0 \mid \gamma_3[\xi_1*\xi_3] \neq 0$	0.857	-	-	-0.047	-	-	0.250**	0.00	1.00	0.00
CONS (ξ_3)			H_{a26}: $\gamma_1[\xi_1]; \gamma_2[\xi_3] \neq 0 \mid \gamma_3[\xi_1*\xi_3] \neq 0$	0.839	-	-	-0.490	-	-	-	-	-	-
	RED (η_3)			0.870	-	-	-	-	-	-	-	-	-
JD (ξ_1)		[B]	H_{026}: $\gamma_3[\xi_1*\xi_3] = 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_3] \neq 0$	0.857	0.837	0.878	-0.060	-0.151	0.031	0.257**	18.109	0.846	0.098
CONS (ξ_3)			H_{a26}: $\gamma_3[\xi_1*\xi_3] \neq 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_3] \neq 0$	0.839	0.823	0.854	-0.490	-0.591	-0.388	-	-	-	-
JD x *CONS*				0.778	0.736	0.820	0.061	-0.032	0.154	-	-	-	-
	RED (η_3)			0.870	0.856	0.884	-	-	-	-	-	-	-
Interaction effect of *SOC* on the relationship between *Job demands* and *Cynicism* [H2.1] ($E[\eta_1 \mid \xi_1, \xi_4, \xi_1*\xi_4] = \tau + \gamma_1[\xi_1] + \gamma_2[\xi_4] + \gamma_3[\xi_1*\xi_4] + \zeta$)													
JD (ξ_1)		[A]	H_{028}: $\gamma_1[\xi_1]; \gamma_2[\xi_4] = 0 \mid \gamma_3[\xi_1*\xi_4] \neq 0$	0.858	-	-	0.324	-	-	0.196**	0.00	1.00	0.00
SOC (ξ_4)			H_{a28}: $\gamma_1[\xi_1]; \gamma_2[\xi_4] \neq 0 \mid \gamma_3[\xi_1*\xi_4] \neq 0$	0.837	-	-	-0.309	-	-	-	-	-	-
	CYN (η_1)			0.908	-	-	-	-	-	-	-	-	-
JD (ξ_1)		[B]	H_{028}: $\gamma_3[\xi_1*\xi_4] = 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_4] \neq 0$	0.858	0.829	0.886	0.328	0.161	0.495	0.216**	3.515	0.971	0.030
SOC (ξ_4)			H_{a28}: $\gamma_3[\xi_1*\xi_4] \neq 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_4] \neq 0$	0.837	0.817	0.858	-0.317	-0.409	-0.225	-	-	-	-
JD x *SOC*				0.760	0.707	0.813	0.110	0.011	0.210	-	-	-	-
	CYN (η_1)			0.908	0.891	0.925	-	-	-	-	-	-	-

Appendix 2 continues on the next page →

TABLE 1–A2: (Continues...): Evaluation of proposed latent interaction and curvilinear effects.

Model			Statistical hypothesis	Measurement component			Structural component				Model fit		
Predictor	**Outcome**			**Standardised lambda parameter (λ_{ij})**	**95% CI (Lower)**	**95% CI (Upper)**	**Standardised gamma parameter (γ_{ij})**	**95% CI (Lower)**	**95% CI (Upper)**	R^2	**S-Bχ^2**	**CFI**	**RMSEA**
Interaction effect of *SOC* on the relationship between *Job demands* and *Exhaustion* [H2.2] ($E[\eta_2 \mid \xi_1, \xi_4, \xi_1{*}\xi_4] = \tau + \gamma_1[\xi_1] + \gamma_2[\xi_4] + \gamma_3[\xi_1{*}\xi_4] + \zeta$)													
JD (ξ_1)		[A]	H_{029}: $\gamma_1[\xi_1]; \gamma_2[\xi_4] = 0 \mid \gamma_3[\xi_1{*}\xi_4] \neq 0$	0.828	-	-	0.424	-	-	0.239**	0.00	1.00	0.00
SOC (ξ_4)			H_{a29}: $\gamma_1[\xi_1]; \gamma_2[\xi_4] \neq 0 \mid \gamma_3[\xi_1{*}\xi_4] \neq 0$	0.866	-	-	-0.257	-	-	-	-	-	-
	EE (η_2)			0.919	-	-	-	-	-	-	-	-	-
JD (ξ_1)		[B]	H_{029}: $\gamma_3[\xi_1{*}\xi_4] = 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_4] \neq 0$	0.828	0.807	0.849	0.433	0.355	0.511	0.302**	14.699	0.859	0.086
SOC (ξ_4)			H_{a29}: $\gamma_3[\xi_1{*}\xi_4] \neq 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_4] \neq 0$	0.866	0.840	0.893	-0.294	-0.393	-0.195	-	-	-	-
JD x *SOC*				0.798	0.749	0.846	0.188	0.091	0.285	-	-	-	-
	EE (η_2)			0.921	0.911	0.931	-	-	-	-	-	-	-
Interaction effect of *SOC* on the relationship between *Job demands* and *Reduced efficacy* [H2.3] ($E[\eta_3 \mid \xi_1, \xi_4, \xi_1{*}\xi_4] = \tau + \gamma_1[\xi_1] + \gamma_2[\xi_4] + \gamma_3[\xi_1{*}\xi_4] + \zeta$)													
JD (ξ_1)		[A]	H_{030}: $\gamma_1[\xi_1]; \gamma_2[\xi_4] = 0 \mid \gamma_3[\xi_1{*}\xi_4] \neq 0$	0.852	-	-	0.135	-	-	0.146**	0.00	1.00	0.00
SOC (ξ_4)			H_{a30}: $\gamma_1[\xi_1]; \gamma_2[\xi_4] \neq 0 \mid \gamma_3[\xi_1{*}\xi_4] \neq 0$	0.841	-	-	-0.361	-	-	-	-	-	-
	RED (η_3)			0.901	-	-	-	-	-	-	-	-	-
JD (ξ_1)		[B]	H_{030}: $\gamma_3[\xi_1{*}\xi_4] = 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_4] \neq 0$	0.856	0.824	0.880	0.140	-0.060	0.341	0.168**	3.627	0.944	0.031
SOC (ξ_4)			H_{a30}: $\gamma_3[\xi_1{*}\xi_4] \neq 0 \mid \gamma_1[\xi_1]; \gamma_2[\xi_4] \neq 0$	0.841	0.819	0.862	-0.370	-0.478	-0.262	-	-	-	-
JD x *SOC*				0.758	0.705	0.812	0.118	-0.003	0.239	-	-	-	-
	RED (η_3)			0.901	0.881	0.922	-	-	-	-	-	-	-
Curvilinear effect of *Job demands* on *Cynicism* [H5] ($E[\eta_1 \mid \xi_1, \xi_1{*}\xi_1] = \tau + \gamma_1[\xi_1] + \gamma_2[\xi_1{*}\xi_1] + \zeta$)													
JD (ξ_1)		[A]	H_{014}: $\gamma_1[\xi_1] = 0 \mid \gamma_2[\xi_1{*}\xi_1] \neq 0$ H_{a14}: $\gamma_1[\xi_1] \neq 0 \mid \gamma_2[\xi_1{*}\xi_1] \neq 0$	0.850	-	-	0.157	-	-	0.025**	0.00	1.000	0.00
	CYN (η_1)			0.892	-	-	-	-	-	-	-	-	-
JD (ξ_1)		[B]	H_{014}: $\gamma_2[\xi_1{*}\xi_1] = 0 \mid \gamma_1[\xi_1] \neq 0$ H_{a14}: $\gamma_2[\xi_1{*}\xi_1] \neq 0 \mid \gamma_1[\xi_1] \neq 0$	0.850	0.830	0.871	0.101	-0.021	0.230	0.037**	28.74	0.505	0.180
JD x *JD*				0.857	0.817	0.897	0.160	0.054	0.267	-	-	-	-
	CYN (η_1)			0.891	0.880	0.903	-	-	-	-	-	-	-
Curvilinear effect of *Job demands* on *Work engagement* [H6] ($E[\eta_4 \mid \xi_1, \xi_1{*}\xi_1] = \tau + \gamma_1[\xi_1] + \gamma_2[\xi_1{*}\xi_1] + \zeta$)													
JD (ξ1)		[A]	H_{015}: $\gamma_1[\xi_1] = 0 \mid \gamma_2[\xi_1{*}\xi_1] \neq 0$ H_{a15}: $\gamma_1[\xi_1] \neq 0 \mid \gamma_2[\xi_1{*}\xi_1] \neq 0$	0.859	-	-	0.127	-	-	0.016	0.00	1.00	0.00
	WE (η_4)			0.944	-	-		-	-	-	-	-	-
JD (ξ_1)		[B]	H_{015}: $\gamma_2[\xi_1{*}\xi_1] = 0 \mid \gamma_1[\xi_1] \neq 0$ H_{a15}: $\gamma_2[\xi_1{*}\xi_1] \neq 0 \mid \gamma_1[\xi_1] \neq 0$	0.859	0.837	0.882	0.186	0.051	0.320	0.061**	48.85	0.381	0.205
JD x *JD*				0.861	0.823	0.899	- 0.163	-0.260	-0.066	-	-	-	-
	WE (η_4)			0.944	0.936	0.953	-	-	-	-	-	-	-

JD, job demands; JR, job resources; CYN, cynicism; EE, exhaustion; RED, reduced professional efficacy; WE, work engagement; CONS, conscientiousness; SOC, sense of coherence; S-Bχ2, satorra-bentler Chi-square; SCF, scaling correction factor for the Chi-square; df, degrees of freedom; CFI, comparative fit index; RMSEA, root mean square error of approximation.