A Conceptual Model of Workplace Stress: The issue of accumulation and recovery and the health professional

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Abstract

Given that interventions for workplace stress have been shown to be effective, and behaviour change can be sustained over time (Veach, Rahe, Tolles and Newhall, 2003), a model that can serve to monitor the medium and long-term effects of both stressors and stress-management interventions should prove useful. After reviewing some familiar concepts in the stress arena, this paper presents such a model, building on existing work (Diehl and Hay, 2010; Ray, 2008; Selye, 1970, 1976; Zubin and Spring, 1977) and it is thought that this adapted model will be useful for management personnel, counsellors, educators, employees, and researchers.

Introduction

To create a frame of reference, the paper begins by presenting some common definitions, causes and consequences of workplace stress and then reviews some existing workplace models. A model that is used by the primary author is presented and, finally, its proposed effectiveness for workplace practice and research is considered. To create a focus for the model, specific examples will be taken from the health professional literature as this is an area that has been highlighted as an environment ripe for stress (Cutler, Alspector, Harding, Wright and Graham, 2006, Deckard, Meterko and Field,1994; Henning, Hawken and Hill, 2009; Hooper, Craig, Janvrin, Wetsel and Reimels, 2010; West, Huschka, Novotny, Sloan, Kolars, Habermann and Shanafelt, 2006). The main purpose of this paper is to create a frame of reference for the concept of stress as it relates to the workplace environment, and specifically the occupational work environment encountered by health professionals. As such, one specific focus of the stress model is its link with the concept of the arousal (Bryant, Harvey, Guthrie and Moulds, 2000), as this is particularly pertinent to the health environment which is often highly charged creating high levels of arousal (Bakker and Demerouti, 2007; Rick, Acton, and Payne, 1988; Ryan, 2010).

Definition of workplace stress

Life in the workplace undoubtedly presents particular challenges and opportunities that can generate different types of stressors, and workplace stress can be defined and described in numerous ways. In an earlier review article, Baker (1985) postulated that many definitions of stress were framed by psycho-physiological explanations around a conflicting relationship

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between individuals and their environment. This perspective considered the demands of the environment in relation to the resource capabilities of the individual. Such models tended to view stress in terms of a dynamic process between physiological, psychological, and behavioural entities that are cognitively interpreted by the individual (Rahe, 1999). As such, stress is defined in terms of its origin, whether this is from the individual or the workplace, or more likely a combination of both.

The notion of stress is far reaching and can encompass numerous disciplines, such as medicine, sociology, management, and psychology (Pitts, 2007). Consistent with Baker's (1985) analysis, a frequently cited definition of workplace stress relates to the person-environment fit model (Blix and Lee, 1991; Edwards, 1996, 2008). In this view, problems with stress-related phenomena occur when the person-environment fit is dysfunctional. This definition of workplace stress is used as the frame of reference for this paper, such that stress arises when undue pressure is applied as a consequence of tasks or conditions occurring within the work environment during the course of employment (Pitts, 2007; Blix and Lee, 1991).

Causes of workplace stress

Several causal factors are now discussed, specifically predisposition factors, demographic factors, job-demand characteristics, leadership and management, working in interdisciplinary teams and the advent of conflict scenarios. The examples are specifically from the health professions literature.

Person-environment fit characteristics were investigated in reference to the profession of psychiatry where it was shown that psychiatrists tended to be more neurotic, open and agreeable when compared with physicians and surgeons (Kumar, Fischer, Robinson, Hatcher and Bhagat, 2007). The attributes of neuroticism, openness and agreeableness may be useful for psychiatrists to perform well within their sensitive profession but, also, may create a predisposition to stress-related outcomes due to the psychologically demanding nature of their work such as when working with patient violence; difficult or hostile relatives or patient suicide (Kumar, Hatcher and Huggard, 2005). These latter factors are also in line with demand-control theories, which emphasise the demands of the work situation and the environmental moderators of stress, such as empowerment in relation to a decision-making process (Baker, 1985). Other studies have also shown that doctors with high scores on neuroticism and who were more introverted tended to be more at risk of stress-related problems (McManus, Keeling and Paice, 2004).

A further study of young surgeons in New Zealand and Australia identified stress-related factors such as being female, working in small hospital units and working excessive hours (Benson, Sammour, Neuhaus, Findlay and Hill, 2009). However, it has been suggested that females are disproportionately employed in workplaces that are highly stressed as they are considered less likely to respond to conflict and stress with aggression (Barling, Dupre and Kelloway, 2009). It has also been noted that predispositions to stress are related to mood states, including depressed mood and anxiety (Brief and Weiss, 2002). A study investigating workplace stress amongst Japanese doctors (Haoka, Sasahara, Tomotsune, Yoshino, Maeno and Matsuzaki, 2010) indicated that conflict and the hierarchical nature of supervision created stressful environments.

However, there is a twist to this story, as one study suggested that personality factors may also play a role in selecting particular career choices; more specifically Shanafelt et al., (2009) found that about 40 percent of American surgeons surveyed suffered exhaustion and burnout, but ironically 70 percent of the sample seemingly enjoyed this stressful career choice. Nonetheless, there is good evidence to suggest that workplace stressors are harmful as they affect performance

as well as personal well-being (Wallace, Lemaire and Ghali, 2009). Some causal factors cited in the medical literature include workload, work hours, fatigue, emotional interactions, cognitive demands, restricted autonomy, and structural and organisational changes to practice (Wallace et al., 2009; Boerjan, Bluyssen, Bleichrodt, Van Weel-Baumgarten and Van Goor, 2010; Haoka et al., 2010; West et al., 2006).

Similar studies from the nursing profession (McVicar, 2003), have shown several job-demand factors that create an environment of stress. McVicar suggested that key issues are workload, leadership/management, professional conflict, and emotional labour. Workload issues are related to the inadequate staffing of both nurses and administrative personnel, which is inevitably related to funding concerns. Many nurses leave full-time positions as it is perceived that these positions require higher levels of responsibility leading to greater stress with no adequate remuneration packages (Lumley, Stanton and Bartram, 2004).

Leadership and management styles are also linked to employer and employee stress, with positive and integrative styles such as transformational leadership tending to engender more participation at all levels. Further stressful precipitators linked with the issues of leadership and management are shift work and remuneration (McVicar, 2003).

One key cause of stress identified in hospital settings is inter-professional and intra-professional conflicts, which are often related to poor communication between team members (Xyrichis and Lowton, 2008). The emotional demands of the job and working with patients who are in constant need of attention all play a role in creating a stressful environment (McVicar, 2003; Hooper et al., 2010). Brief and Weiss (2002) cited a study that showed that nurses' exposure to AIDS patients was significantly correlated with the cultivation of negative affect and thus, impacted mood state. This mood state was also moderated by organisational and social support, suggesting that if management were more supportive of staff the stressful consequences of working with very ill patients could be ameliorated. In addition, the personal backgrounds and contexts that nurses bring to the hospital also play a key role in the way they can cope with this stressful environment (Brief and Weiss, 2002; McVicar, 2003).

Consequences of stress

Physical

The physical consequences of stress are, generally, considered in physiological terms. It was noted by Steffy and Jones (1988) that the use of physiological measures to monitor stress was a step forward and complemented survey methods by allowing access to more objective and reliable measures. Some of the earlier physiological measures shown to be related to stress were higher levels of serum cholesterol, triglyceride serum, uric acid, and blood pressure; and these physiological measures are considered indicators of stress-related disorders such as coronary disease and peptic ulcers (Steffy and Jones, 1988). More recent studies have confirmed that workplace stressors are associated with greater coronary heart disease risk (Chandola, Heraclides and Kumari, 2009). Measures in this research to determine levels of stress were linked to sympatho-adrenal biomarkers (plasma catecholamines and heart rate variability) and HPA axis biomarkers – the post-morning profile of cortisol.

Psychological and social

Psychological and social consequences of workplace stress are given a wide exposure in the literature (Barling et al., 2009; Deckard, Meterko and Field, 1994; Henning et al., 2009, Kumar et al., 2007, Srivastava et al., 2007). Some of the obvious signs of workplace stress identified in the health profession literature include problems with personal and professional relationships, insomnia, headaches, anxiety, panic attacks, and depression (Srivastava et al., 2007, Deckard et al., 1994). Owens (2001) also explored the prevalence of sleep loss and fatigue amongst medical personnel and noted links with stress and to the incidence of medical errors and quality of patient care. A further study (West et al., 2006) found that self-perceived errors were associated with incidence of depression and burnout (including reduced empathy, depersonalisation, emotional exhaustion, and lower personal accomplishment).

At the extreme end of the continuum, there is evidence to suggest that job stress is linked to workplace aggression and violence (Barling et al., 2009). In a recent article (Dellasega, 2009) that reviewed some of the ideas and literature in relation to bullying in the nurse workplace found (from a survey of over 1000 health workers) that 44 percent of nurses in the United Kingdom had experienced "peer bullying". Similar experiences were found in Finland, the United States, and New Zealand. Bullying was also noted in a radiographic workplace environment (Ng, Yeung, Cheung, Chung and White, 2009), although in this case the source of bullying (such as verbal abuse) came from patients rather than peers.

Existing approaches to and models of stress in the workplace

Research in the area of stress has embraced several measurement systems that encompass the use of physiological methods (Chandola et al., 2009), self-report stress measures (Kristensen, Borritz, Villasden and Christensen, 2005; Holmes and Rahe, 1967; Curbow, Spratt, Ungaretti, McDonnell and Breckler, 2000; Lambert, Lambert and Ito, 2004; Haoka et al., 2010; Boerjan et al., 2010; Robinson, Clements and Land, 2003), observational measures (Morash and Haarr, 1995) and qualitative measures such as using semi-structured interviews (Kinman and Jones, 2005). These systems are useful when exploring the philosophical approaches or models that frame stress phenomena as they relate to the workplace environment. Two approaches to explaining stress in the workplace are considered: unitary approaches (causal versus intervention) and multidimensional approaches (integrative).

Causal and intervention approaches

Several of these have been proposed in the literature. The first type of approach explains a particular aspect of the process of workplace stress and often involves a theoretical standpoint, such as focussing on the causes of stress or focussing on methods of preventing, minimising or managing stress. Causal approaches, such as the person-environment fit and job demands-control models, fit this category (Baker, 1985; Blix and Lee, 1991; Edwards, 1996, 2008; Karasek, 1979; Pitts, 2007). Models of intervention are based on developing approaches that are integral to managing stress, which can be considered in terms of primary, secondary and tertiary prevention systems (Cooper and Cartwright, 1997). Primary prevention refers to ameliorating the workplace stressors that exist within the work environment. Secondary prevention focuses on developing a person's level of awareness and providing techniques to cope with stress. Lastly, tertiary prevention is aimed at treating and assisting persons thought to have suffered from a serious illness related to stress.

Integrative approaches

The second type of approach tends to integrate cause with intervention. Wallace et al., (2009) have provided a holistic model that considers an explanatory phase and an action phase. The explanatory phase involves workplace stressors and their effect on physicians, which has a follow-on impact on the health-care system. Physicians' outcomes are also affected by contextual factors and person characteristics. The action phase considers the intervention aspect of dealing with the issue of workplace stress and outlines potential interventions based on the causal evidence. Such interventions consist of addressing concerns related to: (1) workplace and profession awareness, management and prevention, (2) physician self-care and prevention, (3) physician treatment and recovery, and (4) improved patient care and system outcome. Another example of this type of integrative approach for health professionals is Dunn's conceptual model of medical student wellbeing. In this model, a 'coping reservoir' demonstrates the interplay between positive input (psychosocial support, social activities, mentorship, intellectual stimulation) and negative input (stress, internal conflict, time and energy demands) as well as taking into account personality factors, and possible outcomes (burnout or resilience). It is suggested as a useful model for use in individuals to pinpoint possible areas for intervention (Dunn, Iglewicz and Moutier, 2008).

A conceptual model of stress: Applications for focussing on one element, integration and measurement

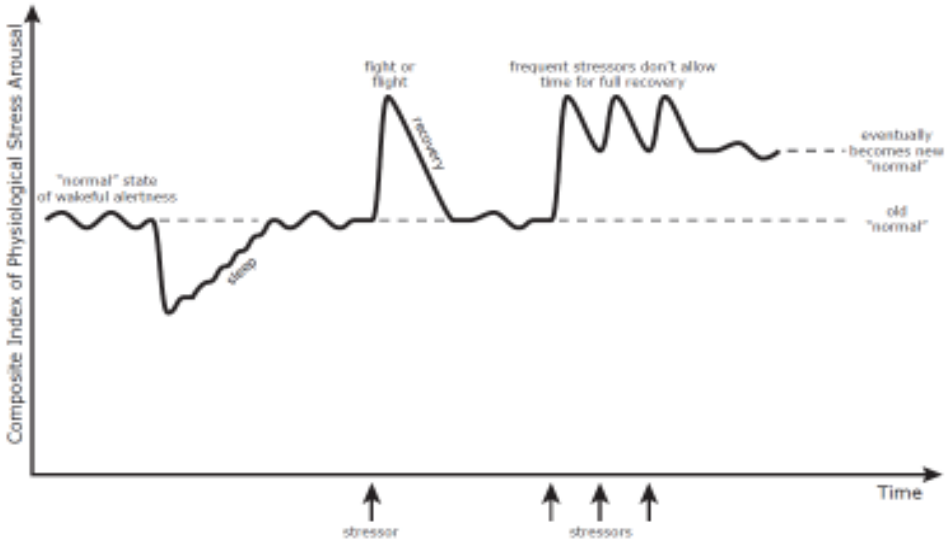
The present paper aims to present a measurement model that can be used to monitor arousal states over time and to consider these state changes in reference to their impact on workplace stress, specifically in the health professions. The authors feel that this model will be useful for directing research in this area. It is an extension of earlier models cited in this area (Zubin and Spring, 1977; Selye, 1970, 1976) and considered in more recent literature (Diehl and Hay, 2010; Ray, 2008). These earlier models used an adaptation framework intermeshed with the notion of resilience, 'survival of the fittest'. Selye (1970), in his seminal work on the evolution of stress, noted the relationship between stress and the symptoms of loss of vigour and feeling exhausted. It is from the feedback loop between stress and its symptoms that the three phases described in his General Adaptation Syndrome arise: the experience of hardship (alarm reaction), the adaptation to it (stage of resistance), and finally the make or break phase (stage of exhaustion).

The notion of adaptation and resilience resonates with the health profession literature. A recent article (McAllister and McKinnon, 2009), reviewed the area of resilience in relation to health professions and their adaptation to the health workplace. McAllister and McKinnon suggested that resilience has personal and cultural aspects that are required when faced with demanding work environments. For example, nurses and paramedics are often placed in traumatic situations that are extremely adverse and thus, have to introduce mechanisms to survive these situations. McAllister and McKinnon further state that research into the mechanisms involved in resilience and adaptation in relation to the health workplace is still in its infancy. Consequently, the main purpose of the present paper is to describe an adapted measurement model that can be used to investigate these phenomena in more detail within the health and other environments.

The adapted model is represented in Figures 1 and 2 below. The horizontal axis indicates time and the vertical axis represents a combination of physiological (and potentially psychological) indices of arousal, which is pertinent to the health professions given the evidence suggesting acute and chronic exposure to high levels of arousal leading to adverse stress-related pathologies (Bakker and Demerouti, 2007; Rick et al., 1988; Ryan, 2010). The exact mix of indices is not crucial so long as it consistently indicates the reaction typically seen in response to acute

stressors. Heart rate on its own, for example, could be expected to follow essentially the same pattern as indicated in the graphs, and the index mix could be customised to meet the needs of different research projects. Similarly the absolute values of the rising and falling index at different points in time are less important than the *pattern* of responses.

Figure 1. Accumulation of stress over time



As can be seen in Figure 1, a person is conceptualised to have a reasonably constant "normal" state of arousal when awake, until some event or activity changes it significantly (Selye, 1970, 1976; Zubin and Spring, 1977). Clearly, the hours of sleep are one such event and the so-called "fight or flight" response, or stress reaction to an acute stressor is another; both are indicated in the diagram. In an ideal world, individuals would have the time to recover fully from the physiological changes produced by the stress response, as the stressor is dealt with or ameliorates, and their arousal index returns in due course to its "normal" state.

However, in many workplace environments, and especially in the medical professions, the frequency of stressors is high enough not to allow this opportunity (McAllister and McKinnon, 2009). A person begins to recover from an acute stress response but has not yet completed the process – they have not yet returned to their "normal" state – when another stressor occurs, producing a repeat stress response. As the figure indicates, in a high stress environment the frequency of occurrence of stressful events can prevent the individual recovering sufficiently to return to their original "normal" state of arousal until they have finished work for the day; and recovery at this stage is likely to take longer than it would from a single stressful event – a notion of accumulative stress that has been presented on numerous occasions (Kasl, 1984; Benoliel, McCorkle, Georgiadu, Denton and Spitzer, 1990). If their chosen forms of out-of-work "rest and recreation" are in fact more arousing than relaxing, and if their workplace is chronically stressful, it is easy to envisage a longer-lasting change in arousal state, such that a higher level becomes their new "normal" state, interrupted only by sleep, or in some cases by alcohol or drug induced stupor. Clearly the extent to which different individuals follow this path will depend on a number of factors, including their level of resilience or stress vulnerability (Zubin and Spring, 1977; Selye, 1970, 1976; Diehl and Hay, 2010; McAllister and McKinnon, 2009; Ray, 2008).

Figure 2. Implementation of relaxation techniques in professional life

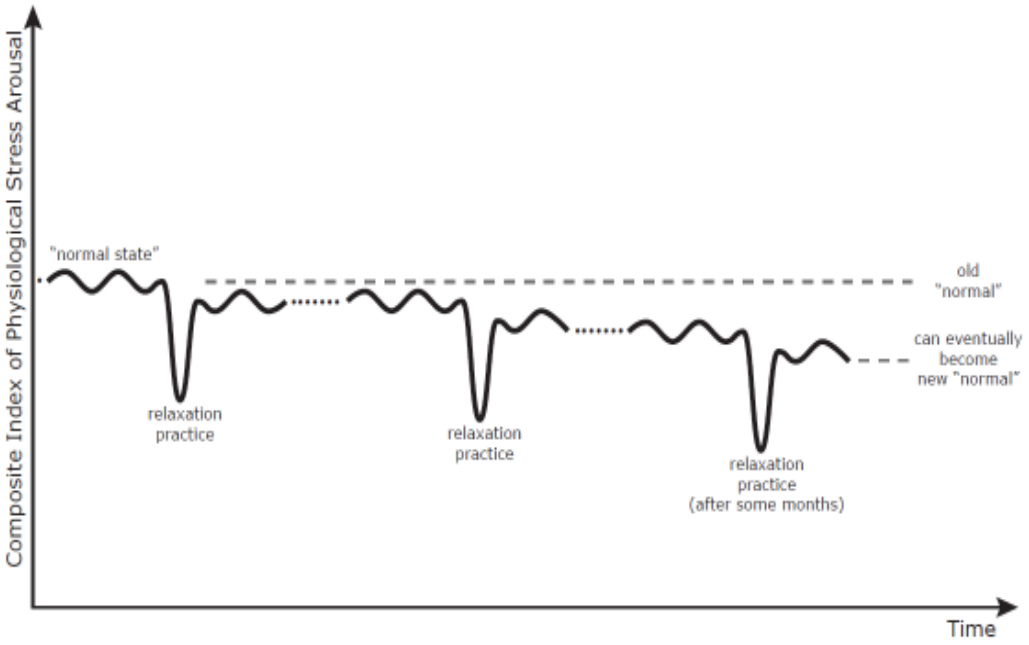


Figure 2 indicates how, over time, the use of an effective relaxation practice can reverse this negative process and actually lower a person's "normal" arousal state. The concept is that after a session of, say, Tai Chi, progressive muscle relaxation or Transcendental Meditation, during which the person's arousal index will have fallen significantly, returns to their usual activities while retaining a slightly more relaxed state than normal. Clearly, they cannot perform normal activities while experiencing the full "relaxation response" (Benson, 1975, 2000), but they *can* do so while remaining slightly less aroused than was previously typical for them. Over time, typically several months, this change can become lasting, resulting in a new lower "normal" state of arousal – almost a mirror image of the higher arousal produced by long-term stress. Good evidence from a number of studies, including meta-analyses, for this process in the case of blood pressure and a range of other cardio-vascular risk factors in response to Transcendental Meditation and, to a lesser extent progressive muscle relaxation, is provided in a review by Schneider, Alexander, Salerno, Rainforth and Nidich (2005).

Thus, the model attempts to describe the medium to long-term changes resulting from the accumulated effects of repeated short-term changes in arousal in response to stressors. This model can incorporate the different measurement systems presented above and aim to be instructive for interventions. However, as the model is dynamic in nature, it may also create insight into the accumulative nature of stress-induced arousal and the recent conditions that impact on the increase in stress. It is ideally suited for the health workplace (and indeed many other workplace contexts) as it maps out changes that may occur over an extended period of time and can be used to appraise the temporal effect of working in a stressful or stress-free environment. It can also be employed to monitor stress-induced arousal levels of health professionals and consider the effect of critical incidents such as major management changes.

Implications for research and well-being

This proposed model of monitoring stress-arousal levels is useful for both workplace practice and research. Effective interventions are available and a recent article in the New Zealand Medical Journal (Henning et al., 2009) posed several initiatives that could be applied to the medical workplace environment to heighten quality of life for doctors and thus, reduce the onset of stress and burnout. The initiatives include: (1) having a monitoring system for identifying early warning signs of burnout, (2) promoting and implementing engagement in healthy exercise, (3) developing healthy sleep patterns, (4) creating access to retreats and regular meditation, (5) establishing peer groups and one-on-one support systems, and (6) ensuring close supervision and support for junior doctors. These ideas were derived from reviewing the salient literature in this area (Bruce, Conaglen and Conaglen, 2005; Child and Old, 2004; Hassed, Lisle, Sullivan and Pier, 2009; Huggard, 2003; Krasner, Epstein, Beckman, Suchman, Chapman, Mooney and Quill, 2009; Owens, 2001; Paice, Rutter, Wetherell, Winder and McManus, 2002; Saleh, Quick, Conaway, Sime, Martin, Hurwitz and Einhorn, 2007) and resonate with more recent research (Hartfiel, Havenhand, Khasla, Clarke and Krayer, 2010). In addition, interventions relevant to New Zealand need to consider the unique contextual aspects of the New Zealand environment such as the multicultural nature of the health workforce in general (Suaalii-Sauni et al., 2009; Alexander, 2008) and doctors more specifically (McKimm, Wilkinson, Poole and Bagg, 2010).

Research paradigms are crucial to investigating these areas. The research in this area is flexible and can encompass both qualitative and quantitative approaches and utilise physiological and psychological self-report stress measures (e.g., Chandola et al., 2009; Holmes and Rahe, 1967; Morash and Haarr, 1995) and semi-structured interviews (Kinman and Jones, 2005). The measurement model proposed in this study can be used to consider the multifaceted levels of stress that encompass psychological and physiological factors. First, the model can be used to monitor self-perceived levels of wellness using self-report mechanisms as monitoring mechanisms (Kristensen et al., 2005; Holmes and Rahe, 1967; Curbow et al., 2000; Lambert et al., 2004; Haoka et al., 2010; Boerjan et al., 2010; Robinson et al., 2003). Second, physiological measures (Chandola et al., 2009) can be used to gain an objective measures of stress-induced arousal. External to the measurement model, sociological aspects of wellness can also be investigated by considering the wider aspect of context and culture (Alexander, 2008; Suaalii-Sauni et al., 2009) and it may be that some aspects of this dimension, too, can yield numerical data that can be used in the model.

Conclusions

The measurement model presented in this paper is an extension of earlier models (e.g., Selye, 1970, 1976; Zubin and Spring, 1977). It suggests that humans adapt to the workplace environment to survive its inherent stressors. However, adaptation may not be a functional outcome if it leads to vulnerability to stress-related illness and problems with well-being. This measurement model will likely be useful for various workplace environments, but the focus of this paper was the health-related environment. For example, the authors intend to utilise this framework for further empirical quantitative and qualitative work in this area, specifically monitoring doctors' well-being in the hospital environment. In addition, the first two authors have already used it in training and development courses (for example, to explain the cumulative effects of ongoing stress and of repeated use of secondary stress-management interventions to business and medical students) as it is an inherently intuitive and applied model that often resonates with medical and business students as it does with both employers and employees alike.

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