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Psychosocial working conditions of shiftworking nurses: A long-term latent transition analysis

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Abstract

Aim: This study aimed to identify profiles of working conditions to which nurses were exposed to over time and investigate how changes in working conditions relate to shiftworking and health.

Background: Previous studies rarely addressed the issue of working conditions development over long periods and the effects of such development on nurses' health.

Methods: Data from a national cohort of nurses in Sweden ($N = 2936$) were analysed using a person-centred analytical approach—latent profile and latent transition analysis.

Results: Nurses report better psychosocial working conditions as they progress into mid-career. Shiftworking nurses experience poorer working conditions than their dayworking counterparts and tend to move from shiftwork to daywork as they progress into mid-career. In mid-career, nurses in work environments characterized by low autonomy and support tend to report poorer health outcomes.

Conclusion: Current analyses suggest that shiftworking nurses are particularly in need of interventions that address poor work environments. Not only do they experience more negative psychosocial working conditions than their dayworking counterparts, but they do so while having to contend with demanding schedules.

Implications for Nursing Management: The findings highlight that organisational interventions should target different aspects of the work environment for nurses in diverse stages of their careers.

KEYWORDS
burnout, job demands, latent transition analysis, shift work, sleep

1 | BACKGROUND

The current shortage of nurses exposes the need to promote healthy work environments that enable nurses to thrive throughout their careers (World Health Organization [WHO], 2006). The establishment of an appropriate mix of experienced and inexperienced nurses is a key strategy for employers to achieve this goal (Aiken et al., 2017). We need to understand what types of work environment allow nurses

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to thrive and develop at work over many years and thereby promote better patient outcomes (Duffield et al., 2011).

In previous studies, the effects of working conditions on workers' health, and consequently turnover, were estimated during relatively short time periods ranging from several months to a maximum of 5 years (Aronsson et al., 2017). Thus, there is a need for studies monitoring the exposure to risk factors over a long time, which also consider the multidimensional nature of workplace stressors (Tuckey et al., 2015). The current study examines the development of working conditions in a large cohort of nurses up to 15 years after graduation. The analysis focuses on associations between psychosocial working conditions, shift work status and two indices of health, namely, burnout and sleep disturbance.

1.1 | Nurses' psychosocial work environment

Two key determinants of the quality of nurses' psychosocial work environment are workload (Duffield et al., 2011) and the quality of relationships with fellow health care professionals (Manojlovich et al., 2014). With regard to workload, studies have shown that even if nurses manage to prioritize effectively and adapt their working practices under high time pressure, the increased risk of adverse consequences for patients remains highly unsatisfactory (Recio-Saucedo et al., 2018). With regard to workplace social relations, some of the key characteristics include having the possibility to collaborate with competent colleagues, having supportive relationships with the leadership and working in cultures that promote constant improvement and skill development (Kramer et al., 2013).

Therefore, the first objective of this study is to categorize psychosocial work environments reported by nurses, identify what type of work environments nurses were exposed to in the early stages of their careers and track how their situation changed a decade later. This is achieved by identifying subgroups of nurses who experience similar multidimensional profiles of psychosocial working conditions. Comparable with previous studies (Bujacz et al., 2018; Keller et al., 2017; Portoghese et al., 2020) and as suggested by the Job Demand-Control-Support model (Johnson & Hall, 1988), we expect to find approximately four profiles of psychosocial working conditions that can be characterized as either balanced (matching levels of demands with control/support) or unbalanced (uneven levels of demands and control/support).

The current analyses also seek to determine the proportions of nurses that change from one profile to another in the transition from early career to mid-career. In doing so, the analyses aim to distinguish between profiles that are associated with sustainable employment (i.e., work environments in which nurses are more likely to remain over time) and those environments that should be targeted with interventions in order to reduce the risk of staff turnover.

- Research Question 1a. What profiles of psychosocial working conditions are nurses exposed to in early career and mid-career?
- Research Question 1b. How prevalent are these various profiles, and does their prevalence change over time?

1.2 | Work schedules and job characteristics

Shift work has been identified as a predictor of intention to leave among nurses due to its impact on fatigue and life outside work (Hayes et al., 2012). To some extent, these problems can be mitigated by appropriate design of work schedules and providing schedule flexibility (Kecklund & Axelsson, 2016). However, there is evidence that some of the negative outcomes associated with shift work may also be due to poorer psychosocial working conditions experienced by shiftworkers (Angerer et al., 2017). Such findings suggest moving the practical focus of prevention from work schedules to working conditions.

Therefore, the second objective of the current study is to determine whether the psychosocial work environment of shiftworking nurses differs from those of dayworkers and whether the relationships between work schedule and work environment characteristics change over time. This approach will help identify which aspects of the work environment need addressing in order to mitigate the challenges faced by nurses who work shifts. It also considers to what extent mitigation strategies need to be adjusted according to whether the nurse is in the earlier or later stages of their career.

- Research Question 2. Are nurses having a certain shift work scheme more likely to also share a certain profile of psychosocial working conditions, and are these relationships similar in early career and mid-career?

1.3 | Work environment and health

Psychosocial work characteristics are important determinants of well-being and recovery—outcomes that, in turn, are likely to impact on nurse retention (Blake et al., 2013). A systematic review (Aronsson et al., 2017) found that low job control, low workplace social support and high job demands were linked to increased risk of burnout, that is, emotional exhaustion, depersonalisation and reduced personal accomplishment (Maslach, 1982). Another systematic review found that high job demands were also associated with increased risk of sleep disturbance (Linton et al., 2015). Inadequate sleep is in turn associated with greater turnover intentions among health care workers (Wang & Yuan, 2018). Thus, the final objective of the current study was to map the different profiles of working conditions onto indices of nurses' health, specifically burnout symptoms and sleep disturbance.

- Research Question 3. Do nurses sharing a certain profile of working conditions differ in terms of health outcomes (sleep disturbance and burnout symptoms), and do these differences exist both early and later in the career?

2 | METHODS

2.1 | Study design and population

The LANE study (Longitudinal Analysis of Nursing Education/Entry in work life; Rudman et al., 2010) consists of three national cohorts of registered nurses (RNs). Data were self-reported and collected via mail survey or web survey with three reminders. Participants were recruited during their nursing education. The cohorts were formed in 2002, 2004 and 2006 when all nursing students from all 26 nursing programmes in Sweden were invited to participate in the study. A total of 6138 nursing students were eligible, and 4316 (70%) joined the study. The data used in this study were from approximately 2 years after graduation (early career) and 11 to 15 years after graduation (mid-career). At Time 1 (early career), 2936 nurses were included in the analyses (age M = 32.5, SD = 7.5, range 22–57; 11% were men). At Time 2 (mid-career), 2474 nurses were included in the analyses (Table S1). The reporting follows the STROBE (von Elm et al., 2008) guidelines for reporting observational studies. Ethical permission to conduct the study was given from the Regional Ethics Review Board in Stockholm on 25 May 2016 (No. 01-045, Supplementary Application No. 2016/793-32).

2.2 | Measures

Psychosocial working conditions were measured using 12 items, which were combined to form five factors (Table S3). The factors represented workload ('Is it necessary to work at a rapid pace?' and 'Do you have too much to do?'), cognitive demands ('Does your work require quick decisions?' and 'Does your work require complex decisions?'), autonomy ('Can you influence the amount of work assigned to you?' and 'Can you decide the length of your break?'), decision making ('Can you influence decisions that are important for your work?' and 'If there are alternative methods for doing your work, can you choose which method to use?') and support ('If needed, can you get support and help with your work from your immediate supervisor?'; 'Are your work achievements appreciated by your immediate superior?'; 'Does your immediate superior encourage you to participate in important decisions?'; and 'Does your immediate superior help you develop your skills?'). The items were derived from the General Nordic Questionnaire for Psychological and Social Factors at Work (QPS Nordic; Wännström et al., 2009). The items were rated on a 5-point response scale ranging from '*very rarely or never*' (1) to '*very often or always*' (5), via '*rarely*' (2), '*sometimes*' (3) and '*often*' (4).

Burnout was measured using a unidimensional scale (using items from the Oldenburg Burnout Inventory; Gustavsson et al., 2010; Halbesleben & Demerouti, 2005). Six items (e.g., 'At work I often feel emotionally drained.') were rated using a 4-point response scale ranging from '*does not apply at all*' (1) to '*applies completely*' (4). The distribution of burnout index scores was similar across time (M = 12.70, SD = 3.50 in early career and M = 12.07, SD = 3.81 in mid-career; range 6–24).

Sleep disturbance was measured with one item ('I rate my sleeping quality as ….') and a 5-point response scale ranging from '*good*' (1) to '*bad*' (5), via '*pretty good*', '*not good nor bad*' and '*pretty bad*' (Kecklund & Åkerstedt, 1992). The distribution of sleep disturbance scores was also similar across time (M = 1.96, SD = 0.98 in early career and M = 2.27, SD = 1.06 in mid-career).

Shift work schemes were measured with one item ('Which hours do you usually work?'). Response categories referring to daytime, two-shift (morning and evening) and three-shift (morning, evening and night) work schemes were coded as separate categorical variables. The majority of nurses (87%) could be categorized as having one of these work schemes. Notably, prevalence decreased over time for two-shift schemes (48.7% in early career and 19.7% in mid-career) and three-shift schemes (29.7% in early career and 15.1% in mid-career), whereas prevalence of daywork markedly increased (9.5% in early career and 51.6% in mid-career).

2.3 | Statistical analysis

Data were analysed using latent profile (LPA) and latent transition (LTA) models. Such models are part of a person-centred analytical approach that aims to identify subgroups of individuals who share a similar profile of scores on various indicators of interest (Morin et al., 2018, 2020). First, factor scores saved from preliminary measurement models of working conditions were used to empirically distinguish unique LPAs separately at each time point. Second, the longitudinal measurement invariance of both measurement models and LPA models was systematically tested, following established guidelines (Millsap, 2011; Morin et al., 2020). The invariant model assumes that similar profiles can be identified over time. Third, to examine changes between early career and mid-career, the transitions among profiles over time were investigated in the LTA model. Next, predictors (shift work schemes, controlled for gender and age) and health outcomes (burnout and sleep disturbance) were added to the LTA model. Simultaneously, the predictive and explanatory similarities were tested across early career and mid-career to establish whether the associations with predictors and outcomes varied over time (Fernet et al., 2020; Morin et al., 2020). More details about the analysis strategy are presented in the supporting information.

3 | RESULTS

3.1 | Profiles of psychosocial working conditions

The analysis of measurement models revealed that the five-factor model fitted well to the data both in early career and in mid-career (Table S2). Thus, the five indicators of psychosocial working conditions were used to form profiles separately for early career and mid-career (Figure S2 and Table S4). The four-profile solution was chosen

in the early career and mid-career, because it was supported both theoretically and empirically. The four profiles of working conditions (Figures 1 and 2) were named as the supporting profile (low demands and high control/support), the demanding profile (high demands and low control/support), the constraining profile (low demands and low control/support) and the balanced profile (average demands and control/support).

3.2 | Psychosocial working conditions over time

The longitudinal design of the study allowed us to estimate the prevalence of profiles at each time point as well as individual transitions among profiles in early career and mid-career (Table 1). Over time, prevalence of the demanding and constraining profiles decreased, the prevalence of the supporting profile remained similar and the prevalence of the balanced profile increased.

Transitions among profiles are represented by the percentage of nurses for whom the profile changed from early career to mid-career (see Table 1, lower panel). About 40% of nurses who experienced the supporting or balanced profile in early career reported having the same profile in mid-career. In comparison, only about 25% of nurses classified into the constraining profile and about 14% of those classified into the demanding profile in early career reported having the same profile later in their careers. It is notable that for a substantial proportion of nurses, progression from early career to mid-career was accompanied by a transition into the supporting or balanced profile, representing an improvement in the balance between demands and autonomy/support at work. However, also a

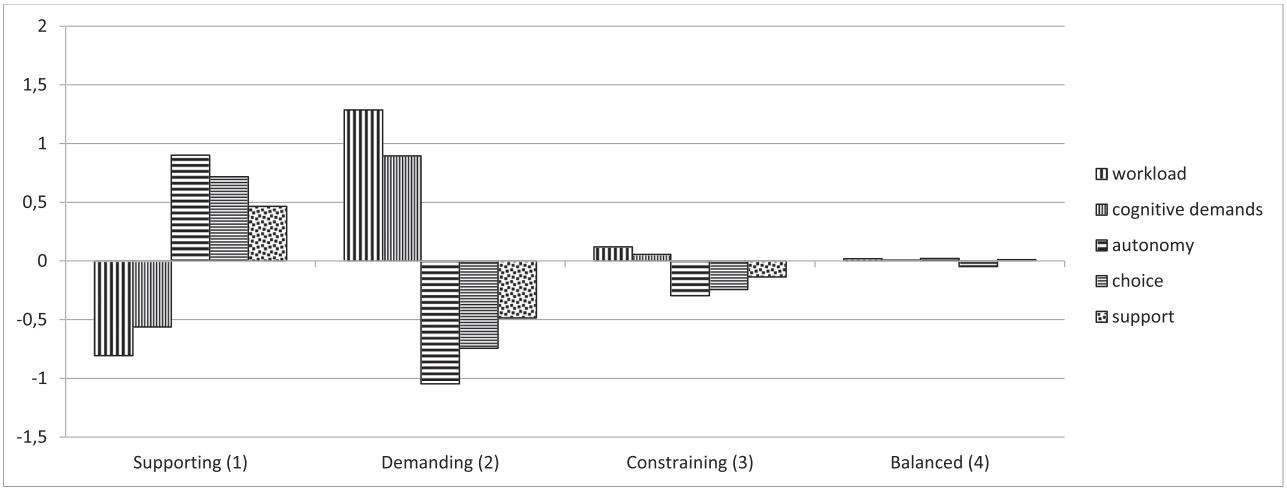


FIGURE 1 Final four-profile solution identified in the early career. Profile indicators are factor scores with mean of 0 and a standard deviation of 1. Estimates from the configural similarity model

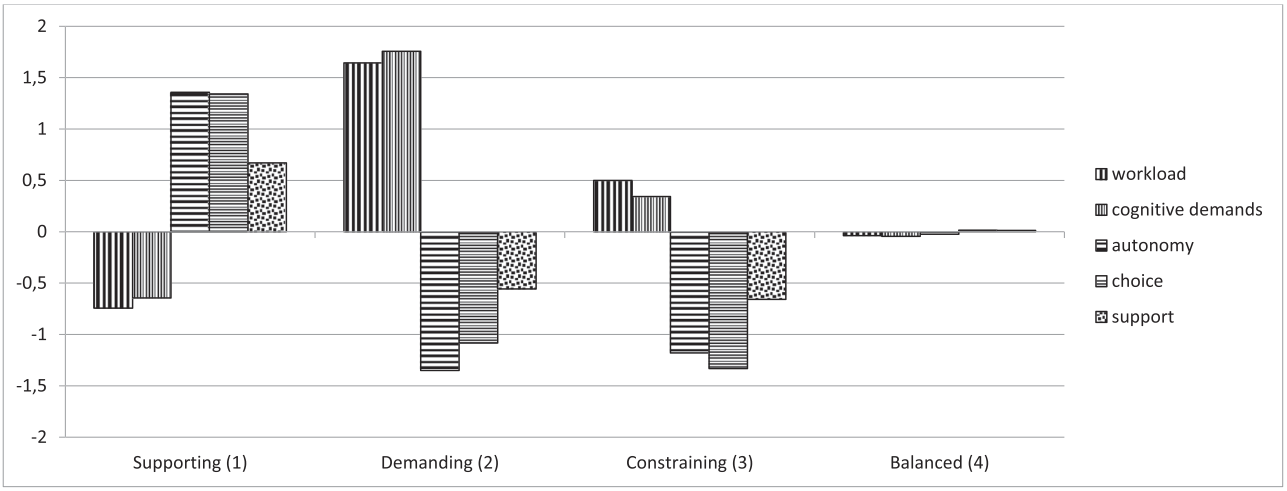


FIGURE 2 Final four-profile solution identified in the mid-career. Profile indicators are factor scores with mean of 0 and a standard deviation of 1. Estimates from the configural similarity model

TABLE 1 Profile membership and transition probabilities based on the latent transition model

	Supporting (1)	Demanding (2)	Constraining (3)	Balanced (4)
Profile membership based on the most likely latent profile (%)				
Early career	27.5%	12.6%	40.6%	19.3%
Mid-career	26.7%	6.1%	22.6%	44.5%
Transition probabilities from early career classes (rows) to mid-career classes (columns)				
Supporting (1)	**42.2%**	2.4%	13.5%	41.9%
Demanding (2)	19.4%	**13.9%**	28.9%	37.8%
Constraining (3)	18.8%	5.5%	**25.7%**	49.9%
Balanced (4)	26.0%	7.8%	25.0%	**41.2%**

Note: Percentages of those staying in the same profile are marked in bold.

TABLE 2 Profile membership and shift work schemes

	Demanding (2)		Constraining (3)		Balanced (4)	
	Logit	OR (95% CI)	Logit	OR (95% CI)	Logit	OR (95% CI)
Gender	−0.961***	0.382*** (0.274–0.534)	0.087	1.091 (0.646–1.845)	−0.134	0.874 (0.497–1.538)
Age	−0.028	0.972 (0.941–1.005)	−0.011***	0.989*** (0.985–0.993)	−0.005	0.995 (0.989–1.001)
Day	−1.094*	0.335*** (0.143–0.787)	−1.177***	0.308*** (0.221–0.429)	−0.679***	0.507*** (0.407–0.632)
Two shifts	0.729**	2.073* (1.340–3.206)	0.289*	1.336* (1.225–1.456)	0.123	1.131 (0.718–1.781)
Three shifts	1.629***	5.099* (2.638–9.855)	0.737***	2.090*** (1.706–2.562)	0.671***	1.956*** (1.765–2.167)

Note: Gender is coded 1 = male and 0 = female. Age is coded in years at the time of graduation. Supporting (1) class was selected as the reference. See Tables S6–S8 for more comparisons. For the shiftwork schemes, all other schemes are the reference group. Effects are constrained to equality across time due to predictive similarity.
Abbreviations: CI, confidence interval; OR, odds ratio.
*$p < .05$. **$p < .01$. ***$p < .001$.

considerable proportion of nurses have transitioned into the constraining profile in the mid-career.

3.3 | Shift work schemes

Generally, nurses who worked on a particular shift work schedule tended to report similar patterns of working conditions, as illustrated by the significant associations between shift work schemes and profile membership that are shown in Table 2. Moreover, the relationships between shift work schemes and profile membership were shown to be similar over time (Table S5).

Dayworking nurses were more often members of the supporting profile than any other profile, as indicated by the significant negative associations in Table 2. Nurses working two shifts were significantly more likely to be members of either the demanding or constraining profile, rather than the supporting profile, as indicated by the positive associations in Table 2. Nurses working three shifts were significantly more likely to be members of the demanding, constraining or balanced profile, rather than the supporting profile. The profile most strongly associated with both two-shift and three-shift working was the demanding profile. The strongest associations between shift work scheme and profile membership were observed for three-shift workers.

3.4 | Health consequences

Profiles of psychosocial working conditions were related to burnout levels and sleep disturbance (Table 3). Members of the supporting profile had significantly lower levels of burnout and less sleep disturbance than members of the other profiles. Members of the balanced profile experienced low to average levels of burnout and sleep disturbance, which were still significantly higher than those experienced by the members of the supporting profile, especially in the mid-career. Members of the demanding profile experienced significantly higher levels of burnout, as did nurses who were members of the constraining profile in mid-career. Notably, the relationships between profile membership and health outcomes differed between early career and mid-career. This was especially marked in the constraining profile, wherein higher levels of burnout and sleep disturbance were reported in mid-career than in early career.

4 | DISCUSSION

The aim of this study was to characterize different psychosocial work environments experienced by nurses and to explain how these exposures change as nurses progress from the early stages of their careers to mid-career.

TABLE 3 Profile membership and health

	Supporting (1)	Demanding (2)	Constraining (3)	Balanced (4)
Early career				
Burnout	−1.762	2.739	0.339	−0.937
Sleep disturbance	−0.272	0.263[a]	0.078[a]	0.055[a]
Mid-career				
Burnout	−2.581	3.919	2.284	0.027
Sleep disturbance	−0.329	0.539	0.325	−0.026

Note: Values above zero represent scores higher than the sample mean; values below zero represent scores lower than the sample mean. Values marked with the same superscript letter are similar within each row. All other values are significantly different from one another ($p < .01$).

To answer the first research question, we identified four profiles of working conditions corresponding with previous studies profiling work environment (Bujacz et al., 2018) and consistent with Job Demand-Control-Support theory (Johnson & Hall, 1988). With regard to the prevalence of the various profiles of working conditions over time, the results suggest a tendency for nurses to gravitate towards more positive work environments as they go from early career to mid-career. This gravitation towards supporting and balanced profiles of working conditions indicates that many of those who remained in nursing for 10 or more years experienced an increase in control and support, together with a reduction in demands.

With regard to the second research question, daywork was associated with membership of the supporting profile (i.e., better working conditions) in both early career and mid-career. This is consistent with previous studies, which have found that shiftworkers have poorer working conditions than their dayworking counterparts (Angerer et al., 2017). The findings are, however, less consistent with those of a recent study of hospital-based Finnish health care workers, many of whom were nurses (Karhula et al., 2018). This cross-sectional study found few differences between dayworkers and rotating shiftworkers (a mixture of both two- and three-shift workers) with respect to psychosocial working conditions. Unlike that study, however, the current analyses focussed exclusively on nurses and were able to more accurately pinpoint which nurses were experiencing more adverse profiles of working conditions. Associations between shift work scheme and profile membership were stronger for three-shift workers than for two-shift workers. Of the three types of schedule studied, three-shift workers were least likely to be members of the supporting profile and most likely to be members of the demanding profile. This suggests that nurses working three shifts tended to experience the poorest psychosocial working conditions.

With regard to the third research question, psychosocial working conditions were associated with health indices in both early career and mid-career. The findings reflect the so-called health diagonal of the Job Demand-Control model (Karasek, 1979). Even though previous findings suggested that positive work attitudes may be supported by high levels of both job resources and job demands (Bakker et al., 2010), the current study and previous person-centred analyses have showed that high control and low demands (i.e., supporting profile) may be healthier and more sustainable over time (Bujacz et al., 2018; Portoghese et al., 2020). The poorest health outcomes were associated with membership of the demanding profile (i.e., high demand and low control/support), whereas the better health outcomes were associated with membership of the supporting profile (i.e., low demand and high control/support). Nurses in the demanding profile were thus identified as being most in need of additional support in both early career and mid-career. Notably, the constraining profile of working conditions, characterized by moderate demands combined with low autonomy and support, was associated with adverse health outcomes mainly in the mid-career. This finding highlights the need for organisational interventions, targeted towards mid-career nurses, that address issues around underutilization of skills, lack of decision-making opportunities and insufficiently challenging tasks at work. Thus, this study is among the first to point out that although interventions aiming to reduce work demands may be sufficient for early career nurses, increasing job control and support seems necessary to improve nurses' health as they progress to mid-career. For example, an intervention programme including an increased access to continuing professional development through postgraduate qualifications and short courses was shown to significantly improve psychological well-being of hospital nurses (Rickard et al., 2012).

4.1 | Limitations

The tendency for nurses in mid-career to report more positive, less demanding work environments should be interpreted carefully. Nurses with many years of experience in the profession are likely to find their work less demanding, as compared with how they may have perceived the same situations earlier in their career (Arrowsmith et al., 2016). Caution is also required when attempting to extrapolate the current findings observed within a sample of predominantly female nurses. There are potential gender differences in the extent to which working conditions and work schedules are associated with burnout and sleep disturbance (Purvanova & Muros, 2010). Lastly, the current study included a limited range of psychosocial work environment factors. It did not consider other work environment factors that are experienced by many nurses, such as teamwork (Welp & Manser, 2016) or the threat of workplace violence (Edward et al., 2014).

5 | CONCLUSION

The current analyses suggest that shiftworking nurses are particularly in need of measures that address poor work environments. Not only do they experience more negative psychosocial work environments than their dayworking counterparts, but they do so while having to contend with demanding work schedules. Thus, additional measures should be considered that address the fatigue and recuperation of shiftworkers (Blake, 2016). This can be achieved by optimizing scheduling to enable sufficient sleep, training and education in finding ways to optimize recovery and finally treating fatigue levels as indicators of a risk for health and safety (Wong et al., 2019). The current findings in relation to health outcomes suggest that interventions should not be limited to addressing issues around nightworking but should consider other fatigue-related scheduling issues.

5.1 | Implications for nursing management

Understanding how work environment affects nurses' health over time can help identify which nurses are at risk of seeking alternative career paths. Even though psychosocial working conditions may vary across cultures and countries, the problem of shiftworkers being more likely to experience worse working conditions is relevant for health care workers across the globe. The current findings also highlight that organisational interventions should target different aspects of the work environment for nurses in diverse stages of their careers. For newly graduated nurses, it is important to reduce workload and mitigate rapid pace of work (Rickard et al., 2012). For mid-career nurses, interventions may additionally target underutilization of skills, as well as focus on increasing appreciation and participation in decision making (Addor et al., 2017).

AUTHOR CONTRIBUTIONS

Aleksandra Bujacz: Conceptualization; methodology; formal analysis; data curation; visualization; writing—original draft; writing—review and editing; funding acquisition. **Ann Rudman**: Conceptualization; investigation; data curation; writing—original draft; project administration; funding acquisition. **Petter Gustavsson**: Conceptualization; investigation; data curation; supervision; funding acquisition. **Anna Dahlgren**: Conceptualization; writing—original draft. **Philip Tucker**: Conceptualization; funding acquisition; supervision; writing—original draft; writing—review and editing.

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CONFLICT OF INTERESTS

None.

ETHICS STATEMENT

Ethical permission to conduct the study was given from the Regional Ethics Review Board in Stockholm on 25 May 2016 (No. 01-045, Supplementary Application No. 2016/793-32).

DATA AVAILABILITY STATEMENT

Data are not available. The data that have been used are confidential. Due to the sensitive nature of the questions asked in this study, survey respondents were assured that raw data would remain confidential and would not be shared.

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