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Applied Ergonomics 38 (2007) 635–642

APPLIED ERGONOMICS

www.elsevier.com/locate/apergo

Tolerance of shift work

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Received 22 August 2005; accepted 29 May 2006

Abstract

This study aimed to explore criteria for shift work tolerance and to investigate the relationships between personality traits and states and shift work tolerance. Eighty-nine policemen and policewomen completed a questionnaire, once during consecutive night shifts and again during rotating shifts, and their responses were used to assess anxiety, emotional control, positive and negative affect, health complaints, sleep quality, difficulties in social and domestic life, and perceptions about shift work. Both the criteria for tolerance and the relationship between tolerance and personality varied according to shift type. Night shift tolerance involved four factors—*somatic health*, *flexibility, sleep* and *sleep need*—while rotating shift tolerance involved three factors—*somatic health*, *flexibility* and *fatigue*. Tolerance of shift work was associated with anxiety, repressive emotional style and mood. During night shifts, anxiety was the most influential personality factor for the somatic health and sleep dimensions of shift tolerance. During rotating shifts, positive and negative moods, rather than trait personality factors, were important predictors of the somatic health and fatigue shift tolerance dimensions. These results suggest a mechanism for more effective matching of workers to suitable shift schedules.

Keywords: Shift schedule; Physical symptoms; Trait anxiety; Emotional control; Behavioral traits; Mood

1. Introduction

Adverse health effects are sometimes reported by shift workers, such as inability to experience effective sleep (Åkerstedt et al., 1991, 1992; Härmä et al., 1998; Zuzewicz et al., 2000), persistent fatigue (Leung et al., 2006), regular use of sleeping pills (Scott, 2000), disruptions in cognitive and physical performance (DeVries-Griever and Meijman, 1987; Totterdell et al., 1995a), high prevalence of gastrointestinal and cardiovascular disease (Boggild and Knutsson, 1999; Ohira et al., 2000; Boggild and Jeppesen, 2001, Garbarino et al., 2002a, b), changes in behavior including work performance, job attitudes (Demerouti et al., 2004) and affective symptoms (Boivin et al., 1997). Researchers have linked these complaints reported by shift workers to perturbation of circadian rhythm structure (Steenland, 2000; Parkes, 2002). Furthermore, studies have shown that disturbed sleep and the nocturnal lifestyle that accompanies shift work may affect psychosocial well-being by disrupting social relationships and alertness (Barton et al., 1994; Novak and Auvil-Novak, 1996), and leading to elevated negative moods (Healy et al., 1993; Smith-Coggins et al., 1997; Firth-Cozens and Moss, 1998; Poissonnet and Veron, 2000). Koller (1983) found that the accompanying lifestyle changes resulted in shift workers visiting a doctor less often than day workers, despite the fact that they often reported more symptoms of ill health.

Importantly, however, not all shift workers are similarly affected (Costa, 1996, 2003; Kogi, 1996; Monk et al., 1996). For example, research has found that while some workers experience serious disturbances after performing 6 months of a nocturnal work schedule (Reinberg et al., 1984), others show no signs of health compromise after more than 30 years of shift work (Ashkenazi et al., 1997). The notion of shift work tolerance was first conceptualized by Andlauer and his colleagues who suggested that the existence of common subjective health complaints could be used as an indicator of individual differences in the ability to adapt to

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0003-6870/$ - see front matter © 2006 Published by Elsevier Ltd.
doi:10.1016/j.apergo.2006.05.003

shift work without adverse consequences (Andlauer et al., 1979). Factors shown to be associated with individual differences in shift work tolerance include each individual's innate circadian type—their degree of eveningness or morningness (i.e. the time of day at which they are normally most alert) (Smith et al., 2002); sleep duration and quality (Hartmann et al., 1972; Monk, 1988); the ability to overcome drowsiness and adapt to nocturnal schedules (Rosa, 1990); and sleep flexibility—the ability to sleep at irregular times and in unusual places (Folkard et al., 1979; Costa et al., 1989). Psychosocial factors such as positive support from, and difficulties with relationships with co-workers, family and friends, work satisfaction, perceptions of work demands and physical effort have also been linked with sleep quality, experience of stress, physical symptoms and fatigue among some shift workers (Bohle and Tilley, 1993; Smith et al., 1999; Cruz et al., 2000; Åkerstedt et al., 2002).

While personality has been shown to play a role in health complaints such as coronary heart disease, asthma, and cancer (Friedman and Booth-Kewley, 1987; Antoni and Goodkin, 1991), it is a relatively recent focus in research on shift workers and few aspects have yet been studied. Studies have investigated mood changes (Bohle and Tilley, 1993) and depression (Healy et al., 1993) in shift workers and negative affectivity has been shown to relate to shift work intolerance (Åkerstedt et al., 1991, 1992; Härmä et al., 1998; Hennig et al., 1998; Parkes, 2002). Further, the personality trait, repressive emotional style, i.e. the tendency to control and to deny reactions during the experience of negative emotions, and to appear content in the face of problems (Watson and Greer, 1983; Esterling et al., 1990), has also been linked with health complaints including coronary heart disease, asthma and cancer (Friedman and Booth-Kewley, 1987; Antoni and Goodkin, 1991). Although as noted above adverse health effects have been investigated among shift workers, this personality trait has not previously been explored in published research on shift work tolerance.

Furthermore, while research suggests many factors which may influence tolerance of shift work, it is not clear whether the same factors apply to all types of shift. Factors which might distinguish an individual's ability to adapt to different types of shift include behavioral traits such as sleep flexibility, sleep need and circadian type, state variables such as chronic fatigue, somatic symptoms, sleep problems, social disruption, work satisfaction and perceived workload, and personality traits such as trait anxiety and emotional control. Few studies have measured these factors in different shift situations and while some have compared the same individuals across different shift types (e.g. Boggild and Jeppesen, 2001; Mitchell and Williamson, 2000), these studies have not investigated tolerance and have typically examined group means rather than individual comparisons.

Therefore, the present study was undertaken firstly to explore the dimensionality of shift work tolerance and secondly, to explore the relationship between shift work tolerance and personality. Specifically, we aimed to determine which of the personality variables trait anxiety and emotional control and state positive and negative affect might be the most influential predictors of individual differences in tolerance of police officers, each exposed to two different shift situations with comparable tasks and working conditions. The dimensionality of tolerance was explored in terms of sleep flexibility, circadian type (morningness/eveningness), sleep need, sleep problems, chronic fatigue, somatic symptoms (including digestive and cardiovascular problems, symptom inventory and pain), social disruption, work dissatisfaction and perceived workload.

2. Methods

2.1. Participants

Participants were police officers of the Auckland City District of the New Zealand Police. One hundred and forty officers of two stations were at the time of this study employed on a 5-week shift roster, which was repeated throughout the year. The roster consisted of 7 consecutive nights (22:00–07:00) followed by 5 days off, and then 6 days rotating shifts that consisted of early morning shifts (07:00–15:00/17:00) and afternoon shifts (14:00/15:00–23:00, or 16:00–02:00) followed by 2 days off. A sequence of 3 days of either morning or afternoon shifts followed by 2 days off continued for 2 weeks, at which point the participants returned to the beginning of the roster and night shifts. Thus, each officer experienced different shift types while employed in the same job. Eligibility to participate in this study was restricted to those officers who had been on this roster for at least the previous 2 weeks and who were aged between 18 and 59 years. Participants were excluded if they were under medication for mental or physical illnesses or scheduled to transfer to other stations or shifts.

A total of 89 police officers (62 men, 11 women, 16 undisclosed) in the New Zealand Police Auckland City District volunteered to participate; 54 returned both initial and final questionnaires and therefore constituted the sample for this study, a response rate of approximately 37% of those officers exposed to the 5-week shift roster. The duration of their exposure to the 5-week roster ranged from 2 weeks to 13 months; some participants, therefore, had not yet completed a full 5-week roster. Their tenure on the police force varied from 1 to 32 years and they were employed across all categories of job (investigation, traffic, patrol, youth, operations, community, dog handling). The participants included 43 males (79.6%) and 11 females (20.4%), aged between 19 and 59 years (mean = 31.54 years, SD = 6.998). Data for the population of police employed on the 5-week roster system were unavailable, but when assessed by comparison with data provided by the Auckland City District's human resources department