Applied Ergonomics 45 (2014) 773–779

Contents lists available at ScienceDirect

Applied Ergonomics

journal homepage: www.elsevier.com/locate/apergo

What roles do team climate, roster control, and work life conflict play in shiftworkers' fatigue longitudinally?

Anne Pisarski [a,*], Jennifer P. Barbour [b]

[a] Queensland University of Technology, QUT, School of Management, Gardens Point Campus, Alice Street, Brisbane 4000, Australia
[b] Griffith University, Australia

ARTICLE INFO

Article history:
Received 3 April 2012
Accepted 17 October 2013

Keywords:
Shiftwork
Fatigue
Nursing

ABSTRACT

The study aimed to examine shiftworkers fatigue and the longitudinal relationships that impact on fatigue such as team climate, work life conflict, control of shifts and shift type in shift working nurses. We used a quantitative survey methodology and analysed data with a moderated hierarchical multiple regression. After matching across two time periods 18 months apart, the sample consisted of 166 nurses from one Australian hospital. Of these nurses, 61 worked two rotating day shifts (morning & afternoon/evening) and 105 were rotating shiftworkers who worked three shifts (morning afternoon/evening and nights). The findings suggest that control over shift scheduling can have significant effects on fatigue for both two-shift and three-shift workers. A significant negative relationship between positive team climate and fatigue was moderated by shift type. At both Time 1 and Time 2, work life conflict was the strongest predictor of concurrent fatigue, but over time it was not.

1. Introduction

There is a considerable body of shiftwork research that examines the relationships between fatigue, work life conflict, control of shifts and shift type (AHR Committee, 2000; Duxbury, 2003; NCEPH, 2003; Winwood et al., 2006). However, many of these studies are cross-sectional and fail to examine these relationships over time resulting in potentially elevated error risks (Huselid and Becker, 2008). There is also very little research that examines the role of team climate in mitigating the negative impact of shift work (Pisarski et al., 2006). The aim of this study is to examine shiftworkers fatigue and the longitudinal relationships that impact on fatigue such as team climate, work life conflict, control of shifts and shift type in hospital based nurses.

Most shiftwork researchers consider shiftwork to mean a formal work arrangement that involves at least two teams or shifts relieving each other on a regular basis (Akerstedt et al., 1989). Fatigue is generally defined as a decline in physical and/or mental performance as a result of sleep disturbances, disruption to the biological clock and prolonged exertion often related to complex, monotonous work and actual workload (Moore-Ede, 1995; Williamson et al., 2011). Work life conflict is generally defined in the literature as occurring when the emotional and behavioural demands of work/non-work roles are incompatible, such that participation in one role is made more difficult by virtue of participation in the other (Pisarski and Loudoun, 2007). Team climate is the atmosphere or dynamics that exist within a team and contains elements of trust, cohesiveness and supportiveness (Adams and Galanes, 2000).

Harrington identified in a 2001 study that shiftwork involves over 20% of the labour force in developed countries and an even greater percentage in less developed countries (Harrington, 2001). This statistic has not changed, for example, in the United States in 2010, 29% of people work shiftwork (NHIS–OHS, 2013) and 16% of Australians were shiftworkers (ABS, 2009). The health and safety of shiftworkers is of vital concern because of the high cost to individuals, organisations and society when these concerns are overlooked (Pisarski and Loudoun, 2007). Managing shiftwork requires a thorough understanding of what shiftwork involves, the hazards associated with it, how these risks can minimised, and the control mechanisms monitored. Shiftworker fatigue increases the risks of health effects (Pisarski et al., 2006; Williamson et al., 2011) and the risk of accidents and disasters occurring (Folkard and Lombardi, 2006).

1.1. Fatigue and shiftwork

It has been well noted that many highly publicised disasters such as Chernobyl, Three Mile Island, Bhopal, Exxon Valdez and the Estonia Ferry disasters occurred in the early hours of the morning.

* Corresponding author. Tel.: +61 7 31385081; fax: +61 7 31381313.
E-mail addresses: a.pisarski@qut.edu.au (A. Pisarski), jennifer.barbour@griffithuni.edu.au (J.P. Barbour).

0003-6870/$ – see front matter © 2013 Elsevier Ltd and The Ergonomics Society. All rights reserved.
http://dx.doi.org/10.1016/j.apergo.2013.10.010

Investigations of these disasters concluded that one common contributing factor was human fatigue (Folkard and Lombardi, 2006). More recently, in Queensland, Australia, the investigation into the grounding of the Shen Neng 1 on the Great Barrier Reef in 2010 found that fatigue was a major contributor to the accident (Australian Transport Safety Bureau, 2011).

Although it should be noted that there is some confusion about how fatigue is identified and measured, studies have found that shiftwork and associated fatigue have a negative effect on performance, alertness and safety (Dorrian et al., 2011; Williamson et al., 2011; Yuan et al., 2011). Fatigue is an industrial issue, occupational health and safety issue and, at times, an environmental issue. Individuals and organisations that fail to manage human fatigue sensibly, risk having or creating injury and error risk with a broad range of damaging and enduring consequences (Williamson et al., 2011). Williamson et al., (2011) for example identified two major causes of fatigue, sleep homeostasis factors and the nature of the task such as tasks requiring continuous attention or monotonous tasks linked to safety and performance. Williamson et al. (2011) also identified that too few studies have been done on circadian influences to strongly suggest their impact on fatigue.

In healthcare settings, as many as 25% of shiftworkers complain of chronic fatigue (for example, Costa, 2003; Geiger-Brown, 2011; Hossain et al., 2003). Common complaints centre on inadequate sleep and poor quality sleep. Disrupted or deficient sleep is often associated with tension, psychological depression, anxiety, psychosomatic symptoms, persistent fatigue and impaired performance (Shen et al., 2006). Barker and Nussbaum (2011) found that longer shift lengths and increased hours worked per week were associated with higher levels of physical and total fatigue, and also acute and chronic fatigue. In an Australian study of 846 nurses, Winwood et al. (2006) found rotating shiftwork, particularly shifts schedules that included night shifts, was strongly associated with the development of ill health as a result of fatigue. Yuan et al. (2011), in a comparison of nurses who worked only day shifts and those who worked rotating shifts that included regular night shifts, found significantly higher levels of fatigue in the night shift workers. Geiger-Brown et al. (2011) in a study of nurses working 12 h shifts, found adverse work schedules combined with high work demands negatively impact sleep quality and duration leading to increased safety risks. In a follow up study Geiger-Brown et al. (2012) concluded that nurses accrue a significant sleep debt resulting in significant attention lapses. Advances in shiftwork research have also led to a growing awareness of the relationship between work and non-work roles and the impact of conflict between these roles on shiftwork tolerance.

1.2. Work life conflict

Multiple roles can result in increased self-esteem, better health and a more structured life. Conflict between these roles, however, can result in increased stress at home or work, a desynchronisation between work and socially valuable time, negative impacts on health, higher staff turnover and absenteeism, lowered job satisfaction and less organisational commitment (Pisarski et al., 2006; Duxbury, 2003; NCEPH, 2003; Wirtz et al., 2011). Duxbury (2003) found that work/non-work conflict affects workers' ability to enjoy and nurture their family, resulting in lower levels of family well-being and stability. The interplay between home and work factors and their impact on health was investigated in a study of 140 nurses working shiftwork by Peters et al., 2009. This study found that health variables were explained by work and home characteristics. The results showed that job demands contributed significantly to the health problems of nurses, and those respondents who experienced more demands at home reported more general fatigue. In contrast, those who reported more autonomy at home experienced less emotional exhaustion (Peters et al., 2009). Wirtz et al. (2011) found that working on socially valued days such as Sundays resulted in increased risk of occupational accidents and disrupted work life balance especially social wellbeing and the need to consider these factors when designing work schedules.

This literature leads to

Hypothesis 1. There will be a significant positive relationship between work life conflict and fatigue.

1.3. Roster control

One of the key elements in a supportive climate for shiftworkers is control over their work time such as the design of the shift system, starting times and the capacity to make adjustments to work rosters to accommodate other responsibilities and interests (Bacon et al., 2005). In a two part study of over 2000 shiftworkers, Bacon et al. (2005) found that those who were happier with their shift pattern saw this as compensation for the hard work required during a major change process. Nabe-Nielsen et al. (2011a,b), in a study of Danish social and health care workers, analysed the impact of working hours and work time influence on psychological well being. The data were collected at three points over a two year period and indicated that shiftworkers with high levels of control over their work times had higher levels of vitality and better mental health than those who worked only days. Conversely, the combination of shiftwork and low work time control was associated with worse psychological well being (Nabe-Nielsen et al., 2011b).

Brooks (2000) also argues in support of shift control, suggesting that team based, self-rostering processes for nursing staff are important in improving retention and minimising the negative impacts of shiftwork. This lack of roster control has been found to exacerbate physical and psychological ill health and increase sick leave and nurse turnover (Prescott and Bowen, 1987; Silvestro and Silvestro, 2000). A large empirical study of nurse retention in 90 patient care units in the U.S.A. (Prescott and Bowen, 1987) showed that staff scheduling problems is the most frequently cited reason for staff nurse resignations. Silvestro and Silvestro (2000) examined the efficacy of departmental, team and self-rostering practices in 50 wards in NHS hospitals in the United Kingdom. Their findings suggest that the choice of rostering system should be contingent upon ward size and rostering system complexity. The implication of this contingency approach to rostering is that, as wards grow in size, self-rostering and team rostering become more difficult, yet a move to departmental rostering can be perceived as retrograde, with staff relinquishing control (Silvestro and Silvestro, 2000). Bailyn et al. (2007) found that control over rosters can have positive results for nurses and benefit the nurse manager, providing nurses see this as not an individual entitlement but rather as a balance between individual and unit benefit. Nabe-Nielsen et al. (2011c) investigated the impact of flexibility, variability, regularity and predictability of working hours on shift workers in aged care settings. They found that workers influence over their shift schedules buffered the adverse effects of shift work and assisted individuals to have more control. Interestingly, however, this increased control over their individual shifts by staff decreased continuity of care for their aged patients and co-operation with colleagues (Nabe-Nielsen et al., 2011c). Control over rosters is a complex issue, and while it appears that control may alleviate fatigue, reduce sick leave and turnover, for individual shiftworkers its implementation may be problematic for continuity of care for patients and potentially create issues at the team level.

This leads to

Hypothesis 2. There will be a significant negative relationship between roster control and fatigue.