

**Paul Bowen, Keith Cattell & Peter Edwards**

---

## **Workplace stress experienced by quantity surveyors**

*Peer reviewed and revised*

### **Abstract**

This article reports on the relationship between workplace stress of quantity surveyors and job demand, control and support factors. Using an online quantitative survey, the perceptions of workplace stress of professional quantity surveyors in South Africa is sought. Particular focus is given to differences in gender, age and ethnicity. Job demand issues explored include working to tight deadlines, working long hours, the work/family balance, and a perceived need to work harder to 'prove oneself'. Job control factors include control over the type of work assigned, the pace of work, the work environment, and the match between authority and responsibility. Job support factors include assistance and support received from line managers and colleagues. Organisational stressors, in the form of job prospects and the general work environment, are also examined.

Findings show that the majority of the respondents experience high levels of stress at work, with females reporting higher levels than males. Younger, more than older colleagues, experience workplace stress, although this may be explained by conditioning over time. The extent to which these professionals are able to control their job situations does not appear to have a major influence on stress. Tight deadlines, long working hours, and a work/family imbalance may play a bigger role. Respondents would appreciate having more time to do a better job. Employees generally do not expect managers and colleagues to consistently make their work easier, but they do believe that colleagues can be relied upon in times of difficulty.

Professional and employer organisations should pay closer attention to the issues concerning workplace stress and implement appropriate policies and measures to counter it. Further research will be undertaken to explore in more detail the relationships between stress and the type of work undertaken.

**Keywords:** Occupational stress, job demands, job control, stressors, quantity surveyors, South Africa

---

Prof. Paul (P.A.) Bowen, Department of Construction Economics and Management, University of Cape Town, Private Bag, Rondebosch 7701, Cape Town, South Africa. Phone: +27 (0)21 650 3443, email: <paul.bowen@uct.ac.za>

Prof. Keith (K.S.) Cattell, Head of Department of Construction Economics and Management, University of Cape Town, Private Bag, Rondebosch 7701, Cape Town, South Africa. Phone: +27 (0)21 650 2452, email: <keith.cattell@uct.ac.za>

Prof. Peter (P.J.) Edwards, School of Property, Construction & Project Management, RMIT University, GPO Box 2476, Melbourne, 3001, Australia. Phone: +61 3 9925 2198, email: <peter.edwards@rmit.edu.au>

## Abstrak

Hierdie artikel doen verslag oor die verband tussen bourekenaars se beroepspanning en werkkuitdagings, beheer en ondersteuningsfaktore. 'n Aanlyn kwantitatiewe opname word gedoen en die siening van werksplekspanning onder professionele bourekenaars in Suid-Afrika word nagevors. Daar is in besonder gefokus op verskille in geslag, ouderdom, en etnisiteit. Teikendatums, lang werksure en die wanbalans tussen werk en familie asook die behoefte om harder te werk om 'jouself te bewys' is van die beroepseise wat ingesluit is. Beheer oor die tipe werk wat gedoen word, die werkspas, die werksomgewing en die toets tussen gesag en verantwoordelikheid is werksbeheerfaktore wat ingesluit is. Werkondersteuningsfaktore sluit in hulp en ondersteuning van bestuurders en kollegas. Organisasiestressors in die vorm van werksvooruitsigte en die werksomgewing word ook getoets.

Resultate toon dat die meeste deelnemers hoë vlakke van spanning by die werk ondervind en dat die vroulike geslag se spanningsvlakke hoër is as dié van die manlike geslag. Jong mense beleef meer spanning as hul ouer kollegas, wat meer beheer het as gevolg van jare se ondervinding. Die mate waartoe hierdie professionele werkers hul werksituasies kan beheer, beïnvloed waarskynlik nie hul werkspanning nie. Teikendatums, lang werksure en die wanbalans tussen werk en familie speel moontlik 'n groter rol. Deelnemers dui aan dat hulle dit sal waardeur indien daar meer tyd toegelaat kan word sodat hulle werk van 'n beter gehalte kan doen en, alhoewel hulle nie van hul bestuurders en kollegas verwag om hul werk deurentyd makliker te maak nie, glo hulle tog dat hulle op hul kollegas kan staatmaak in moeilike omstandighede.

Professionele en werkgewersorganisasies behoort meer aandag te gee aan probleme wat te doen het met werkplekspanning en behoort 'n toepaslike beleid in werking te stel en toe te pas om werkspanning te verminder. Verdere navorsing sal gedoen word om die verband tussen spanning en die tipe werk wat gedoen word, vas te stel.

**Slutelwoorde:** Beroepspanning, werkseise, werksbeheer, stressore, bourekenaars, Suid-Afrika

## 1. Introduction

Many authors have pointed to the stressful nature of working in the construction industry (Lingard & Francis, 2004: 991; Pocock, Skinner & Williams, 2007: 31; Love, Edwards & Irani, 2010: 650). Construction professionals are responsible for the safe delivery of projects, on time, within budget and capable of satisfying client requirements. Project work is characterised by considerable dynamism and uncertainty, elevating its stressful nature (Williams, 1999: 272; Asquin, Garel & Picq, 2010: 166; Mohr & Wolfram, 2010: 168). Work hours in construction are long (Van Wanrooy & Wilson, 2006: 352) and the ability to meet project objectives is often compromised by unexpected events (Miceli & Castelfranchi, 2005: 291; Leung, Chan & Yuen, 2010: 1094). Interpersonal and inter-role conflict (Leung, Skitmore & Chan, 2007: 1064; Loosemore & Galea, 2008: 127), well established stressors, as

well as 'burnout' (Lingard, 2003: 69; Lingard & Francis, 2004: 162) characterise the industry.

Stress is a major challenge to the health of working people (HSE, 2006: 31). Houtman (2005: 2) reports that work-related stress was the second most common work-related health problem found in a survey across 15 European Union countries. The European Working Conditions survey indicates that work intensity and quantitative demands have increased, particularly up to the mid-1990s and in the period between 1996 and 2001, and that job autonomy has decreased (Gallie, 2005: 352). The increasing significance of work stress was recognised in the European Commission's Strategy on Health and Safety at Work 2002-2006, which identified psychosocial issues as an emerging occupational health and safety priority risk area (Commission of European Communities, 2002: 3).

Previous studies of workplace stress in construction have focused on site managers (Djebarni, 1996: 281), construction labourers (Goldenhar, Williams & Swanson, 2003: 218), construction managers (Lingard & Francis, 2004: 991), estimators (Leung *et al.*, 2007: 1063), architects (Sang, Dainty & Ison, 2007: 1305), and construction project managers (Leung, Chan & Olomolaiye, 2008: 644).

This present research forms part of a larger study examining the workplace stress experienced by construction professionals in South Africa. This study focuses on the relationship between workplace stress and job demand, control and support factors, the effects of workplace stress, the coping mechanisms adopted by professionals in an attempt to militate against the effects of stress, and the role of harassment and discrimination as work-related stressors. Data were collected from architects, engineers, quantity surveyors, as well as project and construction managers via an on-line survey (N=676). Earlier articles have reported on the comparative levels of perceived job stress and job demand, control and support (JDC/S) factors (Bowen, Edwards & Lingard, 2013a: 393); the comparative relationship between job stress and harassment and discrimination at work (Bowen, Edwards & Lingard, 2013b: 620); stress, stress effects and coping mechanisms (Bowen, Edwards, Lingard & Cattell, 2013c), and predictive modelling of stress as a function of JDC/S factors (Bowen, Edwards, Lingard & Cattell, 2013d).

Using the data emanating from the quantity surveyor respondents, this article reports on the relationship between quantity surveyors' workplace stress and job demand, control and support factors. It focuses, in particular, on differences in gender, age and ethnicity. Job demand issues explored include working to tight deadlines,

working long hours, the work/family balance, and a perceived need to work harder to 'prove oneself'. Job control factors include control over the type of work assigned, the pace of work, the work environment, and the match between authority and responsibility. Job support factors include assistance and support received from line managers and colleagues. Organisational stressors, in the form of job prospects and the general work environment, are also examined.

The contribution of this work lies in its examination of the work stress experienced by quantity surveyors in a developing country characterised by economic hardship and social problems.

## **2. Workplace stress**

According to Karasek (1979: 285), the relationship between work and health can be explained by the combination of demands and control inherent in a job. The Job Demand-Control (JDC) model of workplace stress posits that work that is simultaneously high in demands and low in control produces the most stressful responses and is most damaging to health (Belkic, Landsbergis, Schnall & Baker, 2004: 86; De Lange, Taris, Kompier, Houtmans & Bongers, 2004: 160).

Later adaptations of Karasek's JDC model have incorporated workplace support as a resource that, together with control, can mitigate the extent to which job demands induce harmful effects in workers (Schaufeli & Bakker, 2004: 908). Thus, Johnson, Hall & Theorell (1989: 272) suggest that social support from one's colleagues or supervisor serves to reduce the damaging impact of stressful work situations on workers' health. Social support is defined as "instrumental aid, emotional concern, informational, and appraisal functions of others in the work domain that are intended to enhance the wellbeing of the recipient" (Michel, Mitchelson, Pichler & Cullen, 2010: 92).

According to the Job Demands-Control-Support (JDC-S) theory of workplace stress, jobs that are high in demands, low in control and low in workplace social support are experienced as the most stressful and produce the most damaging health impacts. When employees perceive an imbalance between work demands and their personal or environmental resources, a range of stress responses can occur, including physiological, emotional and behavioural responses that have a damaging impact on workers' health, work performance and relationships (Houtman, 2005: 2).

Organisations differ in physical structures as well as in the attitudes and behaviours they elicit in people (Sharma, 2013: 212). According to French, Kast & Rosenzweig (1985), organisational climate is an enduring quality of the internal environment of an organisation as perceived and experienced by its members, which influences their behaviour, and can be described in terms of the values of a particular set of characteristics (or attributes) of the organisation. These characteristics form the organisational culture, and their perceived presence and strength combine to form the organisational climate. McShane & Travaglione (2003) suggest that organisational culture shapes the way in which an organisation interacts with its environment, and the actions chosen to be implemented. Assumptions, beliefs and values can be difficult to observe as they are learnt and often unconsciously followed by employees. Cultural values include those which are being sought by the organisation (espoused values) and those which are currently in use (enacted values). The latter tend to guide individual decisions and actions. Organisation cultures may be overtly or covertly exhibited in an organisation. They can also appear as counter subcultures within larger organisations, and thus conflict with an espoused corporate culture.

Thompson, Stradling, Murphy & O'Neill (1996: 647) found that stress and strain conditions were significantly less favourable in organisations with a negative organisational climate (characterised by employee perceptions of high compliance expectations, lower individual recognition and supervision, and lower employee autonomy), compared to organisations that were not so characterised.

Sharma (2013: 212) identifies fear of job redundancy, lack of job security, non-commensurate wages with levels of responsibility, under-participation in decision-making, office politics and conflicts, and interpersonal relations as important determinants of occupational stress.

Newton & Jimmieson (2006) examined the relationship between organisational culture and occupational stress. They report that an employee's 'fit' with the organisational culture is important, and that for some employees, workplace events are viewed as more of a challenge than stressful, and that these employees tend to more closely identify themselves with the organisation.

### **3. Workplace stress and the construction industry professions**

The construction industry is a high-risk industry for work stress (Pocock *et al.*, 2007: 31) and several contributory factors have been identified. Sutherland & Davidson (1989: 226) identify inadequacy of information flow, onerous paperwork and excessive workload as the top three stressors among construction site managers. Leung *et al.* (2007: 1067) report high levels of objective stress (i.e., stress associated with external demands such as deadlines, time constraints and workload) in construction estimators, associated mainly with a perceived lack of autonomy and/or low levels of reward. In a study of Hong Kong construction industry employees, onerous bureaucracy, a lack of opportunity to learn new skills and work-family conflict were ranked as the three most difficult stressors to manage (Ng, Skitmore & Leung, 2005: 273).

The experience of work stress is associated with low levels of job performance in construction. Djebarni (1996: 281) reports a curvilinear relationship between stress and leadership performance among construction site managers. However, Leung *et al.* (2008: 648) provide no evidence for a curvilinear relationship between stress and performance. Indeed, they report that the task performance of construction project managers is inversely and linearly linked to stress. Leung *et al.* (2008: 648) suggest that the stress levels of construction project managers in their sample may be higher than the threshold value at which the 'inverted U-curve' effect would apply.

In Australia, Haynes & Love (2004: 137) identified workload, long hours and insufficient time with family as the three most significant stressors experienced by construction project managers. However, there is evidence that work stress is experienced to varying degrees, depending on the nature of employment in the construction industry. Love *et al.* (2010: 655) report that construction professionals, who are working for construction contracting organisations, experience higher levels of stress and lower levels of workplace support than construction professionals working for consulting organisations. Similarly, Lingard & Francis (2004: 998, 996) found that site-based construction professionals worked longer hours and experienced higher levels of burnout than their counterparts working in the head or corporate offices of the same organisations.

Research suggests that female construction professionals experience higher levels of work stress than their male counterparts. In a comparative study of architects, project managers, engineers,

quantity surveyors and construction managers, Bowen *et al.* (2013a: 393) found that proportionately more females reported higher levels of stress than males. In a comparative analysis of male and female architects, Sang *et al.* (2007: 1305) report that female architects experienced significantly higher levels of work-family conflict and reported lower levels of job satisfaction and higher turnover intention than their male counterparts.

Previous research has shown that construction professionals experience high levels of work stress. However, this research has almost always taken place in developed economies, such as Australia (Lingard & Francis, 2009; Love *et al.*, 2010), the United Kingdom (UK) (Djebani, 1996) or Hong Kong (Leung *et al.*, 2007; 2008). Consequently, the extent to which the findings apply to developing countries such as South Africa is not known. Moreover, few studies have focussed on the quantity surveying profession. This research aims to:

- Explore workplace stress levels among quantity surveyors in the developing nation of South Africa, and
- Examine the relationship between job demand, control and support factors and perceived levels of workplace stress of quantity surveyors in the South African construction industry context.

The research questions posed in the study are: To what extent do South African quantity surveyors perceive themselves to be stressed at work? What is the relationship between workplace stress and job demand, control and support factors?

#### **4. Research method**

A questionnaire survey was chosen as a suitable method of collecting data for the initial stage of the research, since it allows wide coverage of the quantity surveying profession in South Africa and follows the approach used by earlier researchers. Surveys are a convenient, relatively inexpensive and effective way of obtaining a broad 'snapshot' view of peoples' perceptions and opinions, but usually need to be followed up with case-based methods when issues require exploration in greater depth.

The survey sought demographic, cultural and professional background information from respondents; determined their currently perceived levels of workplace stress; explored their work situations in terms of job demands and job control, and examined organisational stressors such as job security and perceived support

in the workplace. The catalogue of questions was drawn from the works of Sutherland & Davidson (1989: 221) on communication, workload, conflict and social support; Haynes and Love (2004: 129) on workload and work/family imbalances; Ng *et al.* (2005: 264) on working relationships, communication and personal factors; Leung *et al.* (2007: 1063, 2008: 644) on job demands, control and support; Leung, Chan & Yu (2009: 127) on stress and stressors; Love *et al.* (2010: 650) on stress, support and mental health, and Leung, Chan & Chen (2011: 312) on job stress, burnout and physiological stress. Likert scales (Kline, 2000a: 95) were generally used for rating-type questions.

Whilst no definitions of the various constructs *per se* were provided, the information in the covering letter to the questionnaire, the information in the Introduction to the questionnaire, and (indeed) the actual questions themselves provide ample insight into the issues of stress, and job demand, control and support factors. As noted earlier, the questions relating to this study constitute a subset of a wider group of questions in the questionnaire – dealing with job demand, control and support factors, coping mechanisms, as well as harassment and discrimination at work. The pilot study also served to confirm the efficacy of the questionnaire.

Occupation stress indicator (OSI) scales (involving appropriate subscales of, and sub-subscales within job satisfaction; mental and physical health; personality type; control; job pressure, and coping with stress) are extremely complex and not without considerable criticism (Kline, 2000a: 631). The development of such a scale is beyond the scope of this article. The 10-point stress 'scale' used in this study can more properly be described as a form of 'perception metric', indicating the degree of a condition being perceived to be felt at a point in time. Such metrics are used by social psychologists (Kline, 2000b: 122).

Exploratory factor analysis (EFA) was not performed on the job demand, control and support variables. EFA is a data-reduction technique, essentially reducing a large set of variables into smaller sets or components (Pallant, 2010: 181). It is used in the compilation of tests and scales. Factor analysis (FA) helps create coherent subscales from an initial, large number of individual scale items or questions. We are not developing a psychometric scale.

The purpose of this article was not to examine the 'causal' relationships between a dependent variable (stress) and a series of predictor variables. It was never the intention to derive a predictive model; hence, regression analysis (logistic or hierarchical) was not performed.

The difficulty associated with demonstrating validity in questionnaire surveys is acknowledged (Platt, 2001: 33). The analysis is based mainly on statistical significance testing. Consequently, the results do not establish with any certainty a 'causal' link between any of the demographic, job demand, control and support factors, and perceived workplace stress levels. The results may be suggestive of such links, but more in-depth research would be necessary to establish its validity. This study adopted a self-reporting survey measurement method. Therefore, the findings may have the potential risk of common method variance and the validity of data may be questioned. However, it should be noted that the metrics used in this study were based on issues highlighted in the stress management and construction literature. The sample size, to some extent, militates against validity concerns, as do the significance of the correlations between perceived workplace stress level and the job demand, control and support variables. The Cronbach's alpha for each scale (reported below) ranged from 0.75 to 0.78, indicating internal consistency.

Ethical considerations in the form of the absence of deception; privacy and confidentiality, and accuracy were observed (Christians, 2005: 139). Institutional ethical clearance was also obtained.

Following a pilot online study to test the adequacy of the questionnaire, the full survey was conducted between September and November 2010 and administered as an Internet web-based online instrument, as this allowed easy and inexpensive coverage of quantity surveyors registered with their statutory council. Professional registration of quantity surveyors is a legal requirement in South Africa. Undertaking the survey through the auspices of the statutory council provided a valid way of targeting the sample group.

A total of 1.449 quantity surveyors received the request to participate in the survey, of whom 177 completed the questionnaire online. Discounting email 'bounces', this represents a response rate of 12.2%. This level of response is typical for web-based surveys of this nature (Fricker, 2008: 207).

The response data were analysed using the Statistical Package for the Social Sciences (SPSS) (Ver. 21.0 for Mac) software application. Where cross-tabulation was used to establish degrees of association between categorical variables, Pearson's chi-square test (or Fisher's Exact Test, where applicable) for independence was applied at the 5% ( $p=0.05$ ) level of significance. Ethnic differences were analysed by grouping the responses to the 'African', 'Indian', and 'Coloured' (mixed race) options in the questionnaire together as 'Black'

because of the comparatively small numbers of respondents in the separate categories.

## **5. The results**

### **5.1 Sample profile**

The majority of the respondent quantity surveyors are male (80%), White (81%), married (including common law marriages) (77%), English-speaking (53%), and older than 40 years (59%). Whilst nearly two-thirds of all respondents are at least 40 years old, 40% are older than 50 years. The majority of the respondents are located in the more populous provinces of Gauteng (44%), Western Cape (22%), KwaZulu-Natal (12%) and the Eastern Cape (11%). Compared to the SACQSP statistics, female quantity surveyors are over-represented in this study (20% compared to 12%). The biases of the sample in terms of gender, ethnicity, and age should be borne in mind when drawing inferences from the data.

Nearly half of the respondents report more than 20 years' experience, and a quarter have at least 10 years' experience. Experience is significantly related to gender ( $p=0.005$ ) and to race ( $p<0.001$ ), with White male quantity surveyors having worked longer, while 40% of respondents have been with their present firm for five or less years, and 22% in excess of 20 years. Service length is significantly related to gender ( $p<0.001$ ) and race ( $p=0.004$ ), and White males have worked longer for their current firms than females and other ethnic groups.

Overall, the response sample may generally be described as experienced quantity surveying practitioners in private practice, mostly White, male, English-speaking, in a stable relationship, and in a stable work environment.

### **5.2 Overall levels of workplace stress**

Using a 10-point scale (1=minimum stress; 10=maximum stress, with no defined intermediate scale intervals), survey respondents were asked to rate the level of stress that they currently perceive themselves to experience at work. The results are shown in Table 1.

Table 1: QS survey respondents' self-assessment of workplace stress (n=160)

<i>Perceived levels of workplace stress</i>	<i>Frequency(%) (n)</i>
Level 1 (minimum)	4% (n=6)
Level 2	6% (n=10)
Level 3	10% (n=16)
Level 4	9% (n=14)
Level 5	10% (n=17)
Level 6	16% (n=25)
Level 7	21% (n=33)
Level 8	17% (n=27)
Level 9	6% (n=10)
Level 10 (maximum)	1% (n=2)
Mean score (+/- standard error)	5.76 (+/- 0.18)

Notes: Scale values: 1=minimum stress; 10=maximum stress (no intermediate scale interval definitions). Level of stress is significantly related to gender ( $p=0.042$ ), but not to race or age.

Quantity surveyors appear to be highly stressed at work (45% report a stress level of '7' or above) and only 39% report a stress level of '5' or less. The mean stress level scale value reported is 5.76, i.e., respondents generally perceive themselves as experiencing more stress than not. Stress level is not significantly related to ethnicity ( $p=0.719$ ) or age ( $p=0.636$ ), but is to gender ( $p=0.042$ ), with proportionately more women respondents than men reporting high levels of stress compared to their male counterparts.

It can thus be inferred that stress levels experienced by quantity surveyors in South Africa are relatively high, particularly for females.

### 5.3 Job demands

Respondents were asked to rate the nature and effect of their workplace demands. Factors explored include working to tight deadlines; having to work long hours (at work and/or at home); inadequate time to balance work/family responsibilities; actual hours worked, and the need to work harder than others to 'prove' oneself. Except for hours worked per week (grouped in seven time bands), these factors were assessed in terms of 5-point Likert scales vectored from most to least. Tables 2 and 3 depict the results.

Perceived workplace stress level is significantly related to working to tight deadlines ( $p=0.054$ ), working long hours ( $p=0.021$ ), and inadequate time to balance work/family responsibilities ( $p<0.001$ ) (see Table 9).

Table 2: QS survey respondents' self-assessment of job demands

<i>Job demand factors</i>	<i>Frequency (Most of the time/ frequently) (%) (n)</i>	<i>Mean rating value (+/- standard error)</i>
Work to tight deadlines (n=175)	90% (n=158)	1.65 (+/- 0.05)
Work long hours (n=175)	67% (n=118)	2.09 (+/- 0.07)
Inadequate time to balance work/family responsibilities (n=175)	51% (n=89)	2.45 (+/- 0.08)
Need to work harder than others to 'prove' yourself (n=142)	39% (n=56)	2.75 (+/- 0.10)

Notes: Scale values: 1=most of the time; 2=frequently; 3=sometimes; 4=seldom; 5=very seldom. The statistics exclude 'not applicable' responses. None of the job demand factors are significantly related to gender, race, or age.

The majority of the respondent quantity surveyors (90%) report having to work to tight deadlines more often than not (Table 2: mean rating score = 1.65). Similarly, many (67%) find it necessary to work long hours (Table 2: mean rating score = 2.09). This finding aligns with the actual hours worked per week (see Table 3), where 35% of respondents report working more than 50 hours per week. At least 18% of the respondents claim to work more than 55 hours per week.

Table 3: QS survey respondents' reported hours worked per week (n=175)

<i>Hours worked per week</i>	<i>Frequency (%) (n)</i>
31-35 hrs (1)	3% (n=5)
36-40 hrs (2)	5% (n=8)
41-45 hrs (3)	23% (n=41)
46-50 hrs (4)	34% (n=59)
51-55 hrs (5)	17% (n=30)
56-60 hrs (6)	14% (n=24)
>60 hrs (7)	4% (n=8)
Mean score (+/- standard error)	4.17 (+/- 0.10)

Note: Hours worked per week is not significantly related to gender, race, or age.

When actual hours worked are considered in terms of gender, race and age, none of the relationships are statistically significant. Against a background of the changing nature of the workforce, changing family structures and dynamics, and the demands of organisations, Lingard & Francis (2009: 2) emphasise the importance of work/life balance in the construction industry. In the current survey, the mean rating score for quantity surveyors (Table 2: <2.5) indicates that their *inability* to successfully balance work/family responsibilities occurs more often than not. Differences of perceptions of work/life imbalance in terms of gender, race and age are not significant: the perception is uniform. A minority (39%) of respondent quantity surveyors perceive a (self-imposed) need to work harder than other colleagues in the same firm in order to 'prove' themselves (Table 2: 39%; mean rating score = 2.75), but differences in terms of gender, race and age are not significant for this factor.

In addition to examining each of the five job demand factors as individual indicators of workplace demands, an overall job demand scale was computed by summing all items in the direction of greater job demand (Pallant, 2010: 87). All demand factors, except hours worked per week, were reverse-coded for this purpose. Scale scores thus represent the sum total of the endorsed items, and range from 5 to 27, with 27 representing the highest level of job demand. The job demand scale score was internally consistent,  $\alpha = 0.76$ .

#### **5.4 Job control**

Survey participants were asked to rate their perceived degree of control over workplace tasks; their pace of work; their work environment, and whether or not an imbalance exists between their responsibility and level of authority. A 5-point Likert scale was used in each case. For the first three factors, the scale intervals corresponded to 1=total control; 2=a lot of control; 3=some control; 4=a little control, and 5=no control. For the fourth factor (responsibility/authority), the scale intervals were 1=strongly agree; 2=agree; 3=neutral; 4=disagree; 5=strongly disagree. Responses to each of the four job control factors were examined first as individual indicators of workplace control. A job control scale was then computed by summing all items in the direction of greater job control. All control factors were reverse-coded for this purpose. Scale scores represent the sum total of the endorsed items, and range from 4 to 20, with 20 representing the highest level of job control. The job control scale score was internally consistent,  $\alpha = 0.75$ . The results are depicted in Table 4. None of the job control factors are significantly related to perceived level of workplace stress (see Table 9).

Table 4: QS survey respondents' self-assessment of degree of job control

<i>Job control factor</i>	<i>Frequency(total control/a lot of control) (%) (n)</i>	<i>Mean rating value (+/- standard error)</i>
Type of work assigned (n=177)	79% (n=140)	1.86 (+/- 0.06)
Pace of work (n=177)	65% (n=115)	2.12 (+/- 0.08)
Work environment (n=175)	61% (n=106)	2.30 (+/- 0.07)
Job lacks the requisite authority to match the responsibility (n=177)	45% (n=79)	2.95 (+/- 0.10)

Notes: Scale values: 1=total control; 2=a lot; 3=some; 4=a little; 5=no control. Gender is significantly related to task assignment ( $p=0.009$ ), pace of work ( $p=0.024$ ), and an authority/ responsibility imbalance ( $p=0.022$ ). None of the job control factors are significantly related to race. Age is significantly related to task assignment ( $p=0.012$ ), pace of work ( $p=0.007$ ), and work environment ( $p=0.029$ ).

The majority of the respondents report having considerable control ('a lot' or 'total control') over their task assignment (79%), pace of work (65%), and work environment (61%). An imbalance between authority and responsibility is reported by just under half of QS respondents (45%). The respective mean rating scores for the four job control variables are 1.86, 2.12, 2.30, and 2.95, respectively (see Table 4).

Gender difference is significantly related to task assignment ( $p=0.009$ ), pace of work ( $p=0.024$ ), and an authority/responsibility imbalance ( $p=0.022$ ). Proportionately more women than men consider this to be the case. None of the job control factors are significantly related to race. Age is significantly related to task assignment ( $p=0.012$ ), pace of work ( $p=0.007$ ), and work environment ( $p=0.029$ ). Note that cross-tabulation is not shown in this instance.

## 5.5 Job support

Using 6-point Likert scales (1=most of the time; 2=frequently; 3=sometimes; 4=seldom; 5=very seldom; 6=not applicable), survey participants were asked about the extent of support received from line managers and colleagues at work in terms of making an effort to make life easier at work and being relied upon to help when a difficult situation arises. The results are given in Table 5. The option of 'not applicable' was included to cater for instances such as sole practitioner firms. The analysis excludes those responses. After examining each factor as individual indicators of job support, a job support scale was computed by summing all items in the direction

of greater job support, with total scores ranging between 4 and 20, and 20 representing the highest level of job support. All support factors were reverse-coded for this purpose. This scale was internally consistent,  $\alpha = 0.78$ .

Table 5: QS survey respondents' assessment of the frequency of support experienced at work

Types of support received at work (n=total applicable responses)	Frequency(most of the time/frequently) (%) (n)	Mean rating value (+/- standard error)
Effort by line manager to make work-life easier (n=111)	23% (n=26)	3.27 (+/- 0.11)
Assistance by line manager in difficult situations (n=113)	46% (n=52)	2.73 (+/- 0.11)
Efforts by colleagues to make work-life easier (n=145)	29% (n=42)	3.08 (+/- 0.08)
Assistance by colleagues in difficult situations (n=151)	47% (n=71)	2.64 (+/- 0.09)

Notes: Scale values: 1=most of the time; 2=frequently; 3=sometimes; 4=seldom; 5=very seldom. The statistics exclude 'not applicable' responses. Gender is significantly related to assistance from colleagues in difficult situations ( $p=0.044$ ). Race is significantly related to assistance from a line manager in difficult situations ( $p=0.003$ ). None of the job support factors are significantly related to age.

Support at work is strongly related to perceived level of workplace stress (see Table 9), most notably in the form of efforts by colleagues to make work-life easier ( $p<0.001$ ) and to provide assistance in difficult situations ( $p<0.001$ ). Of all respondents to this question, only 23% report that their *line managers* most of the time or frequently make an effort to make their lives easier at work. Differences in terms of gender, race and age are not significant. However, when considering support from line managers in difficult situations at work, nearly half (46%) of all the respondents believe that such support is forthcoming most of the time or frequently. Proportionately more White than Black respondents feel that this support is forthcoming ( $p=0.003$ ), but gender and age are not found to be significantly related to expectations of manager support.

Identical questions were posed to participants in respect of support emanating from *colleagues*. Whilst work colleagues are generally perceived as making more of an effort (than managers) in making their lives easier at work, the overall situation is perceived by

respondents as being much the same. Only 29% believe that their colleagues make their lives easier most of the time or frequently, whereas 47% think that colleagues assist with difficult situations frequently or most of the time. Of the demographic factors, only gender is significantly related to colleagues' assistance with difficult situations ( $p=0.044$ ), with proportionately more men reporting this than women. Note that cross-tabulation is not shown in this instance.

### 5.6 Workplace stress mean scores, and job demand, control and support scale scores: by gender, race and age

The results of this analysis are depicted in Table 6. Despite males reporting significantly lower levels of perceived workplace stress than their female counterparts ( $p=0.042$ ), when the job demand, control, and support scale scores are considered, no significant differences for gender and ethnicity emerged. However, in terms of age, younger (<45 years) respondents report significantly higher levels of perceived workplace stress than do older colleagues ( $p=0.050$ ). Older colleagues report lower levels of job demands, greater job control, and greater job support, but the differences are not significant. The finding with respect to age essentially 'mirrors' that relating to gender in perceived levels of stress.

Table 6: Workplace stress mean scores, and job demand, control and support scale mean scores for quantity surveyors: by gender, race and age

	Mean	SD	Mean	SD	p-value
<i>Scores by gender</i>	<i>Male</i>		<i>Female</i>		
Workplace stress score (1=minimum stress; 10=maximum stress)	5.44	2.25	6.83	1.56	0.042*
Job demands scale score (score range 5-27) (R)	19.08	3.63	19.45	3.54	0.612
Job control scale score (score range 4-20) (R)	14.91	2.29	13.94	2.21	0.440
Job support scale score (score range 4-20) (R)	12.33	3.33	11.46	3.39	0.179
<i>Scores by race</i>	<i>White</i>		<i>Black</i>		
Workplace stress score (1=minimum stress; 10=maximum stress)	5.74	2.25	6.04	1.91	0.719
Job demands scale score (score range 5-27) (R)	19.22	3.67	19.46	3.50	0.420
Job control scale score (score range 4-20) (R)	14.68	2.35	14.97	2.16	0.672

Job support scale score (score range 4-20) (R)	12.33	3.33	11.26	3.43	0.900
Scores by age	Older (≥45 yrs)		Younger (<45 yrs)		
Workplace stress score (1=minimum stress; 10=maximum stress)	5.38	2.40	6.15	1.96	0.050*
Job demands scale score (score range 5-27) (R)	18.87	3.55	19.58	3.68	0.273
Job control scale score (score range 4-20) (R)	15.08	2.29	14.42	2.29	0.282
Job support scale score (score range 4-20) (R)	12.31	3.36	11.97	3.38	0.840

Notes: \* $p \leq 0.05$ ; R=reversed. Scores for all QS respondents are: mean stress=5.76 (SD=2.22); job demand score=19.27 (SD=3.63); job control score=14.74 (SD=2.31), and job support score=12.11 (SD=3.36). Level of workplace stress is significantly related to gender ( $p=0.042$ ) and age ( $p=0.050$ ). The job demand, control, and support scale scores are not significantly related to gender, race, or age.

## 5.7 Organisational stressors

Aside of job demand, control and support factors *per se*, additional (organisational) stressors relating to job certainty and opportunities as well as to human relations aspects of the work environment were examined.

### 5.7.1 Job certainty and opportunities

Survey respondents reported their perceptions of job security, the existence of promotion opportunities within the industry, and alternative job opportunities. Five-point Likert scales (1=strongly agree; 2=agree; 3=neutral; 4=disagree; 5=strongly disagree) were used. This scale was internally consistent,  $\alpha = 0.76$ . The results are given in Table 7. None of these factors are significantly related to workplace stress level (see Table 9). Mean rating scores (Table 7: >2.5) for all factors indicate that, overall, the issues of job security and promotion and alternative employment opportunities are more negatively than positively perceived. While 51% of the respondents feel positive about their job security, only 33% feel optimistic about promotion opportunities, and only 29% consider themselves capable of getting an equivalent job within a reasonably short period.

Table 7: QS survey respondents' assessment of the existence of job certainty issues

<i>Existence of job stability and prospects</i>	<i>Frequency(Strongly agree/agree) (%) (n)</i>	<i>Mean rating value (+/- standard error)</i>
Job security (n=170)	51% (n=86)	2.68 (+/- 0.08)
Job promotion (n=169)	33% (n=55)	2.90 (+/- 0.08)
Ability to secure a similar level job reasonably quickly (n=169)	29% (n=49)	3.12 (+/- 0.08)

Notes: Scale values: 1=strongly agree; 2=agree; 3=neutral; 4=disagree; 5=strongly disagree. Gender is related to perceptions of job promotion ( $p=0.003$ ). None of the job certainty issues are significantly related to race or age.

None of the other job security issues are significantly related to gender, race or age. The factor cross-tabulation is not shown in this instance.

### 5.7.2 The work environment

Survey participants were asked to comment on their general working environment with respect to a variety of issues, namely their freedom to speak freely and frankly about matters concerning them; whether or not they argue frequently with line managers, colleagues or clients; if they feel that they could do a better job if more time was available; whether or not they are given opportunities to improve or perfect their skills, and whether or not they feel fairly compensated for the work done and hours devoted. The results are depicted in Table 8. Six-point Likert scales (1=strongly agree; 2=agree; 3=neutral; 4=disagree; 5=strongly disagree, and 6=not applicable) were used. The 'not applicable' responses relating to the skills improvement question were excluded from the analysis for the reason described earlier. This scale was internally consistent,  $\alpha = 0.57$ . Perceived workplace stress level is significantly related to the perception of being able to do a better job if more time was available ( $p<0.001$ ), and to the freedom to speak openly about issues of concern ( $p=0.054$ ) (see Table 9).

Table 8: QS survey respondents' agreement with work environment factors

Work environment factors	Frequency(Strongly agree/agree) (%) (n)	Mean rating value (+/- standard error)
Freedom to honestly say what I feel and get things off my chest (n=176)	63% (n=110)	2.34 (+/- 0.08)
Argue frequently with line managers, colleagues or clients (n=177)	16% (n=28)	3.55 (+/- 0.08)
Could do a much better job if there was more time (n=175)	68% (n=119)	2.20 (+/- 0.08)
Opportunities to improve skills (n=170)	37% (n=63)	2.81 (+/- 0.08)
Fairly compensated for the work I do and the hours I devote (n=175)	55% (n=96)	2.62 (+/- 0.08)

Notes: Scale values: 1=strongly agree; 2=agree; 3=neutral; 4=disagree; 5=strongly disagree. Gender and age are significantly related to freedom of expression ( $p=0.004$  and  $p=0.043$ , respectively), and race is significantly related to being fairly compensated ( $p=0.020$ ).

The majority (63%) of the respondents consider themselves able to speak openly about matters of concern (Table 8: mean rating score = 2.34). Both gender ( $p=0.004$ ) and age ( $p=0.043$ ) are significantly related to this issue. Proportionately more men than women, and older rather than younger quantity surveyors, consider themselves able to speak freely.

When arguments with line managers, clients and colleagues are considered, only 16% of the respondents believe that this occurs frequently (Table 8: mean rating score = 3.55), and differences in terms of gender, race and age are not significant.

Over two thirds (68%) of the respondents claim that they could do a better job if given more time (Table 8: mean rating score = 2.20). Differences in terms of gender, race and age are not significant. Over a third (37%) of the quantity surveyors report that they are given opportunities to improve their skills (Table 8: mean rating score = 2.81). Again, differences in terms of gender, race and age are not significant.

Slightly more than half (55%) of the respondents consider themselves to be fairly remunerated in terms of work done (Table 8: mean rating score = 2.62). However, differences in terms of ethnicity are significant,

in this instance ( $p=0.020$ ), with proportionately fewer Whites considering themselves unfairly compensated for their efforts, and 25% of Black quantity surveyors considering themselves 'underpaid'.

Table 9: Cross-tabulation of perceived workplace stress level with job demand, control and support factors and general working environment factors

<i>JDC/S factors</i>	<i>p-value</i>
<i>Job demand factors</i>	
Work to tight deadlines (n=160)	0.054*
Work long hours (n=160)	0.021*
Inadequate time to balance work/family responsibilities (n=160)	<0.001*
Hours worked per week (n=160)	0.311
Need to work harder than others to 'prove' yourself (n=128)	0.064
<i>Job control factors</i>	
Type of work assigned (n=160)	0.747
Pace of work (n=160)	0.527
Work environment (n=158)	0.228
Job lacks the requisite authority to match the responsibility (n=160)	0.209
<i>Job support factors</i>	
Effort by line manager to make work-life easier (n=105)	0.049*
Assistance by line manager in difficult situations (n=107)	0.391
Efforts by colleagues to make work-life easier (n=137)	<0.001*
Assistance by colleagues in difficult situations (n=142)	<0.001*
<i>General work environment factors</i>	
Job security (n=160)	0.133
Job promotion (n=160)	0.747
Ability to secure a similar level job reasonably quickly (n=160)	0.797
Freedom to honestly say what I feel and get things off my chest (n=159)	0.054*
Argue frequently with line managers, colleagues or clients (n=160)	0.287
Could do a much better job if there was more time (n=160)	<0.001*
Opportunities to improve skills (n=155)	0.123
Fairly compensated for the work I do and the hours I devote (n=160)	0.058

Note: \*p  $\leq$  0.05

## 6. Discussion

This section considers the nature of professional quantity surveying work in the construction industry and how this might relate to stress. The focus then shifts to stress-related issues such as job demands, job control, support at work, job opportunities, work/life balance, and the work environment, taking into account gender, age and ethnicity differences where these are relevant.

### 6.1 The nature of professional work in the construction industry

Professional work in the construction industry is characterised by two features that are common to the professions of architecture, engineering, quantity surveying, and project and construction management.

First, more often than not, the work involves multitasking on multiple projects. Few construction industry professionals enjoy the luxury of engaging in one task on one project only. In addition, high levels of task differentiation and interdependence are usually encountered; i.e., multitasking involves a substantial number of different tasks (frequently across different projects). Many of those tasks have interrelated dependencies, thus rendering the professional work itself as complex as the projects upon which it is performed (Williams, 1999: 272; Asquin *et al.* 2010: 166; Mohr & Wolfram, 2010: 168).

Secondly, the work of professionals in the construction industry inevitably involves making professional judgements and decisions under conditions of uncertainty. The uncertainty may be associated with the search for solutions to problems relating to project design and construction and/or to the need to model or plan for situations and actions that may (or may not) occur in a future that is not known with certainty. Uncertainty is recognised as a substantial contributor to human stress (Miceli & Castelfranchi, 2005: 291; Lingard, Francis & Turner, 2010: 1094).

Thirdly, in terms of the critical parameters of every construction project, namely time, cost, quality and safety, it can be argued that professionals will each place different emphasis on each criterion, and will be impacted by different uncertainties that arise in relation to project objectives, which often conflict. For example, professional quantity surveyors are highly concerned with project cost (in terms of forecasting and financial administration) and uncertainty, in this instance, is similar to uncertainty associated with the macro-economic systems of society. Considerable uncertainty may exist in terms of the distribution of elemental costs derived from elemental

analyses, forecasted tender price indices, likely rates of escalation, and procurement and contractual arrangements, while the decision-making associated with these factors is frequently critical to project success.

## **6.2 Stress levels**

The survey findings show that high stress levels exist for quantity surveyors working in the South African construction industry (Table 1: 24% of all respondents report levels >7), confirming the Hong Kong findings of Leung *et al.* (2007: 1072). The relationship between time demands of work and the experience of stress may be complex and be moderated by other variables. The results suggest that is not just the quantity of work but the quality of the work experience that determines perceived stress levels and there may be qualitative differences between different quantity surveyors. Female quantity surveyors report significantly lower levels of positive promotion prospects than male colleagues. This is important because job 'certainty' has been shown to impact negatively on the job satisfaction of permanent workers, increase worker stress, and detrimentally affect work-life balance (Burke & Greenglass, 2001: 592; De Cuyper & De Witte, 2007: 65; Probst, Stewart, Grys & Tiernay, 2007: 479; Schreurs, Emmerik, Notelaers & De Wit, 2010: 56).

The findings of this research are also consistent with previous research that has revealed that women working in the construction industry generally experience higher levels of stress than males in similar employment (e.g. Goldenhar, Swanson, Hurrell, Ruder & Deddens, 1998: 28; Caven, 2005: 527; Sang *et al.*, 2007: 1315; Bowen *et al.*, 2013a: 393). Previous research has also reported higher levels of job stress and burnout among younger employees, which is consistent with the findings of the current research (Lingard, 2003: 69; Brewer & Shapard, 2004: 108; Soares, Grossi & Sundin, 2007: 61). This warrants further investigation to examine the role played by family status, life stage, the number of years of professional experience, and the effects of 'conditioning' in determining stress levels and success in coping with stress among quantity surveyors.

## **6.3 Stress factors**

The job demand/control nexus with stress, found in earlier research (e.g., Karasek, 1979; Houtman, 2005), is strongly supported. The high stress levels reported by South African quantity surveyors is matched by their significantly diminished control over the type of work undertaken, the pace of that work, and the environment in

which it is carried out - particularly among female and younger quantity surveyors (Table 4). The strain effects are exacerbated by having to work long hours, meet tight deadlines, and by finding it difficult to balance work/family responsibilities successfully (Table 2). Of particular concern is that fewer than 8% of all the respondents report working a 'normal' week of 40 hours or less. The long hours worked also match the general agreement among respondents that they could do a better job if given more time (Table 8), thus providing fertile and aggravating grounds for job frustration: more time would mean even longer hours and thus even greater work/life imbalance and faster burnout rate.

The high burnout rate associated with all these demand/control factors (Lingard & Francis, 2004: 162; Hausser, Mojzisch, Neal & Schulz-Hardt, 2010: 33) provides a clear signal to the quantity surveying profession that increasingly excessive workloads may be counter-productive, damaging to health and social well-being, and lead to diminishing work standards and declining attractiveness of the profession to new entrants.

## **7. Conclusions**

The contribution of this work lies in its examination of the work stress experienced by professional quantity surveyors in a developing country characterised by economic hardship and social problems. The stress levels experienced by quantity surveyors in South Africa are sufficiently high as to cause concern, not only for the health of individual professionals, but also for the continuing effectiveness of their contribution to the construction industry. The body responsible for guiding and promoting the work of the quantity surveying profession should take careful note of this, and consider what measures of support are needed for their members. The negative ramifications of stress have an inevitable ripple effect, spreading from individuals through families and extended families to communities and thus to society as a whole.

We need to know more about the nature of the work undertaken by quantity surveyors, and what might make some tasks more stressful than others. We need to explore why females report higher stress levels than their male counterparts. Besides seeking more intra-professional understanding, we should also explore inter-professional issues. While uncertainty, in relation to decision-making, cannot be entirely eliminated, it may be possible to mitigate it and manage it.

Employers need to better understand the effect that occupational stress has on their employees and implement strategies preferably aimed at prevention. Such interventions should encompass regular reviews of workload allocations, empowering employees, fostering a supportive work environment, conducting stress appraisals, conducting stress-management workshops, and facilitating stress counselling where warranted. A powerful target would be the eradication of unrealistic deadlines in the planning and scheduling of construction work.

Addressing the root causes of stress among construction professionals and developing measures to deal with them will almost certainly have to proceed on a broad front. The quantity surveying profession could provide a lead in this.

### **Acknowledgements**

Grateful thanks are extended to all the professional quantity surveyors who participated in this study. Without your participation, this research would not have been possible.

This work is based on the research supported in part by the National Research Foundation of South Africa (Grant specific unique reference number (UID) 85376). The grant holder acknowledges that opinions, findings and conclusions or recommendations expressed in any publication generated by the NRF-supported research are that of the author(s), and that the NRF accepts no liability whatsoever in this regard.

### **References list**

Asquin, A., Garell, G. & Picq, T. 2010. When project-based management causes distress at work. *International Journal of Project Management*, 28(2), pp. 166-172.

Belkic, K.L., Landsbergis, P.A., Schnall, P.I. & Baker, D. 2004. Is job strain a major source of cardiovascular disease risk? A critical review of the empirical evidence, with a clinical perspective. *Scandinavian Journal of Work, Environment & Health*, 30(2), pp. 85-128.

Bowen, P.A., Edwards, P.J & Lingard, H. 2013a. Workplace stress experienced by construction professionals in South Africa. *Journal of Construction Engineering and Management*, 139(4), pp. 393-403.

Bowen, P.A., Edwards, P.J. & Lingard, H. 2013b. Workplace stress among construction professionals in South Africa: The role of

harassment and discrimination. *Engineering, Construction and Architectural Management*, 20(6), pp. 620-635.

Bowen, P.A., Edwards, P.J., Lingard, H. & Cattell, K.S. 2013c. Workplace stress, stress effects and coping mechanisms in the construction industry. In press. *Journal of Construction Engineering and Management*.

Bowen, P.A., Edwards, P.J., Lingard, H. & Cattell, K.S. 2013d. Predictive modelling of workplace stress among construction professionals. In press. *Journal of Construction Engineering and Management*.

Brewer, E.W & Shapard, L. 2004. Employee burnout: A meta-analysis of the relationship between age or years of experience. *Human Resource Development Review*, 3(2), pp. 102-123.

Burke, R.J. & Greenglass, E.J. 2001. Hospital restructuring, work-family conflict and psychological burnout among nursing staff. *Psychology & Health*, 16(5), pp. 583-594.

Caven, V. 2005. Constructing a career: Women architects at work. *Career Development International*, 9(5), pp. 518-531.

Christians, C.G. 2005. Ethics and politics in qualitative research. In: Denzin, N. & Lincoln, Y. (eds). *Handbook of qualitative research* (3<sup>rd</sup> edition). Thousand Oaks, CA: Sage, pp. 139-164.

Commission of European Communities. 2002. Communication from the Commission – Adapting to change in work and society: A new community strategy on health and safety at work 2002-2006. COM (2002) 118 final, Brussels. [online]. Available from: <[http://eur-lex.europa.eu/smartapi/cgi/sga\\_doc?smartapi!celexplus!prod!DocNumber&lg=en&type\\_doc=COMfinal&an\\_doc=2002&nu\\_doc=118](http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=COMfinal&an_doc=2002&nu_doc=118)> [Accessed: 20 October 2011].

De Cuyper, N. & De Witte, H. 2007. Job insecurity in temporary versus permanent workers: Associations with attitudes, well-being and behavior. *Work and Stress*, 21(1), pp. 65-84.

De Lange, A.H., Taris, T.W., Kompier, A.J., Houtmans, I.L.D. & Bongers, P.A. 2004. The relationship between work characteristics and mental health: Examining normal, reversed and reciprocal relationships in a 4-wave study. *Work and Stress*, 18(2), pp. 149-166.

Djebarni, R. 1996. The impact of stress in site management effectiveness. *Construction Management and Economics*, 14(4), pp. 281-293.

French, W.L., Kast, F.E. & Rosenzweig, J.E. 1985. *Understanding human behavior in organizations*. New York: Harper and Row.

Fricker Jr., R.D. 2008. Sampling methods for web and e-mail surveys. In: Fielding, N., Lee, R.M. & Blank, G. (eds). *The SAGE handbook of online research methods*, New Delhi, India: SAGE Publications, pp.195-216.

Gallie, D. 2005. Work pressure in Europe 1996–2001: Trends and determinants. *British Journal of Industrial Relations*, 43(3), pp. 351-375.

Goldenhar, L.M., Swanson, N.G., Hurrell, J.J. Jr., Ruder, A. & Deddens, J. 1998. Stressors and adverse outcomes for female construction workers. *Journal of Occupational Health Psychology*, 3(1), pp. 19-32.

Goldenhar, L.M., Williams, L.J. & Swanson, N.G. 2003. Modelling relationships between job stressors and injury and near-miss outcomes for construction labourers. *Work & Stress*, 17(3), pp. 218-240.

Hausser, J.A., Mojzisch, A., Neal, M. & Schulz-Hardt, S. 2010. Ten years on: A review of recent research on the Job Demand-Control (-Support) model and psychological wellbeing. *Work & Stress*, 24(1), pp. 1-35.

Haynes, N.S. & Love, P.E.D. 2004. Psychological adjustment and coping among construction project managers. *Construction Management and Economics*, 22(2), pp. 129-140.

Houtman, I. 2005. *Work-related stress*. Dublin, Ireland: European Foundation for the Improvement of Living and Working Conditions.

HSE (HEALTH AND SAFETY EXECUTIVE). 2006. *Defining a case of work-related stress*. Research Report No. 449, Institute of Work, Health and Organisations, Nottingham, UK.

Johnson, J.V., Hall, E.M. & Theorell, T. 1989. Combined effects of job strain and social isolation on cardiovascular disease morbidity and mortality in a random sample of the Swedish male working population. *Scandinavian Journal of Work, Environment and Health*, 15(4), pp. 271-279.

Karasek, R.A. Jr. 1979. Job demands, decision latitude and mental strain: Implications for job redesign. *Administrative Science Quarterly*, 24(2), pp. 285-308.

Kline, P. 2000a. *Handbook of psychological testing*. 2<sup>nd</sup> edition. UK, London: Routledge.

Kline, P. 2000b. *A psychometrics primer*. London: Free Association Books.

Leung, M-Y., Chan Y.S. & Chen D.Y. 2011. Structural linear relationships between job stress, burnout, physiological stress, and performance of construction project managers. *Engineering, Construction and Architectural Management*, 18(3), pp. 312-328.

Leung, M-Y., Chan, Y.S. & Olomolaiye, P. 2008. Impact of stress on the performance of construction project managers. *Journal of Construction Engineering and Management*, 134(8), pp. 644-652.

Leung, M-Y., Chan, Y.S. & Yu, J. 2009. Integrated model for the stressors and stresses of construction project managers in Hong Kong. *Journal of Construction Engineering and Management*, 135(2), pp. 126-134.

Leung, M-Y., Chan, Y.S. & Yuen, K. W. 2010. Impacts of stressors and stress on the injury incidents of construction workers in Hong Kong. *Journal of Construction Engineering and Management*, 136(10), pp. 1093-1103.

Lingard, H. 2003. The impact of individual and job characteristics of 'burnout' among civil engineers in Australia and the implications for employee turnover. *Construction Management and Economics*, 21(1), pp. 69-80.

Lingard, H. & Francis, V. 2004. The work-life experiences of office- and site-based employees in the Australian construction industry. *Construction Management and Economics*, 22(9), pp. 991-1002.

Lingard, H. & Francis, V. 2009. *Managing work-life balance in construction*. Oxford: Spon Press.

Lingard, H., Francis, V. & Turner, M. 2010. The rhythms of project life: A longitudinal analysis of work hours and work-life experiences in construction. *Construction Management and Economics*, 28(10), pp. 1085-1098.

Loosemore, M. & Galea, N. 2008. Genderlect and conflict in the Australian construction industry. *Construction Management and Economics*, 26(2), pp. 125-135.

Love, P.E.D., Edwards, D.J. & Irani, Z. 2010. Work stress, support, and mental health in construction. *Journal of Construction Engineering and Management*, 136(6), pp. 650-658.

McShane, S. & Travaglione, T. 2003. *Organisational behaviour on the Pacific Rim*, Sydney: McGraw-Hill.

Miceli, M. & Castelfranchi, C. 2005. Anxiety as an 'epistemic' emotion; an uncertainty theory of anxiety. *Anxiety, Stress and Coping*, 18(4), pp. 291-319.

Michel, J.S., Mitchelson, J.K., Pichler, S. & Cullen, K.L. 2010. Clarifying relationships among work and family social support, stressors and work-family conflict. *Journal of Vocational Behavior*, 76(1), pp. 91-104.

Mohr, G. & Wolfram, H.J. 2010. Stress among managers: The importance of dynamic tasks, predictability, and social support in unpredictable times. *Journal of Occupational Health Psychology*, 15(2), pp. 167-179.

Newton, C.J. & Jimmieson, N.L. 2006. A qualitative exploration of organizational culture and workplace stressors: A competing values approach. Available from: <<http://eprints.qut.edu.au/5262/1/5262.pdf>> [Accessed: 28 November 2013].

Ng, T.S., Skitmore, R.M. & Leung, T.K.C. 2005. Manageability of stress among construction project participants. *Engineering, Construction and Architectural Management*, 12(3), pp. 264-282.

Pallant, J. 2010. *SPSS survival manual*. 4<sup>th</sup> edition. Maidenhead: McGraw-Hill.

Platt, J. 2001. The history of the interview. In: Gubrium, J.F. & Holstein, J.A. (eds). *The SAGE handbook of interview research*. Delhi: SAGE Publications, pp. 33-54.

Pocock, B., Skinner, N. & Williams, P. 2007. *Work, life and time: The Australian Work and Life Index (AWALI): Concepts, methodology and rationale*. Centre for Work and Life, Hawke Research Institute for Sustainable Societies, University of Adelaide, Adelaide.

Probst, T.M., Stewart, S.M., Gryns, M.L. & Tierney, B.W. 2007. Productivity, counterproductivity and creativity: The ups and downs of job insecurity. *Journal of Occupational and Organizational Psychology*, 80(3), pp. 479-497.

Sang, K.J.C., Dainty, A.R.J. & Ison, S.G. 2007. Gender: A risk factor for occupational stress in the architectural profession? *Construction Management and Economics*, 25(12), pp. 1305-1317.

Schaufeli, W.B. & Bakker, A.B. 2004. Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, 25(3), pp. 293-315.

Schreurs, B., Van Emmerik, H., Notelaers, G. & De Witte, H. 2010. Job insecurity and employee health: The buffering potential of job control and job self-efficacy. *Work & Stress*, 24(1), pp. 56-72.

Sharma, P. 2013. A study of organizational climate and stress of police personnel. *International Journal of Advanced Research in Management and Social Sciences*, 2(2), pp. 212-230.

Soares, J.J.F., Grossi, G. & Sundin, Ö. 2007. Burnout among women: Associations with demographic/socio-economic, work, life-style and health factors. *Archives of Women's Mental Health*, 10(2), pp. 61-71.

Sutherland, V.J. & Davidson, M.J. 1989. Stress among construction site managers: A preliminary study. *Stress Medicine*, 5(4), pp. 221-235.

Thompson, N., Stradling, S., Murphy, M. & O'Neill, P. 1996. Stress and organizational culture. *British Journal of Social Work*, 26(5), pp. 647-665.

Van Wanrooy, B. & Wilson, S. 2006. Convincing the toilers? Dilemmas of long working hours in Australia. *Work, Employment and Society*, 20(2), pp. 349-368.

Williams, T.M. 1999. The need for new paradigms for complex projects. *International Journal of Project Management*, 17(5), pp. 269-273.