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Work-related contact, work–family conflict, psychological distress and sleep problems experienced by construction professionals: an integrated explanatory model

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ABSTRACT

Contemporary communication technology blurs the boundaries between work–life and family–life environments, through after-hours, work-related contact. We examined the relationship between work contact, work–family conflict and consequent outcomes of psychological distress and sleep problems experienced by South African construction professionals. An integrated model of these factors was proposed and tested using path analysis and responses from 630 survey respondents. Work experience, gender, domestic situation and employment status explain the relationship between job autonomy and control, job pressures, and work contact, which were hypothesized to multivariately explain their negative effects. The final integrated model was a good fit to the data. The results indicate that the antecedents of work–family conflict are job autonomy and control, job pressure and work contact. Psychological distress is determined by work–family conflict, work experience, and job pressure. Sleep problems are influenced by work–family conflict, work contact and psychological distress. An important insight gained is the pivotal role played by job pressure, directly and indirectly, in work stress outcomes. Interventions aimed at reducing psychological distress and sleep problems among construction professionals should target the boundary permeability of work contact and work–family conflict, particularly for less experienced, female and junior professionals with low job control but high job pressure.

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Introduction

Work–family research has evolved considerably from its roots in the 1960s (Lewis and Cooper 1999, Williams *et al.* 2016) when it began as a response to the influx of women, including mothers with young children, into the workforce. The ensuing research chronology is summarized by Lewis and Cooper (1999) as: the interdependence of family and work (1970s), challenging the male model of the work role, which called for dedication to continuous work until retirement and prioritization of work over other roles (Pleck 1977); the “enterprise culture” of the 1980s (Cartwright and Cooper 1997) yielding the concepts of burnout and stress (Lewis and Cooper 1999); and an action research agenda in the early 1990s (Williams *et al.* 2016) which called for family-friendly employment policies to recognize the sustained increase in the employment of women and their contribution to the success of organizations (Lewis 1992).

Whilst the spillover of work into the family domain was theoretically generally applicable, it was exacerbated by work addiction. Robinson (1998) pointed to the dearth of

studies on work addiction, or workaholism (Oates 1971), compared with other addictions like alcoholism. The impact of this disorder on families is that they “*become extensions of work and career and the workaholic ego, molding their lives around interests and values of workaholics*” (Pietropinto 1986, Robinson 1998, p. 262).

The European recession of the latter 1990s and the rise of globalization resulted in many organizations downsizing, thus undermining the recruitment and retention argument (Lewis and Cooper 1999). This, however, led employers to focus on better supporting employees who had survived the changes and research then turned towards how organizations were responding to work–family issues, and on developing theory related to changing organizational cultures (Hall 1990). Work–family linkages, work–family conflict and stress, and strengthening endeavours to develop more robust work–family policies became the focus (Greenhaus and Parasuraman 1999). As a counter to the emphasis on the work–family conflict aspect, other researchers (Sieber 1974, Marks 1977)

posited that the benefits of having multiple roles could outweigh the disadvantages, and following the expansionist hypothesis (Barnett and Baruch 1985) researchers began investigating work–family integration (Greenhaus and Parasuraman 1999), identifying how wellbeing is enhanced by positive aspects of work–family linkages (Kirchmeyer 1992, 1993, Lewis and Cooper 1999, Barnett and Hyde 2001). Other researchers explored: positive spillover (Crouter 1984); enrichment (Kirchmeyer 1992); enhancement (Ruderman *et al.* 2002); facilitation (Frone 2003); and work–life fit (Voydanoff 2007). Researchers also argued that work–family linkages needed to be expanded to include community (Googins 1997, Brannen and Moss 1998) and leisure (Knecht *et al.* 2016). The digital revolution of the 2000s introduced technologies that not only fundamentally affected how work is done, but also spanned the boundary between work and family (Chesley *et al.* 2003).

Thus, research into work–family issues has been conducted for more than 50 years and there is still interest in the work–family conflict aspect, hence the orientation of the current research.

A recent example is the study of a large sample of Canadian working adults by Schieman and Young (2013), who investigated whether work–family conflict, psychological distress and sleep problems were associated with after-hours, work-related communication (hereafter referred to as “work contact” – i.e. the frequency of after-hours communications including email, telephone calls and text messages (Schieman and Young 2013, p. 244).

They used the Job Demands-Resources (JD-R) model of workplace stress as a theoretical framework, and tested the resource hypothesis, positing that work contact, potentially a boundary-spanning demand, could magnify “*the relevance and utility of job-related resources especially as they might function as buffers in the associations between work contact and levels of work-to-family conflict, distress and sleep problems*” (Schieman and Young 2013, p. 4). They also tested the demand hypothesis, proposing that “*Work contact in the context of job pressure may be more problematic for [work–family conflict], distress and sleep problems*” (Schieman and Young 2013, p. 5), such that higher levels of work contact would amplify their negative effects. Their results, using linear regression methods to analyse the data, supported both propositions.

The purpose of our study was to investigate the same question, i.e. whether work–family conflict, psychological distress and sleep problems are associated with work contact, but among South African construction professionals. We adopted a different method of analysis, using path models involving structural equation modelling (SEM). Our study aims to contribute to the existing body of stress research in the construction management context by surfacing work contact as a contemporary stressor, which

employers and employees alike may have to address in the interests of safeguarding the mental health and wellbeing of working professionals. This contribution should also add to the broader (i.e. non-construction sector) debate about work–family conflict.

Construction is a high-risk industry for work-related stress (Lingard and Francis 2004, Pocock *et al.* 2007, Love *et al.* 2010), and professionals in the industry are responsible for the safe delivery of projects, on time, to required standards, and within budget. Project work is dynamic (Asquin *et al.* 2010) and construction project work is characterized by uncertainty, interpersonal and inter-role conflict, all of which contribute to stress (Leung *et al.* 2007, Loosemore and Galea 2008, Lingard *et al.* 2010, Mohr and Wolfram 2010). Professionals in the industry tend to work long hours. For example, working hours in the Australian construction industry are typically in excess of 44 h per week and increased by 11% over the period from 1985 to 2003 (van Wanrooy and Wilson 2006). Bowen *et al.* (2013) found that 32% of South African project and construction managers worked more than 55 h per week, while Watts (2009, p. 44) notes that U.K civil engineers, caught up in a “*long hours culture*”, sometimes work 60–70 h per week. Working long hours is associated with dissatisfaction in the quality of domestic and marital relationships (Lingard and Sublet 2002) and with work–family conflict (Watts 2009). The characteristics of the construction industry and their effects on professionals and others working in the industry thus make it a suitable and interesting context to explore these psychosocial issues, especially with regard to after-hours, work-related communication.

Communication technology advancements, particularly mobile devices such as cellular telephones, smartphones, laptops and tablets, have had a profound and irreversible impact on the nature and character of work, effectively altering when, where and how people work (Boswell and Olson-Buchanan 2007). Madden and Jones (2008) state that 45% of “networked workers” reported working in the evenings and at weekends using a mobile device. The use of mobile devices has enabled employees to connect to work regardless of time of day or location, effectively transcending the work–family boundary (Ferguson *et al.* 2016).

Work contact is regarded as a potential stressor, a boundary-spanning demand that blurs the temporal, physical and psychological boundaries separating a person’s work and nonwork environments (Voydanoff 2005, 2007). It affects permeability between the work and home domains such that workers are regarded as accessible at any time, regardless of location, resulting in increased work–family conflict (Lingard and Francis 2009, Schieman and Young 2013, Westrupp *et al.* 2016). Such conflict is defined as “*a form of inter-role conflict in which the role pressures from the work and family domains are mutually incompatible in*

some respect” (Greenhaus and Beutell 1985, p. 77). Work–family conflict (as distinct from “family-work conflict”) is generally associated with diminished organizational effectiveness such as reduced productivity and increased staff turnover, mainly through its impacts on the health and wellbeing of individuals, e.g. increased risks of depressive symptomatology, physical health complaints and greater risk of substance abuse (Eby *et al.* 2005, Voydanoff 2005). Work–family conflict is also increasingly associated with more pervasive detrimental impacts such as reduced satisfaction with family life, distressed intimate partner relationships and high levels of family distress (Frone *et al.* 1997, Lingard and Sublet 2002). Significant associations have also found between work–home interference and greater levels of daily fatigue and sleep complaints (Van Hooff *et al.* 2006, Maume *et al.* 2009).

Overview of the theoretical framework

As with the Schieman and Young (2013) study, we use boundary theory (Nippert-Eng 1996) and the JD-R model of workplace stress (Demerouti *et al.* 2001, Bakker and Demerouti 2007) to provide a guiding framework for examining how the work contact of construction professionals relates to their experiences of work–family conflict, psychological distress and sleep problems.

Boundary theory

According to Piszczek (2016), the work and family lives of individuals are intertwined and consistently influence each other. Boundary theory (Nippert-Eng 1996) holds that individuals vary on a *continuum* in the extent to which they prefer to either segment or integrate their work and family roles. Work–family boundary dynamics concern the socially constructed lines of demarcation between work and family roles, and the ways in which individuals maintain, negotiate and transition across these lines (Ashforth *et al.* 2000). Of importance is how individuals draw the line between, and transition across, work and family roles in an effort to achieve work–family balance (Allen *et al.* 2014). Situational constraints may result in boundary management strategies not being employed as envisaged, potentially leading to greater work–family conflict and stress (Piszczek 2016).

Work–family boundaries can be a source of conflict by making the transitions between roles more difficult. Construction professionals, through the time-sensitive, supply chain dependent and logistically demanding nature of their work, may find it difficult to balance their work obligations whilst simultaneously contributing meaningfully to, and participating in, family life. The tension arising from this attempted balancing is directly related to work–family conflict (Michel *et al.* 2011).

Work–family balance can be attained in many ways, depending on factors such as the similarity of the work and family domains and the strength of the boundaries between them (Allen *et al.* 2014). Role blurring is conceptualized as uncertainty or difficulty in distinguishing one’s work role from one’s family role (Desrochers *et al.* 2005, Glavin and Schieman 2012). Clark (2000) suggests that this occurs when there is a great deal of permeability and flexibility around borders. For instance, the more one has to deal with family-related matters whilst at work, the greater the blurring between work and family roles, and *vice versa* (Desrochers *et al.* 2005, Matthews *et al.* 2010). Glavin and Schieman (2012) question the nature of the association between high levels of role blurring and work–family conflict, and whether it is beneficial or detrimental to work–family outcomes. One response to this question is that role blurring can be thought of as a resource, the “*flexible resource perspective*” (Glavin and Schieman 2012, p. 76) that enables employees to minimize work–family conflict because it allows them to manage competing role demands. Another response, the “*greedy role perspective*” (Coser 1974, Glavin and Schieman 2012, p. 76), suggests that role blurring makes it more likely that work will infiltrate nonwork roles in the family domain and increase work–family conflict. Most research supports the latter of these two responses, but the robustness of its conclusions is unclear considering the small sample sizes and single item measures used (Glavin and Schieman 2012).

Job demands-resources (JD-R) model of workplace stress

The JD-R model of workplace stress (Bakker and Demerouti 2007), with its origins in the job demand-control (JDC) (Karasek 1979) and job demand-control-support (JDC-S) (Johnson *et al.* 1989, Hobfoll 1998, Schaufeli and Bakker 2004) models, provides a useful lens through which to view the relationship between job demands/resources, and various personal, social and organizational outcomes.

From the perspective of these models, workplace stress is viewed as a response to an imbalance between the job demands made upon the individual and the resources available to deal with them. In this context, job demands comprise physical, psychosocial or organizational requirements of the job, and are associated with certain physiological and/or psychological costs (Bakker and Geurts 2004). A key aspect of job demands is the consequent job pressure felt by the individual (Tausig and Fenwick 2011, Schieman and Young 2013). High levels of job pressure are associated with feeling overwhelmed by the nature of the tasks at hand, and where job demands exceed the time available to satisfactorily accomplish the required tasks. The consequences of job pressure are evident in a range

of behavioural and psychological symptoms such as burnout and psychological distress (Hakanen *et al.* 2008) and exhaustion and sleep problems (Bakker and Demerouti 2007), but it is not clear if the paths to these outcomes are direct or indirect.

Job resources encompass the physical, psychosocial, social or organizational aspects of the job that facilitate the achievement of work goals. Examples of job resources include: *job control*: degree of control over tasks and conduct at work (Karasek 1979); *job autonomy*: the freedom to decide when, where, and how work is undertaken (Tausig and Fenwick 2011); *schedule control*: flexibility in work schedules (Golden 2001); and *challenging work*: skills variety and opportunity for professional development (Bakker and Geurts 2004). Job autonomy and schedule control are viewed as effective resources for navigating work–family boundaries. Professionals enjoying higher levels of job autonomy and schedule control (hereafter termed “job control”) are better placed than other workers to manage how they divide their time and effort between work and family. They are thus better able to navigate between the competing roles as professionals and parents or spouses/partners (Voydanoff 2007). Work situations that promote professional development and skills enhancement generally resonate as desirable job resources (Voydanoff 2007), but may prove stressful for inexperienced professionals “finding their way”, and even for older professionals who are reluctant to embrace change and are content to retain their *status quo* of competence.

How individuals manage competing demands for their time and attention may affect how often they engage in after-hours work communication. A person with strong boundary control (a segmenter) may prefer to avoid using work contact to complete job tasks outside of the work domain. In contrast, others (integrators) may see the use of such technology as the only means possible for meeting job demands. The situation may be exacerbated if there are organizational expectations of such communication, be they real or perceived (Piszczek 2016). The decision to choose a particular measure of boundary control may thus be facilitated or constrained depending on individual circumstances.

Work contact and work–family conflict – antecedents and outcomes

The current proliferation of smartphones and Internet-enabled mobile devices has facilitated greater work flexibility, remote working and after-hours availability, with inter-generational outcomes. Today’s teenagers expect to be connected “24/7” and conceivably will not regard role blurring as a problem when they enter the workforce (Chesley 2005). However, there is evidence that intensive

smartphone users, compared with non-users, neglect the necessary psychological detachment and daily recovery processes regarded as important for the reduction of work–home interference, making them more susceptible to burnout (Derks and Bakker 2014).

An inability to balance work expectations and family obligations contributes significantly towards work–family conflict (Duxbury *et al.* 2008, Nomaguchi 2009). In this context, it is important to understand that the term “work–family” refers to a broad frame that includes the domains of work and nonwork (i.e. home, family, socialising, and leisure) (Schieman *et al.* 2009). Although interference to work–family balance can work in either direction, the work-to-family direction is regarded as being a more pervasive phenomenon (Bellavia and Frone 2005, Geurts *et al.* 2005). Increased work overload due to the use of smartphones results in greater work–family conflict (Derks *et al.* 2014), which in turn exacerbates work-related stress (Yun *et al.* 2012) and burnout (Ferguson *et al.* 2016). Previous studies of construction professionals identify the following as sources of work–family conflict: long working hours, weekend work, subjective work overload and employees’ family structure (Lingard and Francis 2004, 2009, Leung *et al.* 2015).

Such conflict has a damaging effect on job satisfaction, organizational commitment and productivity, and leads to higher turnover intent (Karatepe and Kilic 2007, Ferguson *et al.* 2016) and absenteeism (Mesmer-Magnus and Viswesvaran 2006). It is associated with employee burnout, mental health issues, substance abuse and diminished family functioning (Lingard *et al.* 2007, Westrupp *et al.* 2016). Lingard and Francis (2009) identify the sources of burnout in the construction industry as: work stressors, the work–family interface and employees’ family structures. Specifically, they found that, among civil engineers, subjective overload and role conflict (work) predict emotional exhaustion in parents; hours worked per week predict emotional exhaustion in the case of child-free and dual-earners; and conflict in the relationship between spouse/partner predicts emotional exhaustion in the case of both single and dual-earners and child-free professionals.

Research into the relationship between age and work–family interference has yielded mixed results. Some studies have shown that younger employees experience more distress as a result of such interference (Mennino *et al.* 2005, Voydanoff 2007), whilst others have shown that workers in middle adulthood report the highest levels of interference (Bellavia and Frone 2005). Age differences in work-related resources and demands are also considered to influence the ways individuals manage work–family boundaries (Schieman *et al.* 2009). A study of construction workers (Lingard *et al.* 2010) found that experience of work–family

interference varied according to a worker's employment situation, gender and work location, while the experience of family-to-work interference varied according to a worker's age.

Research into gender patterns of work–family interference has also yielded mixed results (Bellavia and Frone 2005). Various studies have pointed to gender disparities in job demands and resources. Higher levels of autonomy, authority, earnings and greater decision latitude are traditionally associated with men rather than women, all factors that are undoubtedly advantageous when negotiating work–family conflict. However, men are also more likely to work longer hours and overtime without notice, factors which make such negotiation more difficult (Tausig *et al.* 2004, Mennino *et al.* 2005, Schieman and Reid 2008). In contrast, gender differences in other work conditions, such as schedule control, job insecurity and pressure, are less clear (Tausig *et al.* 2004). Little is known about age-by-gender differences in job demands and resources, and their concomitant relationship with age-by-gender differences in patterns of work–family interferences (Moen and Roehling 2005, Schieman *et al.* 2009). Research on construction industry subjects suggests that women experience higher levels of work–life imbalance and work–family conflict than do men (Sang *et al.* 2007, Lingard *et al.* 2010, Cattell *et al.* 2016).

The presence of a partner or children in the home potentially gives rise to competing demands (Jacobs and Gerson 2004), and conflicts in terms of different life roles, e.g. when performance in one role compromises or complicates the capacity to simultaneously perform in another role. For many men and women, parenthood is combined with full-time paid work leading to multiple roles in the work–family domains. Multiple roles can lead to role conflict and are related to negative outcomes such as job dissatisfaction and burnout (Burke 1988) and psychological distress, e.g. depression (Gutek *et al.* 1991). This is especially so for women, given that many working women still retain primary responsibility for the greater portion of childcare and housework (Erkal *et al.* 2007, Copur *et al.* 2010). Previous research is, however, inconclusive regarding the impact of disruption to the work–family boundary in terms of marital status and children. Reynolds and Renzulli (2005) found no difference as a function of marital status, while Mennino *et al.* (2005) reported elevated levels of interference among partnered or married persons. Similarly, Mennino *et al.* (2005) also found the presence of children to be associated with higher levels on interference, whereas Reynolds and Renzulli (2005) reported no such effect. Other studies have found that the number of children in the family impacts the ability of individuals to balance family responsibilities with work demands (Kelly and Voydanoff 1985, Bedeian *et al.* 1988). The impact of

children is more pronounced in the case of younger children, who typically require more care and more resources from their caregivers. Consequently, parents with younger children at home report more conflict between work and family (Burke *et al.* 1979) and have fewer time and energy resources (Grandey and Cropanzano 1999). Lingard and Francis (2008, 2009) show a relationship between parental demands and work–family conflict, and found that construction industry work practices present significant challenges for dual-earner couples. Adaptive strategies are highly gendered, most frequently involving wives or female partners reducing their involvement in paid work. In this “*job versus career*” trade-off (Lingard and Francis 2009, p. 153), women in construction roles scale back their involvement in paid work to devote time to domestic responsibilities, more frequently than do men.

Education, which is important to work–family interference by virtue of its relationship with occupation and work conditions (Mirowsky and Ross 2003), is consistently associated with higher levels of work–family interference (Mennino *et al.* 2005). The impact of education is arguably less pronounced in the current study as the statutory minimum registration requirement for all qualified and practicing construction professionals in South Africa is similar (a Honours-equivalent degree) for all disciplines. However, this does not discount the possibility that further education beyond that required for registration may have an impact, given its association with greater levels of authority, management responsibility and consequently, potentially greater work stress and work–life disturbance.

Bellavia and Frone (2005) found that managers, executives and people within high status professions report higher levels of work–family interference than do those in lower status occupations. While employment status is important, it is arguably less so in the current study as all respondents were registered professionals. However, what does vary amongst the survey respondents is their experience and seniority, and these are used here to differentiate the sample. It is reasonable to assume that more experienced and more senior professionals would experience greater job demands, but also enjoy greater job resources. It is unclear, however, whether or not construction professionals with more experience and seniority would experience higher levels of work–family interference. No evidence of such a relationship could be found in the construction literature.

Psychological distress

Work–family interference is associated with psychological strain (Kinnunen *et al.* 2006), poor self-reported physical health (Frone *et al.* 1997), higher levels of fatigue (Jansen *et al.* 2003), depression and anxiety (Frone *et al.* 1996) and

lower sleep quality (Williams *et al.* 2006). Psychological distress is “an umbrella term that encompasses stress, burnout, depression, anxiety and other related mental health problems” (Facey *et al.* 2015, p. 995). Within a workplace setting, psychological distress is characterized by feelings of unhappiness, depression and anxiety, the primary dimensions of negative affect and mood (Warr 1990) and classified by the Australian Safety and Compensation Council (2006) as mental illnesses attributed to work-related stress.

Recovery outside of working hours is important for employee health, wellbeing, and performance (Sonnentag 2001, 2003), and employees need periods of recovery to detach from work in order to recover properly from work-related stress. Psychological detachment is pivotal to recovery. It is inherent in family and leisure activities – an individual’s sense of being “away” from work (Etzion *et al.* 1998). However, detachment means more than just being physically away from work. It requires that employees cease thinking about work and disengage mentally from it (Sonnentag and Krueger 2006). Derks and Bakker (2014) highlight the importance of psychological detachment and relaxation in order to reduce the risk of work–family interference, noting that psychological detachment will be impossible if employees engage in work contact. Employees who successfully detach from work during after-work hours experience higher levels of life satisfaction and wellbeing (Sonnentag and Fritz 2007), and show better performance (Demerouti *et al.* 2009).

In the context of construction, Lingard (2003), Yip and Rowlinson (2006) and Lingard and Francis (2009) have reported high levels of burnout in construction professionals. In a comparative study, Lingard and Francis (2009) reported that construction employees experienced higher levels of emotional exhaustion than did respondents in the military, technology and management fields. The long hours worked by civil engineers in Australia are negatively related to family participation and relationship quality (Lingard and Sublet (2002). Long working hours are highly indicated in workplace stress and burnout (Hughes and Parkes 2007, Lingard and Francis 2009).

Sleep problems

Sleep is an important healing mechanism for recovery from daily strains, and therefore a prerequisite for optimal daily functioning and health (Cropley *et al.* 2006). Walsh and Lindblom (2000) suggest that sleep must be sufficiently continuous for it to be restorative. Sleep loss and sleep disturbance lead to reductions in performance, fatigue, mood swings and immune function impairment (Rogers *et al.* 2001). Even moderate sleep loss is associated with deficits in alertness and performance (Jewett *et al.* 1999). Although there are many causes of impaired sleep,

consensus in the literature suggests that intrusive cognitions (concerns surfacing in the mind) may contribute to sleep disturbance (Cropley *et al.* 2006). Such concerns include: issues relating to relationships, children, health, finances and work. Of these, issues relating to work may be a primary contributor to impaired sleep, particularly for professionals who emotionally “carry over” their work from the workplace into the home (Basner *et al.* 2007).

Van Hooff *et al.* (2006) and Schieman and Young (2013) found strong correlations between work–home interference and time spent daily on overtime work in the evening, and between work–home interference and daily fatigue and sleep complaints. Sleep problems are a serious threat to the health and wellbeing of employees, affecting cognitive performance, mental and physical health (Törnroos *et al.* 2017). The scale of the problem makes it an important public health issue. Estimates suggest that large numbers are affected, for example, LeBlanc *et al.* (2009) state that 9% of the general population in the U.S.A regularly suffer from insomnia, and 30% do so occasionally. Ohayon and Reynolds (2009) note the caveat that most studies rely on positive responses to general questions about the difficulty of initiating or maintaining sleep, and very few use rigorous criteria and appropriate definitions of what constitutes insomnia, as stipulated in the DSM-IV (American Psychiatric Association 1994), the International Classification of Sleep Disorders (American Academy of Sleep Medicine 2005) and the International Classification of Diseases (World Health Organization 1994). The questions in the Schieman and Young (2013) study, and which were adopted for the current study, were those used in DSM-IV. However, respondents were asked how often they had experienced the subject of the questions in the past month, without the required stipulation (for this to count as a measure of operational insomnia), that the frequency of experience should be three nights per week or more. Despite this limitation, Schieman and Young’s (2013) scale certainly measures the extent to which people believe they have sleep problems, but it is not a rigorous measure of insomnia. There is relatively little literature concerning the relationship between workplace stress and sleep disturbances experienced by professionals. What exists mainly concerns work-related *burnout* and sleep problems (see, e.g. Wood and Killian 2007, Saleh and Shapiro 2008, Armon 2009, Söderström *et al.* 2012, de Beer *et al.* 2014). In relation to construction, the existing literature pertains to site-based construction workers (i.e. artisans and labourers). For example, Powell and Copping (2010, 2016), using an objective measure of sleep in the form of an actigraph, examined sleep deprivation and its consequences for construction workers, as opposed to professionals. They reported high levels of sleep deprivation and a positive link between inadequate sleep and the risk of accidents.

A conceptual model

Based on the literature review, a conceptual model is proposed. Our organizing framework and conceptual model is depicted in Figure 1. A logical starting point was to posit psychological distress and sleep problems as the predictive outcomes of a combination of demographic variables, work-related factors and work contact, and work–family conflict.

The conceptual model was hypothesized as follows: work experience, gender, domestic situation (relationship status and number of children) and employment position level (hereinafter termed “employment position”) were regarded as exogenous variables as they are deemed as given conditions for the respondent and hence do not require explanation. These exogenous variables were then hypothesized to explain work-related aspects such as job control, job pressure and work contact. Job-characteristics (job control and job pressure) and work contact were assumed to covary and each was hypothesized to predict work–family conflict. Finally, work–family conflict was hypothesized to explain psychological distress and sleep problems.

Research method

Primary data collection

The population consisted of architects, engineers, quantity surveyors, and project and construction managers in South Africa registered with their statutory councils. Professional

registration is mandatory in South Africa, so registration/membership lists comprise full populations. Registered professionals were emailed by their respective statutory bodies (assisted where necessary by the voluntary professional institutions), provided with a URL for online access to the questionnaire, and asked to participate.

Of the 942 responses received, 864 were suitable for analysis – representing 9% of the total professional population in the country. They comprised 297 (35%) architects, 294 (34%) engineers, 184 (21%) quantity surveyors and 89 (10%) project and construction managers. Since many in the lattermost group hold dual registration in another discipline, their actual representation in the response sample is likely to be higher.

Official statistics put the proportion of women at 50% of all economically active professionals in the South African economy (Department of Labour 2005), but the percentage of professional women in the construction sector is significantly lower. According to the Council for the Built Environment (2013), the representation of professional women is as follows: architects (19%), engineers (3%), quantity surveyors (15%) and project and construction managers (3%). Of the 864 usable responses, females accounted for 19% of the total and 32% of architects, 7% of engineers, 23% of quantity surveyors and 7% of project and construction managers. Women were thus overrepresented in all professional groupings in the current study.

According to the Council for the Built Environment (2013), “Whites” account for 73% of architects, 77% of engineers, 74% of quantity surveyors and 82% of project

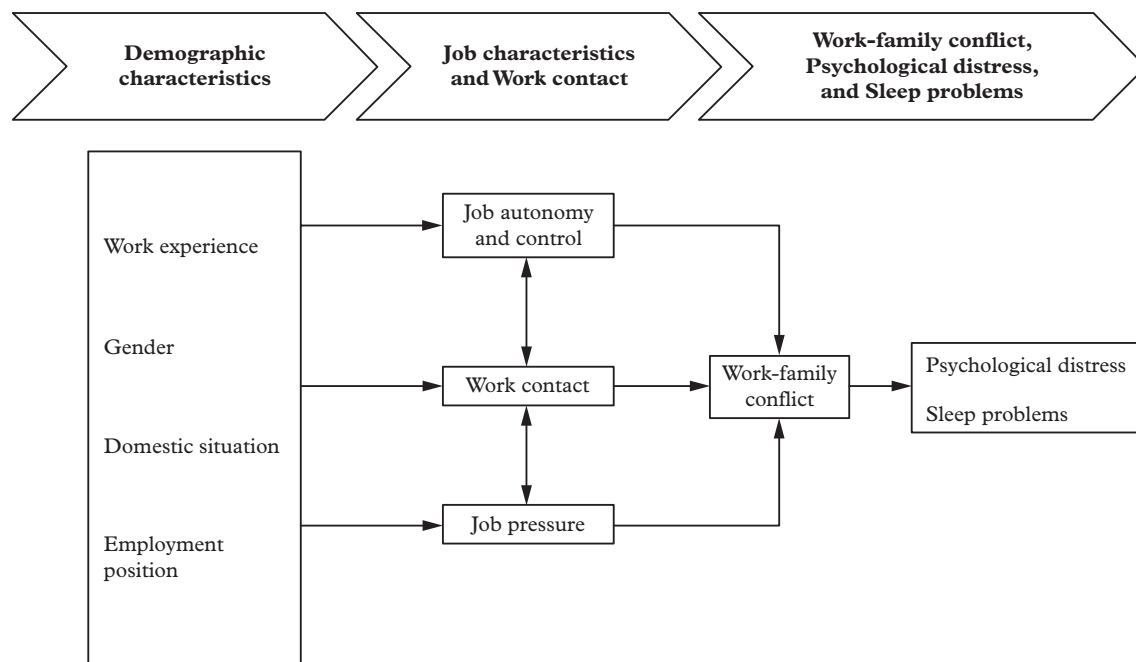


Figure 1. Path model for the hypothesized relationships among demographic characteristics, job characteristics and work contact, and work–family conflict, psychological distress, and sleep problems.

and construction managers. Of the 864 survey respondents, 88% were “White” (92% of architects, 92% of engineers, 78% of quantity surveyors and 78% of project and construction managers) and the remainder were “Black”, “Coloured” or “Indian”. Thus, “White” respondents were slightly over-represented in the current study. The ethnic categories used in this study refer to demographic markers and do not denote any inherent characteristics. Their continued use in post-*apartheid* South Africa is considered important for monitoring improvements in employment equity in various sectors of the economy, including the construction industry.

Questionnaire items

The survey questions drew primarily on Schieman and Young (2013), adapted for online use and amended as deemed appropriate for the professional nature of our sample. This resulted in the exclusion of *schedule control* and *challenging work* as variables, for reasons explained later. The full sets of questions, together with their scoring regimes, are reproduced in Table 1. The questionnaire was piloted prior to administration, but required no modification.

Demographic characteristics

Participants reported their age, gender, ethnicity, relationship status, the number of children younger than 18 years old residing at home, years of experience in the construction industry and employment position. Employment position was categorized as *salaried employee*, *associate*, or *partner or director*. Ethnicity response options comprised “White”, “Black”, “Indian” and “Coloured” (persons of mixed race), following the convention currently in use in South Africa for redress purposes, but these data were not used for the current study.

To allow for the possible interaction effect between relationship status and number of children younger than 18 years old living at home, an interaction variable was computed and labelled *domestic situation*. This interaction variable was developed from the variable reflecting relationship status and the variable indicating actual number of children (<18 years) at home. The interaction variable accounts for the weighted impact of both base variables. The response options for all demographic variables are depicted in Table 1.

Variable development

Job autonomy and control

Three items (JAC1-3) were used to assess the extent of job control experienced by respondents; for example:

“You have the freedom to decide what you do on your job”

Response options were: “strongly disagree”, “somewhat disagree”, “somewhat agree” and “strongly agree”. The full list of questions is depicted in Table 1. The job control items were drawn from Schieman and Young (2013) and based on similar items used in the National Study of the Changing Workforce (see Galinsky *et al.* 2011).

Job pressure

Three items (JP1-3), drawn from Schieman and Young (2013), were used to assess the extent to which participants experienced job pressure (see Table 1). Each item asked participants about job pressure in the preceding three months; for example: *“How often did you feel overwhelmed by how much work you had to do?”* Response options were: “never”, “rarely”, “sometimes”, “often” and “very often”.

Work contact

Three items (WC1-3), drawn from Schieman and Young (2013), were used to assess the frequency of work contact (see Table 1). Each item asked participants about work contact experiences in the preceding three months. For example, *“How often did you receive job-related emails or text messages out of normal office hours?”* Response options were “never”, “rarely”, “sometimes”, “often” and “very often”.

Work–family conflict

Four items (WFC1-4), previously employed by Voydanoff (2007) and Schieman and Young (2013), were used to assess the extent of work–family conflict (see Table 1). Each item asked participants about the frequency of work–family conflict experiences in the preceding three months, for example: *“How often did your job keep you from concentrating on important things in your family or personal life?”* Response options were “never”, “rarely”, “sometimes”, “often” and “very often”.

Psychological distress

Seven items (PD1-7), used by Schieman and Young (2013) and drawn from the Kessler K10 index of generalized psychological distress (Kessler *et al.* 2002), were employed to assess the psychological distress experienced by participants in the preceding month (see Table 1); for example: *“In the past month, how often have you had trouble keeping you mind on what you were doing?”* Response options were: “none of the time”, “a little of the time”, “some of the time”, “most of the time” and “all of the time”.

Table 1. Scale items for composite variables ($n = 630$).

Items	Response options	α
1. Demographic variables		
Gender	Male = 1; Female = 2	–
Relationship status	Divorced, separated, widowed or never married = 1; Married or living with a partner = 2	–
Children under 18 years residing at home	None = 1; 1 Child = 2; 2 Children = 3; 3 Children = 4; 4 Children = 5; 5 Children = 6; 6 Children = 7; 7 Children = 8; Exceeding 7 Children = 9	–
Experience in the construction industry	1–5 years = 1; 6–10 yrs = 2; 11–15 yrs = 3; 16–20 yrs = 4; Exc. 20 yrs = 5	–
Employment position	Salaried employee = 1; Associate = 2; Director or Partner = 3	–
2. Interaction variable (Scale score range: 1–18)		
Domestic situation (DS) = Relationship status x Number of children under 18 years residing at home	–	–
3. Job Autonomy and Control (JAC) (Scale score range: 3–12)		
JAC1. You have the freedom to decide what you do on your job? [C18a]	Strongly disagree = 1; Somewhat disagree = 2; Somewhat agree = 3; Strongly agree = 4	0.83
JAC2. It is your own responsibility to decide how your job gets done? [C18c]		
JAC3. You have a lot to say about what happens on your job? [C18d]		
4. Job pressure (JP) (Scale score range: 3–15)		
In the last 3 months, how often did (were):		0.91
JP1. You feel overwhelmed by how much you had to do at work? [C19a]	Never = 1; Rarely = 2; Sometimes = 3; Often = 4; Very often = 5	
JP2. You have to work on too many tasks at the same time? [C19b]		
JP3. The demands of your work exceed the time you have to do the work? [C19c]		
5. Work contact (WC) (Scale score range: 3–15)		
In the past 3 months:		0.84
WC1. How often were you called about work matters outside of normal office hours? [C20a]	Never = 1; Rarely = 2; Sometimes = 3; Often = 4; Very often = 5	
WC2. How often did you receive job-related emails or text messages out of normal office hours? [C20b]		
WC3. How often did you contact people about work matters outside of normal office hours? [C20c]		
6. Work–family conflict (WFC) (Scale score range: 4–20)		
In the past 3 months:		0.91
WFC1. How often did you not have sufficient time for important people in your life because of your job? [C21a]	Never = 1; Rarely = 2; Sometimes = 3; Often = 4; Very often = 5	
WFC2. How often did you not have sufficient energy to do things with important people in your life because of your job? [C21b]		
WFC3. How often did your work keep you from doing as good a job at home as you could? [C21c]		
WFC4. How often did your job keep you from concentrating on important things in your family or personal life? [C21d]		
7. Psychological distress (PD) (Scale score range: 7–35)		
In the past month, how often did you (feel):		0.90
PD1. Anxious or tense? [B3a]	None of the time = 1; A little of the time = 2; Some of the time = 3; Most of the time = 4; All of the time = 5	
PD2. Nervous? [B3b]		
PD3. Worry a lot about things? [B4a]		
PD4. Have you had trouble keeping your mind on what you were doing? [B4b]		
PD5. Feel restless or fidgety? [B4c]		
PD6. Sad or depressed? [B5a]		
PD7. Hopeless? [B5c]		
8. Sleep problems (SP) (Scale score range: 3–15)		
In the past month how often have you:		0.75
SP1. Had trouble falling or staying asleep? [B6a]	None of the time = 1; A little of the time = 2; Some of the time = 3; Most of the time = 4; All of the time = 5	
SP2. Woke up before you wanted to? [B6b]		
SP3. Woke up feeling refreshed? (R) [B6c]		

Notes: (R) indicates item was reverse coded. Question number references are given in parentheses.

Sleep problems

Three items (SP1-3) were used to measure sleep (see Maume *et al.* 2009, Schieman and Young 2013) (see Table 1). An example question was: “In the past month, how often have you woken up feeling refreshed?” with response options: “none of the time”, “a little of the time”, “some of the time”, “most of the time” and “all of the time”. Question SP3 was reverse coded for analysis.

Missing value analysis

Of the 942 respondents, 78 had not completed more than about 10% of the questionnaire and were removed. The reduced data-set ($n = 864$) was subjected to missing value analysis. None of the variables of interest had more than 5% missing values. To facilitate the use of modification indices in the confirmatory factor analysis (CFA) and path analysis, cases with missing values on any of the analysis variables were deleted. This resulted in a 630-case data-set (hereafter termed the “final dataset”) with no missing values. The demographic characteristics in the final dataset were almost identical to that in the data-set of 864 useable cases.

Scale development and statistical analysis

IBM SPSS version 23.0 for Macintosh (IBM Corporation 2013b) and IBM AMOS Version 23.0 for Windows (IBM Corporation 2013a) were utilised for all statistical analyses. Exploratory factor analysis (EFA) to explore the dimensionality of the data was unnecessary as the items used were drawn from existing scales. To verify the factor structure of all measured variables, a CFA was conducted using SEM. Four critical fit indices were applied to determine the degree of fit of the CFA and path models (see Kline 2011) as follows: χ^2/df ratio (less than 4); Comparative Fit Index (CFI of 0.95 and greater); Root Mean Square Error of Approximation (RMSEA 0.06 and less); and Hoelter critical N (CN index 200 and greater).

Once the factorial models had been estimated and validated, the resultant scales were assessed for reliability using Cronbach’s alpha (see Table 1). We then created scale scores by summing the scores of their respective constituent items, with reversed scoring of individual items where appropriate. Higher scores reflected greater levels of the variable of interest.

Multiple regression analysis (MRA) (not reported here) was used to inform the specification of the path analysis. The variables, applied additively in the MRA, identified significant predictors of the constructs. Variable selection for the MRA was based on the literature.

Finally, a number of path models were specified and tested. Firstly, path models to examine the direct and

indirect determinants of psychological distress and sleep problems were *separately* specified and tested. Thereafter, an integrated, composite path model predicting both psychological distress *and* sleep problems was specified and tested. The use of path analysis differentiates this analysis from that of Schieman and Young (2013), who used multiple regression to test *separate* predictive models for explaining psychological distress and sleep problems, and did not test for a single model accounting for both these outcome variables. The use of path models involving SEM is superior to multiple regression analysis in that they permit the examination of a series of dependence relationships simultaneously (Hair *et al.* 2014). This is particularly useful in the present context for testing the conceptual model containing multiple equations involving dependence relationships. Moreover, path analysis reveals total, direct and indirect effects between variables (total effect = direct effect + indirect effect).

Results

Demographic characteristics of the sample

In the final data-set ($n = 630$), the age of participants ranged from below 25 years to over 60 years, with the mean and median ages in the interval 45–49 years. Most participants were “White” (89%), male (82%) and either married or living with a partner (88%). Just under half (49%) reported children under 18 years old living at home, and most had either one (14%) or two (30%) children. The mean duration of experience in the construction industry was 16–20 years, whilst the median was greater than 20 years. Just over half of respondents were partners or directors (58%), about a third were salaried employees (32%) and the remainder were associates (10%). Almost a third of respondents (32%) reported typically working in excess of 50 h per week, with 16% working 56 h or more per week. Over a quarter (26%) claimed to work (on average) more than 10 h per week at home on job-related work. A minority (8%) reported working in excess of 30 h per week at home on job-related work.

Age and ethnicity, although captured in the survey data, were not included in the path models for various reasons. The number of years of professional work experience was employed and considered important for the model in *lieu* of chronological age. For ethnicity, the picture is somewhat more complex. “Whites” (a minority group in terms of national population demographics) comprised 89% of respondents, followed by “Blacks” (5%), Indians (5%) and “Coloureds” (2%). The high proportion of “White” respondents indicates the extent to which this ethnic group continues to dominate the construction professions, even in post-apartheid South Africa. In terms of investigation, the

majority category in the survey response sample was too large to permit any meaningful inter-ethnic analysis, and consequently, this variable is not included in the theoretical model.

Confirmatory factor analysis

The initial factorial model was specified and tested using CFA. Output indices for the CFA model indicated an adequate fit to the data (χ^2/df ratio = 3.335, CFI = 0.943, RMSEA = 0.061, and Hoelter (95%) = 220), although all factor loadings were statistically significant ($p < 0.001$). The modification indices indicated the need for a number of correlated errors: WFC1 ("insufficient time for family") with WFC2 ("insufficient energy for family"); PD4 ("difficulty in concentrating") with PD5 ("fidgety"); and between PD6 ("depressed") and PD7 ("hopeless"). Similarity in the wording of the relevant questions may explain this, and it was not detected in the Schieman and Young (2013) work. The inclusion of these paths did not threaten the overall integrity of the measurement model. The resultant model presented an excellent fit to the data (χ^2/df ratio = 2.446; CFI = 0.965; RMSEA = 0.048; and Hoelter (95%) = 300). All factor loadings were statistically significant ($p < 0.001$) and all loadings exceeded 0.50. This measurement model is shown in Figure 2. The reliability of all six scales was assessed using Cronbach's alpha, with values ranging between 0.75 and 0.91, indicating good to excellent internal consistency (see Table 1).

Developing and testing the path diagrams

Based on the hypothesized conceptual model derived from the literature (see Figure 1) and the multiple regression analyses, path models were developed specifying the antecedents of: (i) psychological distress; (ii) sleep problems; and (iii) both psychological distress and sleep problems, (see Figures 3–5). The analysis revealed no residual errors and no data problems with the measurement model, thereby permitting use of the model indices and interpretation of the model results.

Antecedents of psychological distress

The output suggested that the initial path diagram was a very good fit to the data (χ^2/df ratio = 1.730, $p = 0.039$, CFI = 0.991, RMSEA = 0.034, and Hoelter (95%) = 606). All paths were significant ($p < 0.01$), with most $p < 0.001$. No suggestions for revision of the path diagram were proposed by the modification indices. The path diagram for this predictive model, the respective regression weights and associated levels of significance are shown in Figure 3 and Table 2, respectively.

Several significant direct pathways (effects) were identified in the path analysis. Gender was significant

in predicting levels of job pressure ($\beta = 0.12$, $p < 0.01$) and work contact ($\beta = -0.11$, $p < 0.01$). Female respondents reported higher levels of job pressure than males but lower levels of work contact. Work experience had a direct role in predicting job control ($\beta = 0.22$, $p < 0.001$), work contact ($\beta = 0.11$, $p < 0.01$) and psychological distress ($\beta = -0.16$, $p < 0.001$). Respondents with higher levels of work experience were more likely to experience greater levels of job control, more extensive work contact and lower levels of psychological distress. Employment position was found to be significant in predicting job control ($\beta = 0.43$, $p < 0.001$) and work contact ($\beta = 0.16$, $p < 0.001$). Respondents with greater seniority were more likely to enjoy greater levels of job control, but also more extensive work contact.

Respondents' domestic situation was significant in predicting levels of job pressure ($\beta = 0.16$, $p < 0.001$). Professionals living with a spouse/partner and with children at home were more likely to experience higher levels of job pressure compared to those without children at home or those living alone. Job control was also significant in predicting job pressure ($\beta = -0.13$, $p < 0.01$), in that construction professionals experiencing lower levels of job control experienced higher levels of job pressure. In turn, job pressure had a direct role in predicting work contact ($\beta = 0.45$, $p < 0.001$), with professionals with greater levels of job pressure more likely to engage in higher levels of work contact.

Work–family conflict was found to have a number of significant direct predictors. Firstly, job control was found to be an important determinant of work–family conflict ($\beta = -0.11$, $p < 0.001$). Respondents with higher levels of job control reported significantly lower levels of work–family conflict than those with lower levels of job control. Secondly, job pressure ($\beta = 0.50$, $p < 0.001$) and work contact ($\beta = 0.22$, $p < 0.001$) were also direct determinants of work–family conflict, with those respondents reporting higher levels of job pressure being more likely to experience greater levels of work–family conflict, and respondents engaged in more extensive work contact also being more likely to experience greater levels of work–family conflict.

Job pressure ($\beta = 0.29$, $p < 0.001$) and work–family conflict ($\beta = 0.32$, $p < 0.001$) were significant in determining psychological distress. Respondents with higher levels of job pressure and more extensive work–family conflict were more likely to experience greater levels of psychological distress.

In terms of total effect, job pressure (0.478) and work–family conflict (0.320) had the most influence on psychological distress. Job pressure had a strong indirect effect on psychological distress (0.192). Due to the indirect (mediated) effect of job pressure on psychological

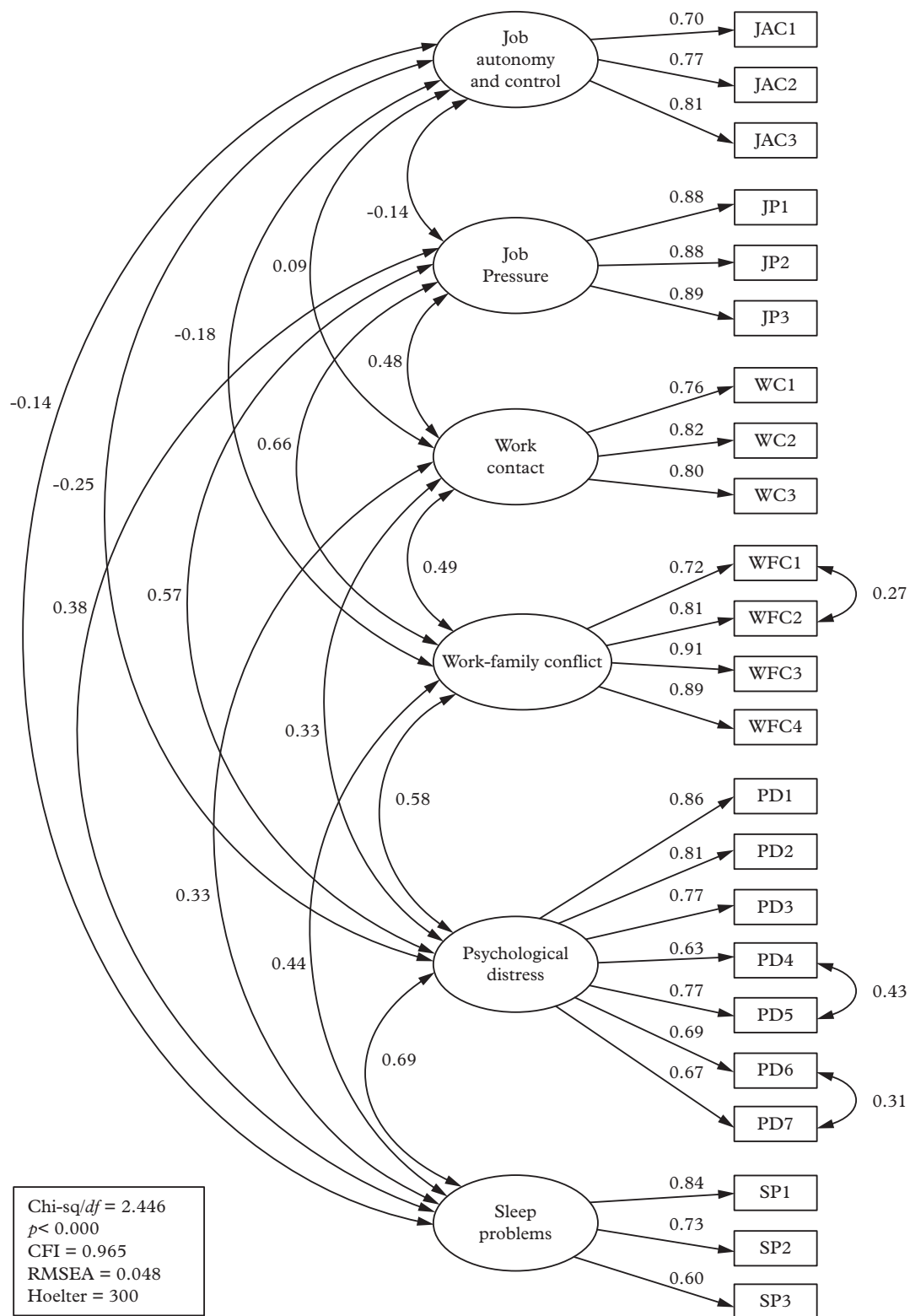


Figure 2. Confirmatory factor analysis.

distress, when job pressure increases by 1 standard deviation, psychological distress goes up by 0.192 standard deviations. This is in addition to the direct (unmediated) effect (0.286) that job pressure has on psychological distress.

Antecedents of sleep problems

The path diagram for the prediction of sleep problems is depicted in Figure 4. The model was an excellent fit to the data (χ^2/df ratio = 1.439, $p = 0.119$, CFI = 0.994, RMSEA = 0.026, and Hoelter (95%) = 729). All paths were

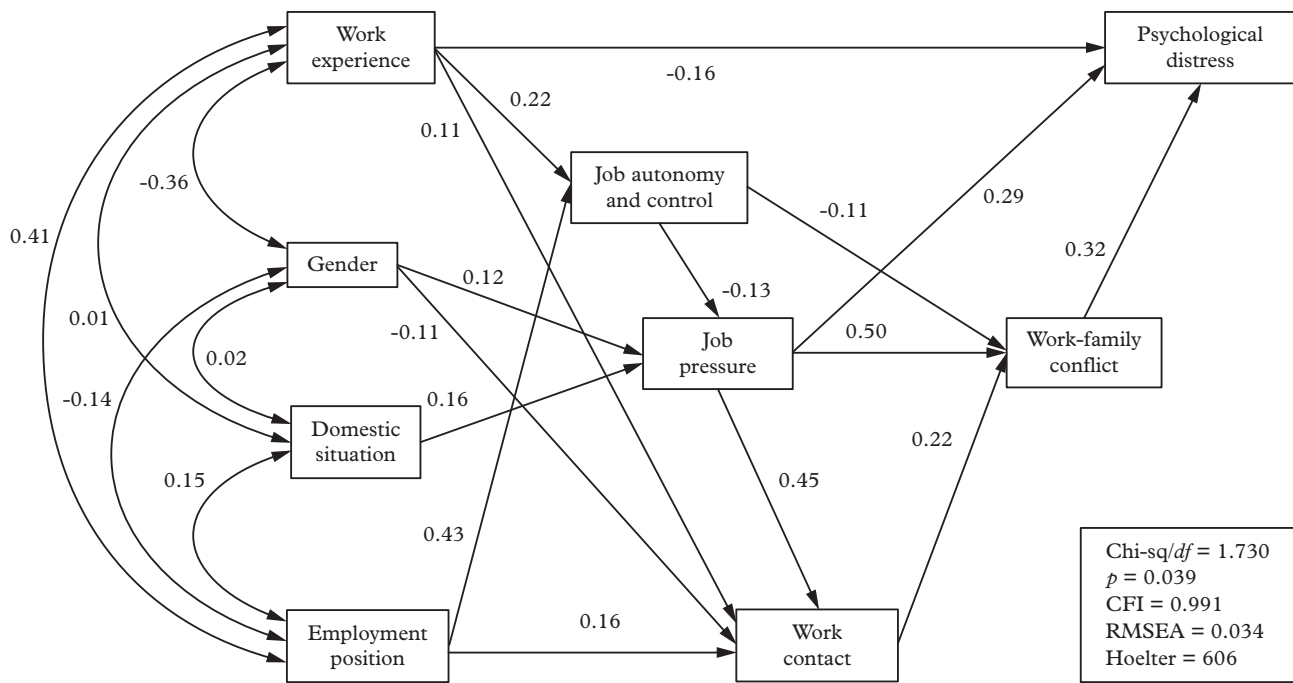


Figure 3. The path diagram of predictors of psychological distress.

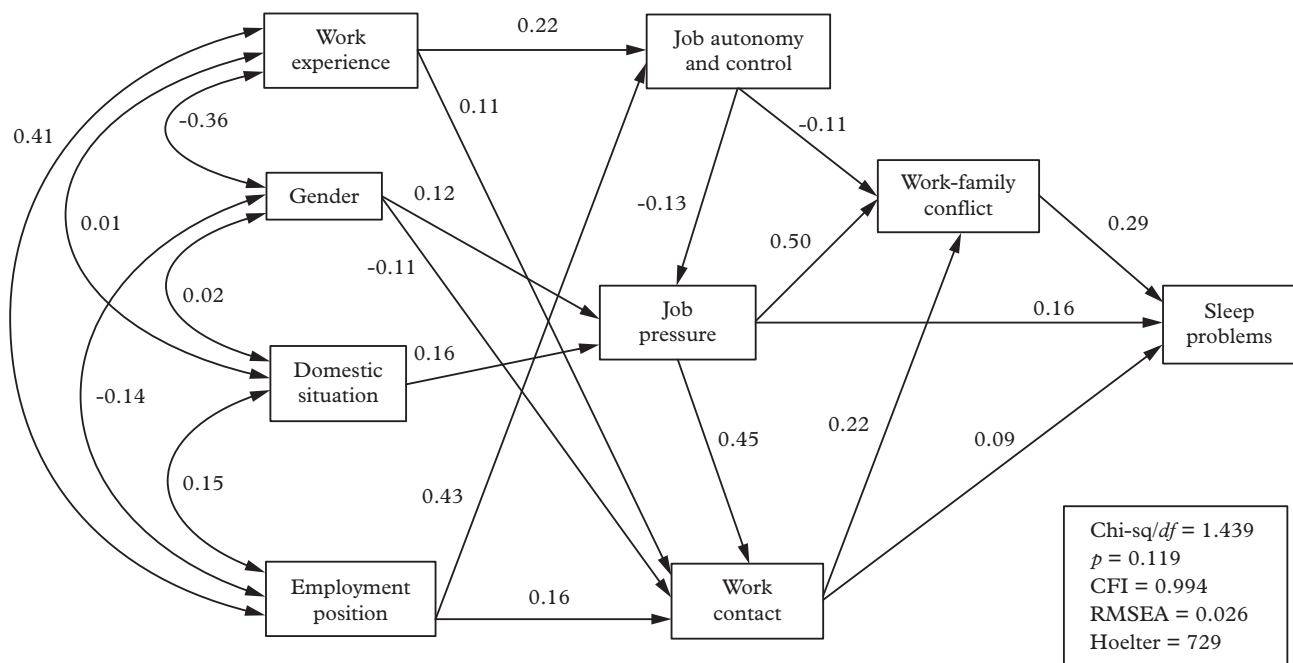


Figure 4. The path diagram of predictors of sleep problems.

significant, with most $p < 0.001$. No suggestions for revision of the path diagram were proposed by the modification indices. The path diagram for this predictive model, the respective regression weights and associated levels of significance are shown in Figure 4 and Table 2, respectively.

The path analysis identified several significant direct pathways. Work experience had a direct role in predicting

job control ($\beta = 0.22, p < 0.001$) and work contact ($\beta = 0.11, p < 0.01$). Respondents with higher levels of work experience were more likely to experience greater levels of job control, but more extensive work contact. Gender was significant in predicting levels of job pressure ($\beta = 0.12, p < 0.01$) and work contact ($\beta = -0.11, p < 0.01$). Females reported higher levels of job pressure than males but lower

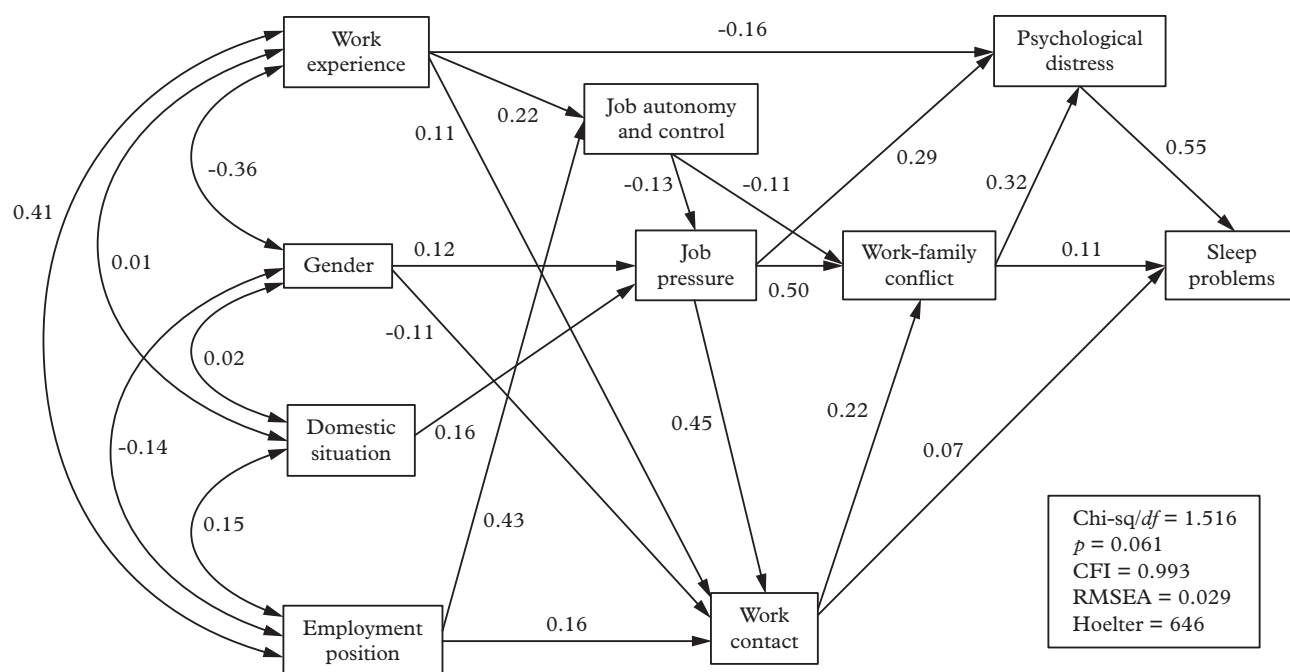


Figure 5. The path diagram of predictors of psychological distress and sleep problems.

Table 2. Maximum likelihood estimates of direct effects for PD, SP, and PD/SP structural equation models.

Direct predictor relationships	PD model		SP model		PD/SP model	
	Standardized regression weights (MLE)	p-value	Standardized regression weights (MLE)	p-value	Standardized regression weights (MLE)	p-value
Job autonomy and control → Employment position	0.429	***	0.429	***	0.429	***
Job autonomy and control → Experience	0.223	***	0.223	***	0.223	***
Job pressure → Gender	0.120	0.002	0.120	0.002	0.120	0.002
Job pressure → Job autonomy and control	-0.126	0.001	-0.126	0.001	-0.126	0.001
Job pressure → Domestic situation	0.157	***	0.157	***	0.157	***
Work contact → Gender	-0.109	0.004	-0.109	0.004	-0.109	0.004
Work contact → Employment position	0.156	***	0.156	***	0.156	***
Work contact → Job pressure	0.450	***	0.450	***	0.450	***
Work contact → Experience	0.110	0.006	0.110	0.006	0.110	0.006
Work-family conflict → Job pressure	0.499	***	0.499	***	0.499	***
Work-family conflict → Job autonomy and control	-0.111	***	-0.111	***	-0.111	***
Work-family conflict → Work contact	0.223	***	0.223	***	0.223	***
Psychological distress → Job pressure	0.286	***	—	—	0.286	***
Psychological distress → Work-family conflict	0.320	***	—	—	0.320	***
Psychological distress → Experience	-0.158	***	—	—	-0.158	***
Sleep problems → Work-family conflict	—	—	0.282	***	0.111	0.004
Sleep problems → Job pressure	—	—	0.155	***	—	—
Sleep problems → Work contact	—	—	0.088	0.030	0.071	0.036
Sleep problems → Psychological distress	—	—	—	—	0.546	***

*** $p < 0.001$.

levels of work contact. Domestic situation was significant in predicting levels of job pressure ($\beta = 0.16$, $p < 0.001$).

People living with a partner and with children at home were more likely to experience higher levels of job pressure compared to those without children at home and/or living alone. Job control was also significant in predicting job pressure ($\beta = -0.13$, $p < 0.01$), in that professionals experiencing lower levels of job control experienced higher levels of job pressure. Job pressure had a direct role in predicting work contact ($\beta = 0.45$, $p < 0.001$), with professionals with

greater levels of job pressure more likely to experience higher levels of work contact. Employment position was significant in predicting job control ($\beta = 0.43$, $p < 0.001$) and work contact ($\beta = 0.16$, $p < 0.001$). Respondents with greater seniority were more likely to enjoy greater levels of job control but also more extensive work contact.

Work-family conflict had a number of significant direct predictors. Firstly, job control was found to be a determinant ($\beta = -0.11$, $p < 0.001$). Respondents with higher levels of job control reported significantly lower levels of

work–family conflict than those with lower levels of control. Secondly, job pressure ($\beta = 0.50, p < 0.001$) and work contact ($\beta = 0.22, p < 0.001$) were also direct determinants of work–family conflict, with those respondents reporting higher levels of pressure being more likely to experience greater levels of conflict, and respondents experiencing more extensive work contact also being more likely to experience greater levels of conflict.

The determinants of sleep problems were job pressure ($\beta = 0.16, p < 0.001$), work–family conflict ($\beta = 0.28, p < 0.001$) and work contact ($\beta = 0.09, p < 0.050$). Respondents with higher levels of job pressure, more extensive work–family conflict and higher levels of work contact were more likely to experience greater levels of sleep problems than other professionals.

Job pressure had the greatest total effect on sleep problems (0.364), with work–family conflict being the next most influential predictor (0.282). Job pressure also had a strong indirect effect on sleep problems (0.208) – stronger than its direct effect (0.155).

Composite model of antecedents of psychological distress and sleep problems

The path diagram for this composite model, the respective regression weights and associated levels of significance are shown in Figure 5 and Table 2, respectively. The model was an excellent fit to the data (χ^2/df ratio = 1.516, $p = 0.061$, CFI = 0.993, RMSEA = 0.029, and Hoelter (95%) = 646. All paths were significant, with most $p < 0.001$. No suggestions for revision of the path diagram were proposed by the modification indices.

A number of significant direct pathways were identified. Gender was significant in predicting levels of job pressure ($\beta = 0.12, p < 0.01$) and work contact ($\beta = -0.11, p < 0.01$). Female respondents reported higher levels of job pressure than males, but lower levels of work contact. Work experience had a direct role in predicting job control ($\beta = 0.22, p < 0.001$), work contact ($\beta = 0.11, p < 0.01$) and psychological distress ($\beta = -0.16, p < 0.001$). Respondents with higher levels of work experience were more likely to experience greater levels of job control, engage in more work contact and experience lower levels of psychological distress. Domestic situation was significant in predicting levels of job pressure ($\beta = 0.16, p < 0.001$). Professionals living with a spouse/partner and with children at home were more likely to experience higher levels of job pressure compared to those without children at home or living alone.

Employment position was significant in predicting job control ($\beta = 0.43, p < 0.001$) and work contact ($\beta = 0.16, p < 0.001$). Respondents with greater seniority were more likely to enjoy greater levels of job control but also be engaged in more extensive work contact. Job control was significant in predicting job pressure ($\beta = -0.13, p < 0.01$),

in that construction professionals experiencing lower levels of job control experienced higher levels of pressure. In turn, job pressure had a direct role in predicting work contact ($\beta = 0.45, p < 0.001$), with professionals with greater levels of job pressure more likely to be engaged in higher levels of work contact.

Work–family conflict had a number of significant direct predictors. Firstly, job control was found to be an important determinant of work–family conflict ($\beta = -0.11, p < 0.001$). Respondents with higher levels of control reported significantly lower levels of conflict than those with lower levels of control. Secondly, job pressure ($\beta = 0.50, p < 0.001$) and work contact ($\beta = 0.22, p < 0.001$) were direct determinants of work–family conflict, with those respondents reporting higher levels of pressure being more likely to experience greater levels of conflict, and respondents experiencing more extensive work contact also being more likely to experience greater levels of conflict.

Job pressure ($\beta = 0.29, p < 0.001$) and work–family conflict ($\beta = 0.32, p < 0.001$) were also significant in determining psychological distress. Respondents with higher levels of pressure and more extensive conflict were more likely to experience greater levels of distress.

Finally, sleep problems were predicted by psychological distress ($\beta = 0.55, p < 0.001$), work–family conflict ($\beta = 0.11, p < 0.01$) and work contact ($\beta = 0.07, p < 0.05$). Respondents with higher levels of psychological distress, more extensive work–family conflict and higher levels of work contact were more likely to experience greater levels of sleep problems than other professionals.

Psychological distress had the greatest total effect on sleep problems (0.546), followed by job pressure (0.359) and work–family conflict (0.285). Job pressure and work–family conflict exerted the most influence over psychological distress, with total effects of 0.478 and 0.320, respectively. The effect of job pressure on sleep problems remained strong but was entirely indirect (0.359).

Discussion

The aim of our study of construction professionals was to examine the association between work contact and work–family conflict, and the health issues of psychological distress and sleep problems. Our findings, based on the path models, show the antecedents of psychological distress, sleep problems, and both psychological distress and sleep problems combined. The discussion below is confined to the last of these – psychological distress *and* sleep problems as depicted in Figure 5 – as it would make the discussion unnecessarily complex to treat them individually.

In our conceptual model, we imply that all four exogenous variables equally predict the variables job control, job pressure and work contact. This was found not to be

the case. Work experience did not predict job pressure as hypothesized, but did help to diminish psychological distress directly, which was not hypothesized. Gender did not predict job control as hypothesized and domestic situation did not predict job control nor work contact as hypothesized. Finally, employment status did not predict job pressure as hypothesized.

Gender was significantly related to both job pressure and work contact: women reported greater levels of job pressure but lower levels of work contact. These findings align, in part, with Tausig *et al.* (2004) who reported inconclusive findings with regard to job pressure, but found that men were more likely to work longer hours and overtime than were women. In the context of the construction industry, our results support the findings of Lingard and Francis (2009), who point to the conflicting roles experienced by working mothers and the consequent job pressures they experience. Contrary to the findings of Tausig *et al.* (2004), however, we found no association between gender and job autonomy, and decision-making latitude and authority; possibly because the focus of this study was on construction professionals rather than on the general construction population.

Previous research (Bellavia and Frone 2005) indicates a relationship between employment position and higher levels of work–family interference. Our study reinforces that finding, with more senior professionals reporting more extensive after-hours work contact than respondents of more junior status. Similarly, the findings support the earlier contention that professionals with more seniority typically enjoy greater job control.

Work experience, like employment position, proved a determinant of job control and work contact – for much the same reasons as outlined above, and was a direct predictor of psychological distress, in that more experienced construction professionals reported lower levels of psychological distress than did respondents with less experience. This may be explained by “*self-conditioning*” whereby experience, in terms of longer exposure to the vicissitudes of the construction industry and professional roles and responsibilities, leads people to adopt more effective coping mechanisms with regard to psychological distress. The Health and Safety Laboratory (HSL) in the U.K (Gervais and Hockey 2012) has noted the positive influence of mental resilience and strength in reducing workplace stress.

The pressurized nature of the construction industry impacts on construction professionals in a variety of ways. Work contact effectively shifts resources from the family domain to the work domain and consequently increases work–family conflict. Such conflict, in turn, increases the probability of the employees suffering some measure of psychological distress and, ultimately, sleep problems. In this context, job pressure was found to exert a strong

influence in determining both the psychological distress and sleep problems experienced by construction professionals. These findings resonate with those of Lingard and Francis (2009) in respect of the construction industry and in relation to the general population.

For work–family conflict, our path models show that both job pressure and work contact are positively associated with work–family conflict and that: (i) this association is weaker among those who have more job autonomy and control and (ii) it is stronger among those who experience greater job pressure. This confirms the Schieman and Young’s (2013) findings of support for both the resource and demands hypotheses of the JD-R model.

For psychological distress, we found job pressure to be positively associated with psychological distress, mirroring Schieman and Young’s (2013) findings. However, contrary to their results, we did not find work contact and job control (which includes schedule control) to be *directly* associated with psychological distress. Instead we found these relationships to be indirect, as reported above – both work contact and job control directly predict work–family conflict, which predicts psychological distress.

Regarding sleep problems of construction professionals, our finding that work contact predicts sleep problems matches that of Schieman and Young (2013). However, we found no direct association between job control or job pressure and sleep problems, as did their research.

Our purpose in this research was to investigate, as did Schieman and Young (2013), whether psychological distress and sleep problems were associated with work contact. In our study, however, we did not find work contact to be directly and positively associated with psychological distress, but found support for the hypothesis of our conceptual model, i.e. that job control, job pressure and work contact covary and each predicts work–family conflict. We also found support for our hypothesis that work–family conflict explains both psychological distress and sleep problems.

To summarize, both work experience and employment status lead to increased work contact, but less so for women. Work contact aggravates both sleep problems and psychological distress, the former directly, and the latter through its effect on work–family conflict.

Broader insights gained from our investigation hinge around the discovery of indirect effects between the factors, and what this means for work–family conflict research. Notably, job pressure directly affects work–family conflict, *and* indirectly, via work contact. The implications of this for construction industry professionals are that amelioration of the factors contributing to job pressure will have a flow-on effect. This would require different responses from employees and employers in negotiating the permeability of work/non-work boundaries. Another insight is that work contact appears to be as much of a boundary

spanning stressor, directly linked to work–family conflict and sleep problems, for construction professionals as it is for the general population.

Limitations

The sector-specific context of the study limits generalization to other sectors and industries and/or the general population. Given the similarity of construction industries worldwide our findings would in all likelihood be applicable beyond the South African construction industry.

In addition, while the survey has shed light on the association between work contact, work–family conflict and health issues of psychological distress and sleep problems of construction professionals, the results do not provide insight into as to how or why *individuals* experience and respond to work contact and work–family conflict in the specific and individual ways that they do.

Our findings are based on analyses of cross-sectional data. The data therefore cannot be used to analyse behaviour temporally, nor can it be used to help determine cause and effect.

We indicated the self-selecting and self-reporting nature of the survey to highlight the voluntary nature of participation, and emphasized that such voluntary participation might reflect individuals with very strong views either way about after-hours, work-related communication and the causes and effects thereof. We acknowledge the potential bias inherent in this as a limitation of the study and that there can be no absolute claim to *complete* representativity. However, we do not believe respondent bias is a serious concern.

The survey instrument did not explore subtle variations in family situations, in terms of shared parenthood and housing responsibility, etc. Only qualitative research is likely shed light on this.

Contemporary approaches to alternative ways of working were not reflected in the survey instrument. For the most part, in attempting to replicate the approach and questions of earlier studies, a conventional physical separation of home and work was adopted. Home-based or home/office-based work situations were not explored. Nor were fly-in-fly-out (FIFO) arrangements, often used for professionals working on remote oil, gas and minerals processing construction projects; or work on overseas projects requiring frequent international travel.

Similarly, the survey instrument did not explore any dimension of positive stress, whereby some *intermittent* work-related stress is seen as beneficial (Dienstbier 1989, Park *et al.* 2011); putting workers “on the edge” and spurring extra effort and creativity, or raising perceptions of self-importance when (occasional) after-hours work-related communication is undertaken.

Sleep quality was measured subjectively rather than objectively and the existence of more objective measures of sleep quality (e.g. actigraphy) is acknowledged (see Powell and Copping 2010, 2016) but they could not be used in an online survey.

The education level of respondents was not included in the analysis because all construction professionals hold at least the minimum registration threshold of education. Whilst qualification levels for registration of construction professionals are very similar in all the cognate disciplines, it is possible that individual professionals may have undertaken further studies.

Importantly, specific media used in work contact were not distinguished in the research. Different media may exert different effects on job pressure and work–family conflict.

Conclusions

First, we achieved the aim of the research by demonstrating the existence of a positive, but complex, inter-relationship between the amount work contact construction professionals engage in, and the levels of work–family conflict, psychological distress and sleep problems they experience.

Second, job pressure plays a pivotal role in that it is strongly associated with work contact, work–family conflict and psychological distress. The construction professions must address the issue of job pressure. The inverse relationship between job control and job pressure should be exploited to potentially reduce levels of work contact and work–family conflict. This, in turn, would help reduce psychological distress and sleep problems. Empowering staff with greater job control will help to alleviate the problem. It is acknowledged that this will be difficult.

Third, the impact of increased work contact on increased work–family conflict is weaker amongst those professionals with greater job control, but stronger among those with more job pressure.

Fourth, female professionals are less involved in work contact, but report experiencing greater job pressure than do males.

Finally, senior professionals engage in higher levels of work contact than do those with less status, but the detrimental effects of this are dampened by the resource of greater job autonomy and control.

Interventions aimed at reducing psychological distress and sleep problems should focus on the reduction of work contact and work–family conflict, particularly among less experienced, female and low-ranking professionals. Responsibility for action lies with employers and individuals alike, but organizational initiatives should be based on clear and transparent communication and mutual trust.

Collectively, these findings provide some insight into the growing phenomenon of sending and receiving after-hours, work-related communication and the impact of job-related demands (job pressures) on its outcomes – in terms of both role functioning and personal wellbeing. Being technologically and more securely tied to work in this way may have unforeseen and far-reaching effects for individual professionals, their families and work organizations. High levels of work contact extend the working day into time that would typically be devoted to family, resulting in elevated work–family conflict. Construction professionals should be aware of the threat to their wellbeing from work contact and should endeavour to set less permeable boundaries between work and family life.

Possible areas for further inquiry into work contact arise from our research. How or why do *individuals* experience and respond to work contact and work–family conflict in the specific and individual ways that they do. This would need the use of qualitative methods. The nuanced effect of alternative ways of working, particularly home-based working, requires further exploration. The influence of additional or postgraduate education on respondents and their experience of workplace stress could be considered in future studies. Future research could investigate how the use of various media in the practice of work contact affects the experience of workplace stress. How does work contact affect productivity? Is work contact associated with forms of workaholism? Do employers regard work contact as a *quid pro quo* – a trade-off expectation against proscribing access to social networking media in the workplace? Finally, what of inter-generational effects?

Our data did not allow us to explore such questions, and they remain speculations that must await future research. In the light of current levels of work contact, and the rapidity of developments in communication media and devices however, that wait cannot be long.

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