

Remoteness, Mental Health and Safety Behaviour among Oil and Gas Workers

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Abstract

The literature lacks a model that combines working in remote and isolated areas, safety behaviour and the relationship between them. This paper reports on an ongoing research study investigating the influence of remoteness on workers' mental health and, in turn, on their safety behaviour. The paper presents a conceptual framework comprising a number of dependent and independent variables for remoteness identified through the literature (i.e., physical isolation and occupational stressors) and for safety behaviour (i.e., compliance and participation). The framework (and relevant hypotheses) is intended to examine the mediating role workers' mental health can have on the remoteness–safety behaviour relationship. Mental health is represented by two more variables; namely, anxiety and depression. This paper is theoretical in nature, focuses on oil and gas workers working in remote areas, but its content should be relevant to the construction industry where the use of a non-resident workforce is common practice in many parts of the world, especially in the Middle East—the geographic focus of this study.

Keywords

Safety behaviour, mental health, occupational stressors, social isolation, loneliness.

1. Introduction

Work in the oil and gas industry presents dangers and challenges, as it is usually undertaken in remote locations and difficult geographical environments. Occupational hazards and the potential for accidents are frequently linked to fatigue and stress-related risk factors (Chan, 2011). Mental health is a significant issue for oil and gas workers, especially those offshore, because of the issue of site/field remoteness. The offshore environment is potentially stressful because the workforce lives and works in one restricted location for a significant time. Life offshore has been described as dangerous, arduous and socially isolating (Wong et al., 2002). The health and safety of workers are affected adversely by the special challenges of offshore work, together with its restrictions, which include isolation from family and community (Chen et al., 2003).

Remoteness is a central concept in this study and is defined as physical isolation, combined with the condition of being a worker in isolation from one's family, friends and familiar surroundings. Such physical isolation is also related to a challenging environment, which is taken into account when assessing the effect of remoteness. Most oil and gas projects are located away from major cities, with a low level of services and infrastructure available—conditions that are typical of the industry in general. Workers reside in camps just beside their workplaces and might be exposed to severe weather hazards.

Many studies have been conducted into the occupational stress influencing offshore workers (Chen et al., 2009; Cooper and Sutherland, 1987; Parkes, 1992). Cooper and Sutherland (1987) identified some of these occupational stressors as risk factors for decreased overall well-being, free-floating anxiety, depression and somatic anxiety. Further, Chen et al. (2009) claimed that some sources of occupational stresses had a positive association with poor mental health. Also, certain other studies have indicated that occupational stress can predict mental health (Chen et al., 2001; Cooper et al., 1989; Lu et al., 1997).

This paper aims to review the relevant literature and proposes a conceptual framework to be empirically tested using a sample of foreign workers in the oil and gas industry in Kuwait. In other words, this study aims to investigate the relationship between working in remote areas and the safety behaviour of workers, directly and indirectly, through their mental health status. Kuwait was selected for the current study because the oil and gas industry is the largest industry in the country, accounting nearly half of the country's gross domestic product. To the authors' best knowledge, no prior study has been conducted in Kuwait (or any of the Gulf Countries) on the effect of remoteness on workers' mental health and safety behaviour. In Kuwait, foreign workers in the oil and gas industry come from diverse countries within Asia and are relocated to a remote, isolated and totally new geographical region. Isolation periods vary from weeks to months, and are usually far longer than any periods reported by previous studies on this topic. Figure 1 presents the conceptual model that captures the scope of the study graphically.

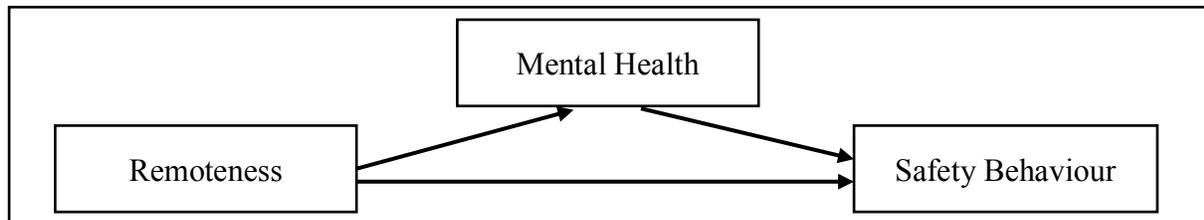


Figure 1: Preliminary Conceptual Model

2. Literature Review

2.1 Remoteness

Remoteness has number of definitions, and there is no single universally recognised definition. In Australia, there are different classifications of remoteness depending on the issue being addressed or used. For example, Wakerman (2004) considers work in a remote area to be isolated

geographically, socially and professionally. In Kuwait, oil platforms and oil rigs are located around the country, with most oil and gas projects away from major cities. The majority of oil and gas workers come from different parts of the world, and many foreign workers leave their home country to live in the field for extended periods of time. Workers therefore face some hardships. In this study, the remoteness variables are considered to be the independent variables, and have been divided into two constructs (physical isolation and occupational stressors), each with its own separate items necessary for construct operationalisation. Below is a brief description of each construct.

2.1.1 Physical isolation

A review by *The Age UK* concluded that feeling lonely is most closely linked to the single variable of physical isolation (The Age, 2010). Furthermore, the House of Representatives Standing Committee on Regional Australia (HRSCRA) (2013) stated that frequent separation from family support and social isolation, informal social controls and the absence of a sense of community can have negative consequences on fly-in-fly-out (FIFO) workers' well-being. Similarly, physical isolation can also be identified from studies that have been conducted on university students and migrants who arrive in an environment that is somehow different and consequently feel physically isolated. According to De Jong Gierveld and Van Tilburg (2006) young people (e.g., students) who have moved to places where they are newcomers frequently report loneliness as a consequence of social isolation. In this paper, the effects of being physically isolated will be measured objectively (in terms of social isolation) and subjectively (as loneliness).

The paper adopts the definition of social isolation from Shankar et al. (2011) as an objective, quantitative measure of network size and diversity as well as frequency of contact. The definition of loneliness was adopted from Cacioppo and Patrick (2008) who describe it as a debilitating psychological condition typified by emptiness, isolation, a sense of worthlessness and lack of control as well as vigilance against external personal threat. Furthermore, a definition from an interesting study by Wright (2005) of loneliness in the workplace been added to this study to make sure that loneliness in the workplace is included as well. Loneliness in the workplace is defined as the distress arising from a perceived lack of high quality interpersonal relationships between employees at work.

2.1.2 Occupational stressors

Occupational stress is defined as the inability of the individual worker to cope effectively with various work demands (Blix et al., 1994). Oil and gas workers are frequently exposed to stressful conditions or physical pressures. Long-term employment in an isolated location also contributes to occupational stress levels (Brešić et al., 2007).

Occupational stressors in the oil and gas industry were investigated by Cooper and Sutherland (1987), who identified seven sources of occupational stress affecting North Sea offshore oil workers: 'relationships at work and at home', 'site management problems', 'factors intrinsic to the job', 'the uncertainty element of the work environment', 'living in the environment', 'safety' and 'interface between job and family'. Later, in their study of 561 Chinese offshore oil workers Chen et al. (2001) ascertained nine factors of occupational stress: 'interface between job and family', 'career and achievement', 'safety', 'management problems and relationships with others at work' (which they subsumed under one label), 'physical environment of the workplace', 'living environment', 'managerial role', 'ergonomics' and 'organisational structure'. When analysing all

the stressors from these two studies, it is clear that ‘living environment’, ‘interface between job and family’ and ‘relationships at work and at home’ are more related to this study’s concept of remoteness than the others are. In this paper, the last two stressors were combined into a single variable, ‘responsibilities towards family’. These stressors are therefore worthy of investigation to identify their effects on mental health, fatigue and safety; and thus the occupational stressors examined in this study are ‘responsibilities towards family’ and ‘living environment’.

2.2 Safety Behaviour

Safety behaviour in this research represents the dependent variable and is a well-recognised concept in the safety literature. It is defined as an individual’s behaviour to enhance their own health and safety and that of their working environment (Burke et al., 2002). Neal et al. (2000) conceptually distinguished two components of such behaviour that can be used for describing workers’ actual behaviour on site: safety compliance and safety participation. These categories have received broad acceptance in research and in practice.

Safety compliance is defined as the core safety activities required for individuals to sustain workplace safety, whereas safety participation is conceptualised as behaviours that might not directly contribute to workplace safety, but assist in fostering a climate promoting safety (e.g., participating in training and voluntary safety meetings).

2.3 Mental Health

Mental health is a mediating variable in this research. It has long been described as the absence of psychopathology (Lamers et al., 2011). The World Health Organization (WHO) defines it as ‘a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community’ (WHO, 2004, p. 12).

In the workplace, it is vital to consider the effect of mental health issues on the quality of life of workers and their families as well as on workers’ physical health and work-related performance (Kim et al., 2009). Studies reveal that working in an intense and pressured work environment can lead to psychosocial problems, including sleep disorders, stress, anxiety and depression (Love et al., 2009).

Depression and anxiety are the most frequently occurring mental disorders that affect working-age adults. Their prevalence seems to be on the rise in Western societies (Reichenberg and MacCabe, 2007). Hence, depression and anxiety are the two mental health disorders of interest in this study.

2.5 Variables and Constructs: Relationships

2.5.1 Remoteness variables—safety behaviour relationship

Many studies have examined the relationships between remoteness variables impacting or influencing safety, and most are qualitative in nature. Separation from family and one’s community and living in camps were potential stress-related factors in migrant Chinese workers in China, where these factors could be a risk for safety or affect safety (Chan, 2009). Siu (2001) argued that emotional overload, the result of factors such as being away from family, predicts accidents.

Finally, stress at work can reduce safety and increase the chance of occupational injury for workers on oil platforms (Parkes, 1992). The first hypothesis in this research is, therefore:

H1. Remoteness variables are negatively associated with safety behaviour.

2.5.2 Mental health is a mediating variable

2.5.2.1 Physical isolation—mental health relationships

A recent editorial in the *American Journal of Public Health* underlined the importance of social isolation as a threat to good mental health (Klinenberg, 2016). Being socially isolated has negative consequences on mental health, as reported in various studies (Cornwell and Waite, 2009; Coyle and Dugan, 2012). Hall-Lande et al. (2007), who investigated young people, revealed that social isolation was linked with an accelerated risk of depressive symptoms, suicide attempts and low self-esteem. It may place individuals at increased risk for poor mental health (Hawton et al., 2011). Evidence suggests that interventions to increase social interactions can actually decrease depressive symptoms (Cattan et al., 2005).

Similarly, many studies have further demonstrated that loneliness is a risk factor for depression (Cohen-Mansfield and Parpura-Gill, 2007; VanderWeele et al., 2011). Loneliness can be injurious to one's health; in particular, to one's mental health (Wilson et al., 2007). Ernst and Cacioppo (2000) identified that extended loneliness increases the risk of depression and even suicide. Hagerty and Williams (1999) found a significant association between loneliness and symptoms of depression in both undergraduates and patients with a major depressive disorder.

2.5.2.2 Occupational stressors—mental health relationships

As indicated earlier, two occupational stressors namely 'responsibilities towards family' and 'living environment' have been selected in this study. In the context of the former stressor, Cooper and Sutherland (1987) revealed that stress in relationships at work and at home is a risk factor for decreased overall well-being, free-floating anxiety, depression and somatic anxiety. Based on Chen et al. (2009), the stress interface between job and family pressures has a positive association with poor mental health. The living environment—another occupational stressor—is a risk factor for decreased overall well-being, free-floating anxiety and phobic anxiety, due to the requirements of shared living and sleeping quarters and the consequent lack of privacy and disturbance by others (Cooper and Sutherland, 1987).

2.5.2.3 Safety behaviour—mental health relationships

Anxiety and depression are two of the major common mental health disorders. One study (Haslam et al., 2005) on the effects of anxiety and depression and of their treatment on performance and safety in the workplace revealed an association with impaired work performance and safety for workers with anxiety and depression, either treated or not currently treated. Another study (Murray et al., 1997) demonstrated that fishermen reported high levels of anxiety, with those who reported most anxiety also reporting more injuries and fewer safety precautions. In the oil and gas industry, Parkes (1992) identified that an offshore environment increases the anxiety of workers compared with an onshore one. Beseler and Stallones (2013) examined the pattern of associations between pesticide poisoning, depressive symptoms, safety knowledge, safety behaviours and injury for farm operators and their spouses. They concluded that depression is more strongly associated with safety behaviour than safety knowledge is. In China, Zheng et al. (2010) found a link between depressive symptoms and greater risk of work-related injuries in male Chinese construction workers. In an investigation of the safety climate among construction workers in Hong Kong (Siu et al.,

2004), psychological distress (depression and anxiety) levels were found to predict accident rates, with direct mediating effects on accident rates and a negative relation with safety attitudes. From this section, two more hypotheses can be formulated for testing:

H2. Remoteness variables are positively associated with mental health.

H3. Mental health is negatively associated with safety behaviour.

Figure 2 represents the conceptual model and the associated hypotheses.

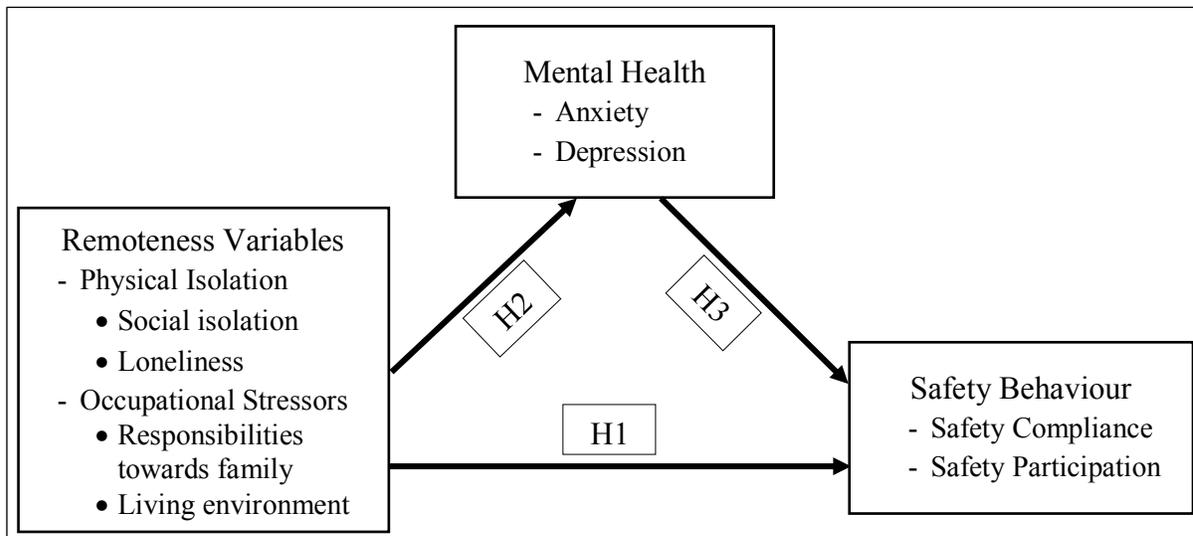


Figure 2: Conceptual Model

3. Research Methodology

The purpose of this study is to empirically test the proposed hypotheses about the influence of remoteness variables on workers' mental health and safety behaviour. It will also examine the mediating role of mental health between remoteness and safety behaviour. Since the purpose of the study is to empirically assess the relationships between different constructs, with a view to generalising the findings to the target population, quantitative methods are deemed to be more appropriate than qualitative ones. The research design judged to be the most appropriate for this purpose is the survey design. The survey method is more effective for showing correlations between constructs, and for generalising from a sample to target population. A questionnaire will be developed using the literature review and distributed to a representative sample of foreign workers in Kuwait in order to collect the data necessary to test the three hypotheses.

4. Discussion and Relevance to Construction

The use of a non-resident workforce is not confined to the oil and gas industry. This practice has been an integral part of many construction operations in many parts of the world, especially in the Middle East. Unfortunately, very few studies are available addressing the influence of remoteness

on safety behaviour. In Australia, as a result of the rapid expansion of the resources sectors, many companies rely on FIFO work arrangements, which can be defined as involving workers whose permanent place of residence is beyond daily commuting range of their work site. This practice is quite common in other parts of the world, particularly for large-scale infrastructure projects. On examining this practice in Western Australia, McKenzie et al. (2014) reported that it offers many challenges for workers and their families: extended separation, potential for loneliness and isolation; and disruption to previous work-life balance patterns. This was supported by another study (Barclay et al., 2016) where experiences of loneliness and social isolation were reported to be common among FIFO geologists. Irrespective of employment roles or education levels, the core demands of FIFO employment involve isolation, sleep problems and loneliness having detrimental effects on workers' well-being, and all of these can lead to safety concerns (Biggs et al., 2016).

Research scholars are of the view that construction organisations that successfully provide safe working environments are those that outperform their competitors. Yet, researchers suggest that because of the complex nature of evaluating mental health, and its link to emotional and cognitive behaviours, more empirical studies on the relationship between mental health and safety behaviour are needed (Biggs et al., 2016). This suggestion partly underlies the motivation for this study.

In light of the above, the similarity of remoteness between the construction and oil and gas industries is clear. This similarity can be further complicated when considering that in countries across the Middle East, the majority of construction workers are non-residents and can face language, social and cultural barriers. It is only recently that the welfare of overseas workers in the Middle East has become a frequent focus of attention in the media. This will ensure that our future study findings, based on the empirical testing of the conceptual framework and its relevant hypotheses, are relevant to construction companies seeking to enhance workers' safety behaviour in remote areas and in harsh environments.

5. References

- Age UK. (2010). "Loneliness and isolation evidence review". London: Age UK.
- Barclay, M., Harris, J., Everingham, J.-A., Kirsch, P. & Shi, M. (2016). "Geologists, FIFO work practices and job satisfaction". *Applied Earth Science*, 125, 221-230.
- Beseler, C. L. & Stallones, L. (2013). "Structural equation modeling of pesticide poisoning, depression, safety, and injury". *J Agromedicine*, 18, 340-9.
- Biggs, H., Wang, X., Mohamed, S., Colquhoun, S. & Dovan, N. "Challenges for the FIFO/DIDO Workforce in the Australian Construction Industry: Impacts on Health, Safety and Relationships". *Proceedings of the CIB World Building Congress (2016): Volume II-Environmental Opportunities and Challenges. Constructing Commitment and Acknowledging Human Experiences*, 2016. Tampere University of Technology, 283-292.
- Blix, A. G., Cruise, R. J., Mitchell, B. M. & Blix, G. G. (1994). "Occupational stress among university teachers". *Educational research*, 36, 157-169.
- Brešić, J., Knežević, B., Milošević, M., Tomljanović, T., Golubović, R. & Mustajbegović, J. (2007). "Stress and work ability in oil industry workers". *Archives of Industrial Hygiene and Toxicology*, 58, 399-405.
- Burke, M. J., Sarpy, S. A., Tesluk, P. E. & Smith-Crowe, K. (2002). "General safety performance: A test of a grounded theoretical model". *Personnel Psychology*, 55, 429-457.
- Cacioppo, J. T. & Patrick, W. (2008). "Loneliness: Human nature and the need for social connection".

- WW Norton & Company.
- Cattan, M., White, M., Bond, J. & Learmouth, A. (2005). "Preventing social isolation and loneliness among older people: a systematic review of health promotion interventions". *Ageing & Society*, 25, 41-67.
- Chan, M. (2009). "Accident risk management in oil and gas construction projects in mainland China". Ph.D. Thesis, University of Sydney, Australia.
- Chan, M. (2011). "Fatigue: the most critical accident risk in oil and gas construction". *Construction Management and Economics*, 29, 341-353.
- Chen, W.-Q., Wong, T.-W. & Yu, T.-S. (2001). "Reliability and validity of the Occupational Stress Scale for Chinese off-shore oil installation workers". *Stress and Health*, 17, 175-183.
- Chen, W.-Q., Wong, T.-W. & Yu, T.-S. (2009). "Influence of occupational stress on mental health among Chinese off-shore oil workers". *Scandinavian Journal of Social Medicine*, 37, 766-773.
- Chen, W.-Q., Wong, T.-W., Yu, T.-S., Lin, Y.-Z. & Cooper, C. L. (2003). "Determinants of perceived occupational stress among Chinese offshore oil workers". *Work and Stress*, 17, 287-305.
- Cohen-Mansfield, J. & Parpura-Gill, A. (2007). "Loneliness in older persons: a theoretical model and empirical findings". *International Psychogeriatrics*, 19, 279-294.
- Cooper, C. L., Rout, U. & Faragher, B. (1989). "Mental health, job satisfaction, and job stress among general practitioners". *Bmj*, 298, 366-370.
- Cooper, C. L. & Sutherland, V. J. (1987). "Job stress, mental health, and accidents among offshore workers in the oil and gas extraction industries". *Journal of Occupational and Environmental Medicine*, 29, 119-125.
- Cornwell, E. Y. & Waite, L. J. (2009). "Social Disconnectedness, Perceived Isolation, and Health among Older Adults". *Journal of health and social behavior*, 50, 31-48.
- Coyle, C. E. & Dugan, E. (2012). "Social isolation, loneliness and health among older adults". *Journal of aging and health*, 24, 1346-1363.
- De Jong Gierveld, J. & Van Tilburg, T. (2006). "A 6-item scale for overall, emotional, and social loneliness: Confirmatory tests on survey data". *Research on Aging*, 28, 582-598.
- Ernst, J. M. & Cacioppo, J. T. (2000). "Lonely hearts: Psychological perspectives on loneliness". *Applied and Preventive Psychology*, 8, 1-22.
- Hagerty, B. M. & Williams, A. (1999). "The effects of sense of belonging, social support, conflict, and loneliness on depression". *Nursing research*, 48, 215-219.
- Hall-Lande, J. A., Eisenberg, M. E., Christenson, S. L. & Neumark-Sztainer, D. (2007). "Social isolation, psychological health, and protective factors in adolescence". *Adolescence*, 42, 265.
- Haslam, C., Atkinson, S., Brown, S. S. & Haslam, R. A. (2005). "Anxiety and depression in the workplace: effects on the individual and organisation (a focus group investigation)". *J Affect Disord*, 88, 209-15.
- Hawton, A., Green, C., Dickens, A. P., Richards, S. H., Taylor, R. S., Edwards, R., Greaves, C. J. & Campbell, J. L. (2011). "The impact of social isolation on the health status and health-related quality of life of older people". *Quality of Life Research*, 20, 57-67.
- House of Representatives Standing Committee on Regional Australia (HRSCRA) (2013). "Cancer of the Bush or Salvation for Our Cities? Fly-in, Fly-out and Drive-in, Drive-out Workforce Practices in Regional Australia, Canberra: Commonwealth of Australia", retrieved from http://www.aph.gov.au/Parliamentary_Business/Committees/House_of_Representatives_Committees?url=ra/fifodido/report.htm.
- Kim, H.-C., Park, S.-G., Min, K.-B. & Yoon, K.-J. (2009). "Depressive symptoms and self-reported occupational injury in small and medium-sized companies". *International archives of occupational and environmental health*, 82, 715.
- Klinenberg, E. (2016). "Social isolation, loneliness, and living alone: Identifying the risks for public health".
- Lamers, S. M., Westerhof, G. J., Bohlmeijer, E. T., Ten Klooster, P. M. & Keyes, C. L. (2011). "Evaluating the psychometric properties of the Mental Health Continuum-Short Form (MHC-SF)". *J*

- Clin Psychol, 67, 99-110.
- Love, P. E., Edwards, D. J. & Irani, Z. (2009). "Work stress, support, and mental health in construction". *Journal of Construction Engineering and Management*, 136, 650-658.
- Lu, L., Cooper, C. L., Chen, Y. C., Hsu, C. H., Wu, H. L., Shih, J. B. & Li, C. H. (1997). "Chinese version of the OSI: A validation study". *Work & Stress*, 11, 79-86.
- Mckenzie, F., Haslam Mckenzie, F. & Hoath, A. (2014). "Fly-In/Fly-Out, Flexibility and the Future: Does Becoming a Regional FIFO Source Community Present Opportunity or Burden?" *Geographical Research*, 52, 430-441.
- Murray, M., Fitzpatrick, D. & O'connell, C. (1997). "Fishermens blues: factors related to accidents and safety among Newfoundland fishermen". *Work & stress*, 11, 292-297.
- Neal, A., Griffin, M. A. & Hart, P. M. (2000). "The impact of organizational climate on safety climate and individual behavior". *Safety science*, 34, 99-109.
- Parkes, K. R. (1992). "Mental health in the oil industry: A comparative study of onshore and offshore employees". *Psychological medicine*, 22, 997-1009.
- Reichenberg, A. & Maccabe, J. H. (2007). "Feeling the pressure: work stress and mental health".
- Shankar, A., Mcmunn, A., Banks, J. & Steptoe, A. (2011). "Loneliness, social isolation, and behavioral and biological health indicators in older adults". *Health Psychology*, 30, 377.
- Siu, O.-L., Phillips, D. R. & Leung, T.-W. (2004). "Safety climate and safety performance among construction workers in Hong Kong". *Accident Analysis & Prevention*, 36, 359-366.
- Siu, O. L. (2001). "A study of safety climate, work stress, and safety performance among construction workers in Hong Kong: a facet approach".
- Vanderweele, T. J., Hawkey, L. C., Thisted, R. A. & Cacioppo, J. T. (2011). "A marginal structural model analysis for loneliness: implications for intervention trials and clinical practice". *Journal of consulting and clinical psychology*, 79, 225.
- Wakerman, J. (2004). "Defining remote health". *Australian Journal of Rural Health*, 12, 210-214.
- WHO (2004). *Promoting mental health: Concepts, emerging evidence, practice: Summary report*.
- Wilson, R. S., Krueger, K. R., Arnold, S. E., Schneider, J. A., Kelly, J. F., Barnes, L. L., Tang, Y. & Bennett, D. A. (2007). "Loneliness and risk of Alzheimer disease". *Archives of general psychiatry*, 64, 234-240.
- Wong, T.-W., Chen, W.-Q., Yu, T.-S., Lin, Y.-Z. & Cooper, C. L. (2002). "Perceived sources of occupational stress among Chinese off-shore oil installation workers". *Stress and Health*, 18, 217-226.
- Wright, S. L. (2005). "Loneliness in the workplace". Doctor of Philosophy in Psychology, University of Canterbury.
- Zheng, L., Xiang, H., Song, X. & Wang, Z. (2010). "Nonfatal unintentional injuries and related factors among male construction workers in central China". *Am J Ind Med*, 53, 588-95.