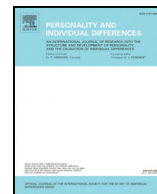




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The predictive power of personality traits on insomnia symptoms: A longitudinal study of shift workers

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ABSTRACT

Shift work can have adverse effects on employees' health, including by inducing symptoms of insomnia, which can cause severe problems for both employees and employers. The personality variables of morningness, neuroticism, and extraversion, along with some demographic variables, have been found to correlate with symptoms of insomnia, although predictive data remain scarce. In response, in this study we sought to discover whether personality variables could predict insomnia by conducting a hierarchical longitudinal (6-month) regression study with shift workers ($n = 96$) employed in the health or social sectors in Trondheim, Norway. We included age, gender, children at home, years of experience and shift schedule as variables in Block 1, and neuroticism, extraversion and morningness as variables in Block 2. As measured by the Bergen Insomnia scale, insomnia was set as the dependent variable. Among other results, neuroticism was positively predictive of insomnia at T2, in accordance with previous studies, whereas morningness was negatively related, which aligns with some research on the subject. Age was found to negatively relate to insomnia, which opposes previous findings. As such, some personality variables seem to predict insomnia among shift workers, although additional longitudinal studies with larger samples should be conducted to validate our results.

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1. Introduction

Shift work can be defined as the arrangement of working hours that differ from the normal diurnal work period (Costa, 2003a, 2003b)—for example, a night shift, which involves working from 10 pm to 6 am (Åkerstedt, 1998). This type of work can adversely affect workers' health (Costa, 1996). Sleep disturbances related to shift work can mimic those seen in clinical insomnia and lead to fatigue and reduced productivity, thereby posing considerable economic and human costs (Åkerstedt, 1998). In particular, several studies have found sleep-related problems and insomnia among shift workers (e.g., Chiu & Tsai, 2013; Eldevik, Flo, Moen, Pallesen, & Bjorvatn, 2013; Swanson et al., 2011). *Insomnia* can be defined as dissatisfaction with sleep quality, combined with problems of initiating or maintaining sleep, or waking up early three nights per week or more, which can cause clinically significant distress over a 3-month period (American Psychiatric Association, 2013).

In a prospective study, Storemark et al. (2013) found that personality characteristics could account for sleep-related problems caused by work shifts. At the same time, though Costa (2003a, 2003b) listed personality as an important aspect of tolerance to shift work, the power of personality in predicting tolerance to shift work has been debated (Härmä, 1993; Nachreiner, 1998; Saksvik, Bjorvatn, Hetland, Sandal, & Pallesen, 2011), largely due to a lack of longitudinal studies. As early as 1998, Nachreiner called for longitudinal studies using cross-lag analyses to investigate the relationship between personality and tolerance for shift work. To the best of our knowledge, save research by Storemark et al. (2013) and Saksvik–Lehouillier et al. (2012), not one longitudinal study has been published that has examined the relationship between personality and insomnia among shift workers. Furthermore, these two studies did not address the most common personality traits, known as the Big Five: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. In response, in the present study we used a longitudinal design and cross-lag analyses to investigate how the Big Five personality variables, as well as dispositional resistance to change, morningness versus eveningness, and age, relate to symptoms of insomnia in shift workers.

1.1. Personality traits and insomnia

Looking beyond shift work, personality traits implicated as risk factors toward insomnia are neuroticism as measured by the NEO-FFI

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(Fernández-Mendoza et al., 2010); all the scales of the MMPI-2 (Vgontzas et al., 2012) as well as specifically depression, social introversion, repression and ego strength (Singareddy et al., 2012); trait anxiety (LeBlanc et al., 2009); and hyperarousability, among others (Fernández-Mendoza et al., 2010). Some of this research is longitudinal (e.g. LeBlanc et al., 2009; Singareddy et al., 2012; Vgontzas et al., 2012) and personality traits thus have been linked to insomnia outside of shift working populations.

The five-factor model (FFM) of personality has dominated in studies of individual differences during the past 40–50 years (Costa & McCrae, 1992). It is postulated that the five different factors—neuroticism, extraversion, agreeableness, conscientiousness and openness to experience—can account for personality as a whole (McCrae & Costa, 1997). Whereas McCrae and Costa (1997) speaks of “openness to experience”, other authors (e.g. Donnellan, Oswald, Baird, & Lucas, 2006) uses the term “intellect/imagination”. Intellect/imagination can be considered as a one part of the larger factor known as openness (John & Srivastava, 1999). Although the two terms often are used interchangeably (Donnellan et al., 2006), we will use the term intellect/imagination, in accordance with the measures used.

1.1.1. Neuroticism

In previous research, neuroticism was found to predict sleep disturbances and complaints about physical and psychological well-being among shift workers (McLaughlin, Bowman, Bradley, & Mistlberger, 2008). Negative affectivity predicts a negative perception of sleep quality, but not actual sleep duration, among shift workers (Parkes, 2002). It is also associated with intolerance in terms of somatic health problems, fatigue and sleep problems in night shift and rotating shift work, which suggests that the trait has negative consequences for shift workers (Tamagawa, Lobb, & Booth, 2007). Earlier, authors Hennig, Kieferdorf, Moritz, Huwe, and Netter (1998) studied the biological rhythms of nurses alternating early shifts and night shifts and found that non-adapters had lower scores on the measure “satisfaction with life”, which the authors relate to depressiveness and neuroticism. The nurses also had reduced sleep durations after their fourth night of shift work. More recently, a large study involving two population-based samples found that greater neuroticism related to reduced sleep quality and total amount of sleep (Hintsanen et al., 2014). When studying how personality traits directly relate to insomnia, insomniacs generally score high on neuroticism, internalization, and other traits related to perfection (van de Laar, Verbeek, Pevernagie, Aldenkamp, & Overeem, 2010). van de Laar et al. (2010) has also posited that personality tests are affected by states as well as traits and that high neuroticism scores might reflect physiological arousal and emotional distress, all due to insomnia. Harvey, Gehrman, and Espie (2014) have added that sleep quality is influenced by genetics—especially sleep reactivity to stress—and that neuroticism is associated with an increased stress response. This effect works to increase stress-reactivity, which can be a predisposing factor to insomnia, as well as hyperarousal, which can be seen as a perpetuating factor (Harvey et al., 2014). In line with this research, arousability has by some been found to be a more precise predictor for stress-induced (Fernández-Mendoza et al., 2010) and regular insomnia (LeBlanc et al., 2009) than neuroticism as a whole.

1.1.2. Extraversion, agreeableness, intellect/imagination, and conscientiousness

Extraversion is a trait defined by sociability and joy found in the company of other people (McCrae & Costa, 1987). Regarding sleep, extraversion seems to correlate with fewer sleep problems and with less sleep deficiency (Hintsanen et al., 2014), and less extraversion has been proposed as a vulnerability to insomnia (LeBlanc et al., 2009). Nachreiner (1998) has reported that extraversion is inconsistently related to shift work tolerance, and that correlations are weak, whereas Saksvik et al. (2011) has stated that extraversion and related traits are related to an absence of physical and sleep-related problems.

By contrast, agreeableness has been related to longer sleep durations as well as good and sufficient sleep (Hintsanen et al., 2014). In that same study, conscientiousness was found to relate to reduced sleep deficiency in one cohort, though not in the final model of the study, and fewer sleep problems. Meanwhile, openness was found to be unrelated to sleep problems (Hintsanen et al., 2014). Reviews find either that extraversion, agreeableness, conscientiousness and intellect/imagination have no relationship with sleep problems in shift workers, or they find no research considering it (Härmä, 1993; Nachreiner, 1998; Saksvik et al., 2011).

1.1.3. Morningness

In terms of circadian rhythms, two personality types have been identified: the morning type (i.e., the lark) and the evening type (i.e., the owl). Whereas the former is considered to be conscientious, emotionally stable, and trustworthy, the latter gets up early with difficulty, is tired after doing so, and stays up late (Cavallera & Giudici, 2008). Larks are most alert in the first part of the day, prefer daytime activities, and have a hard time sleeping late, whereas the opposite is true for owls. In general, evening types are found to be more flexible (Natale, Martoni, & Cicogna, 2003).

Though Nachreiner (1998) has concluded that diurnal type exerts no predictive power over tolerance to shift work, Saksvik et al. (2011) have more recently found that being more of an evening type relates to better tolerance for shift work in general and to sleep in particular. Saksvik et al. (2011) also found that being more of a morning type relates to less flexibility when it comes to sleeping, as well as reduced quality of sleep.

Opposing this, Natvik et al. (2011) found a significant negative association between morningness and insomnia among shift workers. When controlling for different shifts, workers on a three-shift rotation identified as being more evening types experienced more sleep problems than morning types after morning shifts, whereas the same was true for morning types working night shifts (Juda, Vetter, & Roenneberg, 2013). Storemark et al. (2013) found the same association between morningness and sleep-related tolerance for day shifts, yet no such relationship between eveningness and sleep-related tolerance for night shifts. In a non-shift working sample, Ong, Huang, Kuo, and Manber (2007) found that evening types, albeit sleeping more than morning types, had more pathological insomnia symptoms.

1.1.4. Resistance to change

Resistance to change can be conceived as an individual's inclination toward devaluing and resisting change and finding it aversive (Oreg, 2003). It has been suggested that this measure can be used in selecting employees for jobs that entail frequent changes. Since working different shifts can constitute frequent change, this trait can be an important factor in measuring tolerance for shift work. Resistance to change is more-over correlated with neuroticism and facets of extraversion including routine seeking and short-term focus (Oreg, 2003). Accordingly, it can be hypothesized that resistance to change also relates to sleep-related tolerance for shift work, or at least should be controlled for (Bohle, 1997). To the best of our knowledge, no studies examining the relationship between resistance to change and sleep-related intolerance for work shifts have been conducted.

1.2. Age

Many studies have examined the correlation between age and tolerance for shift work (Saksvik et al., 2011). For instance, Bonnefond et al. (2006) found that older age related to more lapses and declines in work performance, but that younger employees reported more subjective sleepiness among a sample of shift workers. Saksvik-Lehouillier et al. (2012) moreover found that age positively correlates with sleepiness, both cross-sectionally and longitudinally (Saksvik-Lehouillier et al., 2012), at least in a sample of Norwegian nurses on a three-shift rotation.

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