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Original Article

Associations between burnout symptoms and sleep among workers during the COVID-19 pandemic



Torhild Anita Sørengaard*, Ingvild Saksvik-Lehouillier

Department of Psychology, Norwegian University of Science and Technology, Norway

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ABSTRACT

Background: The aim of this study was to investigate the relations between underlying dimensions of burnout (ie exhaustion, mental distance, cognitive impairment and emotional impairment) and sleep reactivity in occupations that maintain critical societal functions during the COVID-19 pandemic. Sleep reactivity refers to the vulnerability of experiencing sleep disturbances during stressful and challenging situations, and manifests as difficulties with falling and staying asleep. Previous research has highlighted the importance investigating psychological factors that may influence or trigger vulnerability to stress induced sleep problems, including factors at work.

Methods: Longitudinal self-report data was collected using an online survey administered to Norwegian workers employed in health care, education, social services, emergency services and other sectors with critical tasks during the COVID-19 pandemic at two different time points three months apart. The sample in the present study (N = 1331) consisted of 76% females and 24% males with a mean age of 44 years. **Results:** The results showed that work-related exhaustion measured at baseline was the strongest symptom of burnout associated with higher sleep reactivity three months later, followed by emotional impairment. Mental distance and cognitive impairment at work were not associated with sleep reactivity, indicating that these burnout dimensions have less of an impact on sleep than exhaustion and emotional impairment.

Conclusion: Work-related exhaustion and emotional impairment can lower the individual's tolerance to perceiving events as stressful as well as reinforce the stress response, and contribute to difficulties with initiating and/or maintaining sleep. Workers employed in occupations with critical tasks during the pandemic may be more susceptible to exhaustion, emotional strain and poorer sleep due to increased and prolonged work pressure. Organizational and individual measures that can decrease stress and increase coping should be offered to employees working in high-stress conditions.

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A growing number of studies show that sleep disturbances is a serious concern during the ongoing coronavirus disease (COVID-19) pandemic [1–3]. The pandemic inflicts strain on workers and the general population worldwide, which may contribute to an increased risk of stress related sleep disturbances [4]. In turn, prolonged difficulties with sleep can have severe adverse effects on both mental and physical health [5,6]. Sleep problems also influence the overall quality of life [7], and is considered a risk factor for future sickness absence and disability among workers [8,9].

Many researchers in the field of sleep disorders consider hyperarousal, ie elevated cognitive and physiological activation, as a key

factor in the development of insomnia [10]. This concept is closely related to sleep reactivity, which refers to the trait-like degree of sleep disruption in response to stressful situations [11]. It manifests as difficulties with falling and staying asleep due to the individual's response to challenging events during the day, eg bad news, arguments or conflicts, important appointments and stressing events [4]. High sleep reactivity increases the individual's vulnerability of experiencing insomnia during stressful conditions, and is believed to predispose the development and maintenance of insomnia [12].

The stressors that can contribute to sleep reactivity and insomnia varies [13], and ranges from individual and work factors to physiological and neurological issues. Daily stressors are associated with elevated levels of pre-sleep arousal and poorer sleep [14], which suggests that high stress conditions at work contribute to higher sleep reactivity as well as increased vulnerability to

* Corresponding author.

E-mail address: Torhild.sorengaard@ntnu.no (T.A. Sørengaard).

insomnia. Several occupational factors are related to sleep problems, including cognitive- and emotional demands, and more attention should be given to these factors [15]. Burnout is often defined as a state of physical, mental and emotional exhaustion caused by prolonged and excessive stress at work [16]. This syndrome is closely related to chronic stress at work, and can contribute to the onset and maintenance of sleep disorders, including insomnia [17,18]. Dysregulation of the physiological response to stress and excessive stress hormones, have been linked burnout, sleep reactivity and insomnia [19,20], bringing the concepts close together. We do, however, lack knowledge about which aspects or dimensions of burnout that are related to an increased risk of sleep problems and higher sleep reactivity.

A new conceptualization of burnout proposed by Schaufeli and colleagues [21] defines the underlying dimensions of burnout as exhaustion, mental distance, cognitive impairment and emotional impairment. These dimensions have not been investigated in relation to sleep reactivity so far and may shed new light on which aspects of burnout that contribute to difficulties with sleeping during the pandemic. High emotional and physical exhaustion at work are related to sleep complaints, whereas low levels of exhaustion can contribute to good sleep [22]. Cognitive- and emotional hyperarousal have shown to be strongly related to insomnia [23], further stressing the importance of examining the underlying dimensions of burnout, which includes cognitive and emotional impairment at work in particular, in relation to sleep reactivity. Both cognitive and emotional demands can impact sleep among workers, and positive emotions at work are especially important for good sleep quality [24].

The pandemic has put unprecedented strain on workers in occupations that maintain critical societal functions worldwide, and it is important to investigate and monitor the associations between burnout and sleep disturbances in these occupations. Previous research has called for investigation of psychological factors that may influence or trigger vulnerability to stress induced sleep problems [25], this includes psychological factors at work. More specific, we need to broaden our knowledge and understanding about how symptoms of burnout are related to sleep reactivity and disturbances. Although sleep reactivity is considered a trait-like characteristic, it may still be influenced and elevated by work-related stress factors. The present study seeks to answer this call and investigate underlying dimensions of burnout, ie exhaustion, mental distance, cognitive and emotional impairment, and their relationship to sleep reactivity among workers in occupations with critical tasks during the COVID-19 pandemic. Our central hypothesis is that symptoms of burnout will be associated with higher sleep reactivity. Knowledge of these relations will be valuable when designing organizational and individual measures aimed at preventing and reducing sleep difficulties related to stress at work, especially during the pandemic and in the aftermath.

1. Methods

1.1. Design and procedure

The following paper is based on longitudinal self-report data from employees in occupations within critical sectors (eg health, education, and welfare, social and emergency services) in central Norway during the COVID-19 pandemic. The participants were invited by their work e-mail to participate in the study and answer an online survey administered in June 2020 (Time 1), and again in October (Time 2) the same year. The study was approved by the Norwegian Centre of Research Data and Regional Committees for Medical and Health Ethics in Norway, and the participants provided informed electronic consent before participating in the study.

1.2. Sample

A total of 1331 participants provided their informed consent to participate and answered the questionnaire at baseline. Of those who participated at baseline, 667 (50%) also answered the follow-up questionnaire four months later. The sample consisted of 76% females and 24% males with a mean age of 43.65 years (range 18–68, $SD = 11.36$). The participants were employed in education (40%), the health care sector (19%), labour- and welfare services (16%), social and family services (11%), management and property (9%), and police, fire and rescue services (5%).

1.3. Measures

The questionnaires contained items measuring demographic and background variables, work time schedule, psychosocial work factors, insomnia, and mental and physical health. Sleep reactivity was measured at follow-up (Time 2), whereas the other variables included in the present study were measured at baseline (Time 1).

1.3.1. Sleep reactivity

Ford Insomnia Response to Stress Test (FIRST) is an instrument comprising of nine items that measures the individual's likelihood of experiencing difficulties sleeping in response to stressful events and situations [26]. Examples of situations are a bad day at work, before an important meeting the next day and after a stressful experience at night. Answers were given on a four-point Likert scale and summed to a total score ranging from 9 (low sleep reactivity) to 36 (high sleep reactivity). The instrument has shown good psychometric properties in previous research [25]. The scales internal consistency in the present study was high ($\alpha = 0.86$).

1.3.2. Burnout dimensions

The four underlying dimensions of burnout; exhaustion, mental distance, cognitive impairment and emotional impairment were measured with the 12-item version of the Burnout Assessment Tool [21]. Example of items are "After a day at work, I find it hard to recover my energy" (exhaustion), "I feel a strong aversion towards my job" (mental distance), "At work I may overreact unintentionally" (emotional impairment) and "When I am working I have trouble concentrating" (cognitive impairment). The answers were given on a five-point Likert frequency scale ranging from 1 (never) to 5 (always), which was used to calculate mean scores. The internal consistency was high for exhaustion, cognitive impairment and emotional impairment ($\alpha = 0.82$ – 0.85), and acceptable for mental distance ($\alpha = 0.71$).

1.3.3. Insomnia

The Bergen Insomnia Scale (BIS) was used to measure insomnia [27]. The participants were asked to indicate how many days a week (0–7) during the last month they have struggled with six specific symptoms of insomnia (ie sleep onset, sleep maintenance, early morning awakening, not feeling adequately rested, daytime impairment and dissatisfaction with current sleep). The continuous sum scale ranges from 0 to 42. The Bergen Insomnia Scale has shown good convergent and discriminative validity in previous studies [27], and is a widely used measure of insomnia. The internal consistency for insomnia was high ($\alpha = 0.84$).

1.4. Statistical analyses

The statistical analyses were performed in IBM SPSS (version 27). Pearson correlation analysis was used to examine correlations between all variables included in the present study. Relations between sleep reactivity measured at follow-up as dependent

variable and exhaustion, mental distance, cognitive impairment and emotional impairment measured at baseline were examined with multiple regression analysis. The first model included age and gender as control variables, whereas the second model also included exhaustion, mental distance, cognitive impairment and emotional impairment. The final model adjusted for insomnia measured at baseline to control for the effects of initial symptoms of insomnia on sleep reactivity.

2. Results

Table 1 show descriptive statistics and correlations for all variables included in the present study. The scores on sleep reactivity (ie vulnerability to insomnia in response to stressful events) ranged from 9 to 36 for all the participants, with a mean value of 20.35 (SD = 6.12). Further, sleep reactivity had positive associations to gender (ie females scored higher than males), job demands, work stress, work-related exhaustion, emotional impairment and insomnia. Age was negatively associated with sleep reactivity.

Table 2 show the results from the multiple regression analysis on variables measured at baseline predicting sleep reactivity measured at follow-up. The first model, including only gender and age, explained 5% of the variance in sleep reactivity. After adding exhaustion, mental distance, cognitive impairment and emotional impairment, the explained variance rose to 23%. The final model, adjusting for insomnia measured at baseline, explained 29% of the variance in sleep reactivity. Work-specific exhaustion had the strongest positive association to future high sleep reactivity, followed by emotional impairment. The effects remained significant after adjusting for insomnia in the final model. Mental distance and cognitive impairment had no significant association to sleep reactivity.

3. Discussion

The present study showed that the burnout dimensions work exhaustion and emotional impairment were associated with higher sleep reactivity measured three months later. These effects remained significant even after including insomnia measured at baseline in the final regression model. Mental distance and cognitive impairment had no association to sleep reactivity, indicating that exhaustion and emotional impairment at work are the two main underlying dimensions of burnout contributing to higher sleep reactivity and subsequent elevated risk of sleep problems following stressful conditions at work. Hence, our central hypothesis was partly supported.

The strongest positive relationship in the present study was between work-related exhaustion and sleep reactivity. Prolonged exhaustion among workers often a result of chronic stress at work that has not been successfully coped, and can contribute to difficulties with sleep [17,18]. A possible explanation is that exhaustion

Table 2
Multiple regression analysis on underlying dimensions of burnout predicting sleep reactivity (N = 665).

	Sleep reactivity				R ²
	β	SE	95% CI B	p	
Model 1					0.06
Gender ^a	0.19	0.53	[1.59, 3.68]	0.000	
Age	-0.13	0.02	[-0.12, -0.03]	0.001	
Model 2					0.23
Gender ^a	0.13	0.49	[0.86, 2.79]	0.000	
Age	-0.05	0.02	[-0.07, 0.01]	0.132	
Exhaustion	0.36	0.35	[2.05, 3.40]	0.000	
Mental distance	0.04	0.45	[-0.53, 1.24]	0.431	
Cognitive impairment	-0.05	0.44	[-1.39, 0.32]	0.220	
Emotional impairment	0.12	0.42	[0.43, 2.08]	0.003	
Model 3					0.29
Gender ^a	0.14	0.47	[1.08, 14.79]	0.000	
Age	-0.05	0.02	[-0.07, 0.01]	0.110	
Exhaustion	0.22	0.36	[0.99, 2.40]	0.000	
Mental distance	0.03	0.43	[-0.58, 1.12]	0.531	
Cognitive impairment	-0.05	0.42	[-1.34, 0.31]	0.218	
Emotional impairment	0.10	0.40	[0.21, 1.08]	0.013	
Insomnia	0.29	0.02	[0.13, 0.23]	0.000	

^a male = 0, female = 1.

lower the individual's tolerance to stressful events as well as reinforces their stress response, and thus contributes to higher sleep reactivity and difficulties with initiating sleep. This is supported by previous research, which have found that exhaustion can be related to dysfunctional stress response [28], including exaggerating the individuals susceptibility to perceiving an event as stressful. Pre-sleep arousal is related to increased difficulties with sleeping and shorter sleep [24], which can explain why exhaustion can make it harder to fall asleep following stressful events. A common belief is that exhausted individuals tend to sleep more to compensate for feeling drained of energy, but previous research has demonstrated that exhaustion can contribute to poor sleep [22].

Dysfunctional emotional reactivity can lead to hyperarousal before sleep and contribute to sleep problems like insomnia [29], which can explain why work-related emotional impairment was associated to higher sleep reactivity in the present study. Difficulties with regulating emotions connected to work can contribute to delayed processing of emotions, and may lead individuals to having to deal with these emotions closer to bedtime instead of processing them efficiently at work or during daytime. Activation of negative emotions and high emotional arousal before sleep are related to impaired sleep [30], which again can affect emotional regulation the following day. Good sleep, on the other hand, reduces aversive emotional reactions to stressful stimuli [31]. Hence, the relation between emotional impairment at work and sleep reactivity may be closely linked and multidirectional in nature. This finding highlights the need for acknowledging the importance of emotions at work during the pandemic, as well as further investigation of how the

Table 1
Descriptive statistics and correlations (N = 665–1331).

	Mean (SD)	1	2	3	4	5	6	7	8
1. Gender ^a	0.77 (0.43)	–							
2. Age	43.65 (11.36)	-0.05	–						
3. Exhaustion	2.56 (0.80)	0.14**	-0.20**	–					
4. Mental distance	1.71 (0.62)	-0.01	-0.10**	0.57**	–				
5. Cognitive impairment	2.01 (0.62)	0.05	-0.08**	0.47**	0.51**	–			
6. Emotional impairment	1.54 (0.57)	0.08**	-0.05	0.44**	0.44**	0.46**	–		
7. Insomnia	14.36 (9.91)	0.05	-0.12**	0.49**	0.31**	0.27**	0.29**	–	
8. Sleep reactivity	20.35 (6.12)	0.19**	-0.14**	0.44**	0.28**	0.21**	0.29**	0.44**	–

*p < 0.05 **p < 0.01.

^a 0 = male, 1 = female.

pandemic and related consequences can affect emotional functioning in workers during a prolonged crisis.

3.1. Implications

The findings in this study enables targeting of specific symptoms of burnout when combatting the effects of work stress on employee sleep in organizations, as well as highlights the close association between emotional reactivity and sleep [32,33]. Sleep is a fundamental need that can affect the workers wellbeing, health and safety [34], and organisations should strive to prevent sleep problems related to the employees' work. Exhaustion, emotional impairment, and poor sleep are not just concerns limited to the individual employee. These factors can also affect the employee's performance and relations to others, making it crucial to prevent exhaustion and dysfunctional emotional functioning due to high work strain in the organisation. Previous research has shown that high job demands and work stress are important antecedents for symptoms of burnout [35,36], and perceiving work as exhausting can be more decisive than the overall level of demands [37]. Hence, high work strain can have an adverse effect on sleep through its effect on work-related exhaustion and emotional impairment. The level of stress and demands at work should thus be considered when designing organisational measures aimed at reducing exhaustion and improving emotional functioning among employees during the pandemic.

Offering employees courses in positive coping strategies (eg seeking and giving social support) and effective emotional processing can heighten the level of knowledge and awareness of these factors in the organisation, making it easier for the employees themselves to detect and cope with symptoms of burnout at an earlier stage. These are important preventive measures for the organizations to both consider and offer during and after the pandemic. Symptoms of burnout and sleep problems are on the rise among frontline workers [38–40], and it is vital to address these issues to avoid potential short- and long-term consequences in both the working and general population [41].

3.2. Strengths and limitations

The present study follows a longitudinal design with multiple points of measurement, which strengthen the predictive value of the findings. Although the initial response rate was low, the follow-up rate of 50% was satisfying and provided a sufficient sample size for the purpose of this study. Due to strict time limitations on the questionnaires, the study applied the short form version the Burnout Assessment Tool to measure underlying dimensions of burnout. However, the short version of this instrument has been validated in previous research and is considered a reliable measure of work-related exhaustion [21]. A limitation of the survey is that it did not include questions about previous COVID-19 infection, which could have influenced the respondents sleep and level of stress and burnout symptoms. Further, the potential seasonal differences in sleep and mood were not accounted for in this study. The results in the present study can also have been influenced by common method and self-report bias related to the use of questionnaires [42,43], and the conclusions could have been strengthened by also applying other-reports and objective measures, i. e. physiological measure of arousal before sleep. However, self-report was the most appropriate method in the present study in terms of assessing factors that might only be accessible to the individual themselves, eg how they feel and think [44], as well as the strict infection control and social restrictions during the pandemic.

3.3. Conclusion

Work exhaustion and emotional impairment among workers in critical occupations during the COVID-19 pandemic can contribute to higher sleep reactivity and subsequent sleep disturbances. Mental distance and cognitive impairment at work were not associated with sleep reactivity, indicating that these burnout dimensions have less of an impact on sleep than exhaustion and emotional impairment. Acknowledging that workers during the pandemic may be more susceptible to exhaustion, impaired emotional functioning and higher sleep reactivity due to high work strain is an important step in preventing future health problems, sickness absence and disability in occupations with critical tasks both during and after the pandemic.

Credit author statement

TS: Conceptualization, Design, Investigation, Methodology, Formal Analysis, Writing - Original draft preparation, Writing – Reviewing and Editing. IS-L: Writing - Reviewing and Editing, Supervision.

Conflict of interest

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: <https://doi.org/10.1016/j.sleep.2022.01.022>.

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