INTRODUCTION

About one-third of the general population in Sweden experiences sleep problems between the ages of 19 and 75 years (Ohayon & Bader, 2010; Ohayon & Reynolds, 2009). Poor sleep is known to lead to a number of adverse health outcomes (Van Laethem et al., 2013). Sleep problems may also lead to organisational consequences such as less productivity, more sickness absence (Linton & Bryngelsson, 2000), or injuries at work (Salminen et al., 2010). Individual consequences may be less interest in work, less motivation and concentration (Bültmann

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Summary
The study investigated the association between onset of workplace violence and onset of sleep disturbances. We used self-reported data from the Swedish Longitudinal Occupational Survey of Health (SLOSH) collected in 2014, 2016, and 2018. A two-wave design was based on participants who had no exposure to workplace violence or sleep disturbances at baseline (n = 6,928). A three-wave design was based on participants who in addition were unexposed to sleep disturbances in the second wave (n = 6,150). Four items of the Karolinska Sleep Questionnaire were used to measure sleep disturbances and one question was used to measure the occurrence of workplace violence or threats of violence. Multivariate logistic regression analyses were performed. In the two-wave approach, onset of workplace violence was associated with onset of sleep disturbances after adjustment for sex, age, occupational position, education, and civil status (adjusted odds ratio 1.41, 95% confidence interval 1.02–1.96). The association was no longer statistically significant after further adjustment for night/evening work, demands, control, and social support at work. In the three-wave approach, results were only suggestive of an association between onset of workplace violence and subsequent onset of sleep disturbances after adjustment for sex, age, occupational position, education, and civil status. Onset of frequent exposure to workplace violence was associated with subsequent onset of sleep disturbances in the adjusted analyses, but these analyses were based on few individuals (13 exposed versus 5,907 unexposed). The results did not conclusively demonstrate that onset of workplace violence predicts development of sleep disturbances. Further research could elucidate the role of other working conditions.

KEYWORDS
occupational health, sleep problems, stress, violence, work environment
et al., 2000). Stress is an often mentioned reason for sleep disturbances among the Swedish working population (Åkerstedt et al., 2012; Linton & Bryngelsson, 2000). It has been found that suspected work stressors such as job demands, control and social support at work are associated with sleep disturbances (Linton et al., 2015). It is likely that long-term stress can lead to psychological alertness or arousal, which may hinder the worker to sleep well (Eriksen et al., 2008; Gluschkoff et al., 2017). However, interpersonal stressors such as workplace violence have been given less attention to date (Magnavita et al., 2019).

There are indications that workplace violence has become more prevalent in recent years (Eurofound, 2015), although a clear definition is still lacking (Nyberg et al., 2020). Different definitions, occupational sectors, study settings and countries have led to a large variety in prevalence estimates (Lancot & Guay, 2014). In the sixth European working conditions survey, it was found that verbal abuse in the past month was reported by 12%, threats of violence by 4% and physical violence over the past 12 months by 2% of European workers in different occupational sectors (Eurofound, 2017). Exposure to violence at the workplace has been linked to various physical, emotional and psychological health outcomes (Lancot & Guay, 2014). However, longitudinal research on the relation between workplace violence and sleep disturbances is limited (Lancot & Guay, 2014; Magnavita et al., 2019; Nyberg et al., 2020). Most of the studies are either cross-sectional or have two measurement points. These designs cannot provide convincing evidence on temporality between workplace violence and sleep, and rule out potential reverse causality as has been suggested in the literature (Johannessen & Sterud, 2017; Wieclaw et al., 2006).

The few existing prospective studies have found that workplace violence can increase the risk of subsequent sleep problems (Magnavita et al., 2019). One study investigated workplace violence and sleep problems among Finnish teachers (Gluschkoff et al., 2017). They found that exposure to workplace violence was associated with concurrent and subsequent sleep disturbances. Another study investigated the relationship between several psychosocial factors measured at baseline and the occurrence of sleep problems measured 4 years later in men and women separately. For men, workplace violence was associated with subsequent sleep problems (Johannessen & Sterud, 2017). They also tested for reverse associations and found that sleep problems increased the risk of reporting workplace violence, both in men and in women (Johannessen & Sterud, 2017). These mixed results indicate that further studies are needed with more advanced methodological approaches that can determine the direction of the association.

The aim of the present longitudinal study was to examine if onset of workplace violence is associated with onset of sleep disturbances using both a two- and three-wave design.

2 | METHODS

2.1 | Design and material

We used data from the Swedish Longitudinal Occupational Survey of Health (SLOSH), a cohort study addressing working life, social situation, wellbeing, and health. SLOSH originates from the Swedish Work Environment Survey (SWES), which is based on an approximately nationally representative sample of working individuals aged 16–64 years. Since 2006 when participants of SWES 2003 were followed-up through SLOSH, data have been collected biennially and the cohort has been extended with participants from SWES 2007–2011 resulting in a total cohort of \( n = 40,877 \) in 2014 (Magnusson Hanson et al., 2018). The participants answer one of the two self-reported questionnaires depending on whether they are in paid work for \( \geq 30\% \) of full-time or whether they are in \(< 30\% \) of paid work or not working at all at the time of data collection (Magnusson Hanson et al., 2018). SLOSH respondents are more often female than male, of older age, have a higher education and are married or cohabiting, especially those who participated in multiple waves (Magnusson Hanson et al., 2018). The Regional Ethics Board in Stockholm approved the study and informed consent was given by the participants by returning the questionnaires.

In this study, we used two different analytic samples, derived from SLOSH 2014, 2016 and 2018 with identical measurements for workplace violence and sleep disturbances. The first sample was based on data from two waves, 2014 (T\(_0\)) and 2016 (T\(_1\)). This two-wave design was used to examine if onset of workplace violence was associated with onset of sleep disturbances across the 2-year period. For these analyses we selected participants at baseline (T\(_0\)) who had no exposure to workplace violence and no sleep disturbances and valid answers on the other study variables (\( n = 6,928 \)). To determine whether onset of workplace violence predicts subsequent onset of sleep disturbances, data from three consecutive waves were used (2014, 2016, and 2018). For these analyses, we selected participants who in addition were unexposed to sleep disturbances at T\(_1\) (\( n = 6,150 \)). Figure 1 presents a flow chart on how the samples were derived and the design is illustrated in Figure 2.

2.2 | Workplace violence

Workplace violence was measured with a question asking whether the participants were exposed to violence or threats of violence at their workplace in the last 6 months. The four response options were “once/several times a week”, “once/several times a month”, “sometimes during the last 6 months”, and “never”. The responses of each wave were dichotomised into “yes” (1) and “no” (0). Participants were considered to have onset of workplace violence when they were unexposed at T\(_0\) but exposed at T\(_1\), as illustrated in Figure 2.

2.3 | Sleep disturbances

Sleep disturbances were assessed with four questions from the Karolinska Sleep Questionnaire addressing difficulties falling asleep, repeated awakenings, premature awakening, and disturbed/restless sleep in the past 3 months. The items have been validated and have shown appropriate psychometric characteristics (Magnusson et al., 2000).
Hanson et al., 2017). The response options were "never", "seldom/a few times per year", "sometimes/several times per month", "often/ once or twice a week", "most of the times/three to four times a week", "always/five or more times a week". The Cronbach's alpha was 0.76 for $T_1$ and 0.75 for $T_2$. Sleep was considered as disturbed when one of the items was reported three- or four-times a week or more, in accordance with diagnostic criteria for insomnia (Magnusson Hanson et al., 2017). The respondents were first categorised into two groups: those with sleep disturbances ($=1$) and those without sleep disturbances ($=0$). Next, the respondents were considered to have onset of sleep disturbances when they reported sleep disturbances at $T_1$, but not at $T_0$ (two-wave design) or when they reported...
sleep disturbances at T_2 but not at T_0 or at T_1 (three-wave design) (see also Figure 2).

2.4 Covariates

A number of covariates were obtained from baseline (T_0), which included sex (women or men), age (continuous), occupational position (manual workers, non-manual employees, non-manual professionals or upper level executives, and self-employed), educational attainment (compulsory education, 2 years of upper secondary education, 3–4 years of upper secondary education, university or equivalent education <3 years, and university or equivalent education of ≥3 years), civil status (married/cohabitating or single), night/evening work (working night/evening shifts or daytime/other), and psychosocial work characteristics. The work characteristics were assessed by demands, control and support items of the commonly used Demand–Control Questionnaire (DCQ, Swedish version). The demand dimension was assessed by using five questions (working fast, working intensively, too much effort, enough time, and conflicting demands). The Cronbach’s alpha was 0.74. Two items on decision authority, on having a choice what to do at work and how to do work, were used to measure control. The Cronbach's alpha was 0.76. The response options for demands and control ranged from “yes, often” (1) to “hardly ever/never” (4). The dimension for social support was assessed with using five questions from the DCQ (calm atmosphere at work, good spirit of unity, colleagues are there for me, people understand a bad day, get well on with superiors). The Cronbach’s alpha was 0.81. Response options ranged from “strongly agree” (1) to “strongly disagree” (4). The scales were dichotomised according to the median into low/high demands, low/high control, and low/high support at work.

2.5 Statistical analysis

A number of multivariate logistic regression analyses were performed. Different analytical models were fitted: a crude model without adjustment (Crude Model), a model with adjustment for sex and age (Model 1), a model with further adjustment for occupational position, education, and civil status (Model 2), and a final model with additional adjustment for night/evening work and psychosocial work characteristics (Model 3). In addition, we tested for interaction by including an interaction term between several covariates (sex, night/evening work, high demands, low control, and low social support at work) and onset of workplace violence in the analyses and calculated relative excess risk due to interaction (RERI). Moreover, we tested whether onset of frequent (once/more times a week) or occasional (once/more times a month, sometimes during the last 6 months) workplace violence compared to no workplace violence was associated with onset of sleep disturbances in the three-wave design. This was not possible in the two-wave design because of too few cases among the frequently exposed. Results are presented as odds ratios (ORs) with 95% confidence intervals (CIs). All analyses were conducted with IBM SPSS Statistics, version 26.

3 RESULTS

Table 1 shows descriptive statistics for the two analytical samples. The percentage of women was higher than that of men (54.4% versus 45.6%, 53.3% versus 46.7%) in both samples. The analytical samples further consisted of a higher proportion of people with university education of ≥3 years, of married/cohabiting individuals, and individuals working daytime or other shifts than night/evening shifts. Around 4% had an onset of workplace violence between T_0.
and T₁ (reported no workplace violence 6 months up to T₀ but re-
ported workplace violence in the 6-months period up to T₁).
Table 2 shows the ORs with 95% CIs from the regression anal-
yses for workplace violence and sleep disturbances based on the
two-wave design. The unadjusted analyses showed an associ-
ation between onset of workplace violence from T₀ to T₁ and onset of
sleep disturbances from T₀ to T₁. Adjustment for background factors
(sex, age, occupational status, education, and civil status) did not
change the estimates markedly (Model 1 and Model 2). Participants
with onset of workplace violence had higher odds of onset of sleep
disturbances than participants with no onset of workplace violence
(adjusted OR [aOR] 1.41, 95% CI 1.02–1.96; Model 2). With addi-
tional adjustment for night/evening work and work characteristics in
the fully adjusted model, the associations attenuated to a statistically

### Table 1 Distribution of study variables for the analytical samples at
baseline (n = 6,928 and n = 6,150)

| Variable                        | Two-wave analysis, n (%) | Three-wave analysis, n (%) |
|--------------------------------|--------------------------|----------------------------|
|                                | n = 6,928                | n = 6,150                  |
| Age, years                     |                          |                            |
| 19–29                          | 130 (1.9)                | 113 (1.8)                  |
| 30–39                          | 835 (12.1)               | 713 (11.6)                 |
| 40–49                          | 1,991 (28.7)             | 1,765 (28.7)               |
| 50–59                          | 2,707 (39.1)             | 2,419 (39.3)               |
| 60–69                          | 1,251 (18.1)             | 1,127 (18.3)               |
| 70–76                          | 14 (0.2)                 | 13 (0.2)                   |
| Sex                            |                          |                            |
| Men                            | 3,158 (45.6)             | 2,874 (46.7)               |
| Women                          | 3,770 (54.4)             | 3,276 (53.3)               |
| Education                      |                          |                            |
| Compulsory                     | 614 (8.9)                | 546 (8.9)                  |
| 2-year upper secondary         | 1,475 (21.3)             | 1,354 (22.0)               |
| 3- or 4-year upper secondary   | 1,569 (22.6)             | 1,391 (22.6)               |
| University < 3 years           | 1,047 (15.1)             | 915 (14.0)                 |
| University ≥ 3 years           | 2,223 (32.1)             | 1,944 (31.6)               |
| Occupational position          |                          |                            |
| Non-manual employees           | 1,860 (26.8)             | 1,679 (27.3)               |
| Manual workers                 | 3,290 (47.5)             | 2,905 (47.2)               |
| Non-manual professionals       | 1,719 (24.8)             | 1,511 (24.6)               |
| Self-employed                  | 59 (0.9)                 | 55 (0.9)                   |
| Civil status                   |                          |                            |
| Single (ref.)                  | 1,343 (19.4)             | 1,175 (19.1)               |
| Married/cohabiting             | 5,585 (80.6)             | 4,975 (80.9)               |
| Night/evening work             |                          |                            |
| Yes                            | 443 (6.4)                | 387 (6.3)                  |
| No                             | 6,485 (93.6)             | 5,763 (93.7)               |
| Demands at work                |                          |                            |
| Low demands                    | 4,166 (60.1)             | 3,766 (61.2)               |
| High demands                   | 2,762 (39.9)             | 2,384 (38.8)               |
| Control at work                |                          |                            |
| High control                   | 5,125 (74.0)             | 4,572 (74.3)               |
| Low control                    | 1,803 (26.0)             | 1,578 (25.7)               |
| Support at work                |                          |                            |
| High support                   | 3,888 (56.1)             | 3,505 (57.0)               |
| Low support                    | 3,040 (4.2)              | 2,645 (43.0)               |

*a No exposure to workplace violence at baseline and no sleep disturbances at baseline.

*b No exposure to workplace violence at baseline and no sleep disturbances at baseline and T₁.
**Table 2** Results from logistic regression analysis (n = 6,928) estimating the association between onset of workplace violence and onset of sleep disturbances between T0 and T1.

| Exposed, n | Cases, n (%) | Onset of sleep disturbances to T1 | Crude Model a | Model 1 b | Model 2 c | Model 3 d |
|------------|--------------|---------------------------------|---------------|-----------|-----------|-----------|
|            |              | OR 95% CI                        | aOR 95% CI    | aOR 95% CI| aOR 95% CI| aOR 95% CI|
| Onset of workplace violence T1 |              |                                 |               |           |           |           |
| No (ref)   | 6,639        | 732 (11)                        | 1.00          | 1.00      | 1.00      | 1.00      |
| Yes        | 289          | 46 (1)                          | 1.53**        | 1.10-2.11 | 1.40*     | 1.01-1.94 |

Bold values indicate p < .05.
Abbreviations: CI, confidence interval; OR, odds ratio; aOR, adjusted odds ratio.

aUnadjusted.
bAdjusted for sex and age.
cAdjusted for sex, age, occupational position, education, civil status.
dAdjusted for sex, age, occupational position, education, civil status, working schedule, demands, control and social support.

*p < .05.
**p < .01.

**Table 3** Results from logistic regression analysis (n = 6,150) estimating the association between onset of workplace violence between T0 and T1 and onset of sleep disturbances between T1 and T2.

| Exposed, n | Cases, n (%) | Onset of sleep disturbances to T2 | Crude Model a | Model 1 b | Model 2 c | Model 3 d |
|------------|--------------|---------------------------------|---------------|-----------|-----------|-----------|
|            |              | OR 95% CI                        | aOR 95% CI    | aOR 95% CI| aOR 95% CI| aOR 95% CI|
| Onset of workplace violence T1 |              |                                 |               |           |           |           |
| No (ref)   | 5,907        | 399 (7)                         | 1.00          | 1.00      | 1.00      | 1.00      |
| Yes        | 243          | 25 (0)                          | 1.58*         | 1.03-2.42 | 1.43      | 0.93-2.19 |

Bold values indicate p < .05.
Abbreviations: CI, confidence interval; OR, odds ratio; aOR, adjusted odds ratio.

aUnadjusted.
bAdjusted for sex and age.
cAdjusted for sex, age, occupational position, education, civil status.
dAdjusted for sex, age, occupational position, education, civil status, working schedule, demands, control and social support.
non-significant level (Model 3), which seemed to be mainly driven by the adjustment for demands and to some extent by the adjustment for social support.

In the three-wave design, onset of workplace violence between T₀ and T₁ was associated with a statistically significant higher risk of onset of sleep disturbances between T₁ and T₂ only in the Crude Model (OR 1.58, 95% CI 1.03–2.42; Table 3). Adjustment for sex and age (Model 1) reduced the estimate to a statistically non-significant level (adjusted OR [aOR] 1.43, 95% CI 0.93–2.19). The OR decreased further with adjustment for additional background factors in Model 2, and when considering night/evening work and work characteristics in Model 3, the aOR was further decreased to 1.35 (95% CI 0.88–2.08). In additional analyses, onset of frequent exposure to workplace violence was statistically significantly associated with onset of sleep disturbances in a fully adjusted model (aOR 4.02, 95% CI 1.08–15.02). However, onset of occasional exposure to workplace violence was not clearly associated with onset of sleep disturbances (aOR 1.23, 95% CI 0.78–1.95; analyses based on 13 individuals with frequent exposure, 230 with occasional exposure and 5,907 unexposed, data not shown).

Interaction analyses in the two- and three-wave analyses performed by inclusion of an interaction term did not suggest an interaction between workplace violence and sex (p > .05), and there were no indications of interaction when calculating the RERI (RERI = 0.04). Stratification by sex showed similar estimates as in the main analyses, but no statistically significant associations (Tables S1 and S2). In the two-wave approach, the OR for men in Model 2 was 1.52 (95% CI 0.75–3.12) and for women 1.40 (95% CI 0.97–2.03). In contrast, men with onset of workplace violence from T₀ to T₁ had an OR of 1.63 (95% CI 0.64–4.14; Model 2) for onset of sleep disturbances from T₁ to T₂ and the corresponding OR for women was 1.35 (95% CI 0.83–2.20; Model 2). The association between onset of workplace violence and onset of sleep disturbances was primarily observed among those with high demands, low control, or low social support at T₀. However, when testing for interaction, we did not find any statistically significant interactions between workplace violence and the respective variables (high demands, low control, low social support, and night/evening work) (data not shown).

4 | DISCUSSION

In the present study we used a two- and three-wave design to examine if onset of workplace violence is associated with development of sleep disturbances in the Swedish working population. We found that onset of workplace violence across a 2-year period was associated with an increased risk of onset of sleep disturbances over the same period after adjustment for sex, age, occupational position, education, and civil status, but not after additional adjustment for night/evening work and psychosocial work characteristics. In the three-wave design, onset of workplace violence was statistically significantly associated with subsequent onset of sleep disturbances only in a crude model where no covariates were included, but onset of frequent exposure appeared to increase the risk of subsequent onset of sleep disturbances.

To our knowledge, no previous study has examined the relationship between the onset of workplace violence and the onset of sleep disturbances using a two- and three-wave design in a general working population. Results of previous studies with two measurement points examining prospective relationships between baseline workplace violence and sleep disturbances indicate that workplace violence predicts development of sleep problems (Eriksen et al., 2008; Hogh et al., 2003; Johannessen & Sterud, 2017; Magnavita et al., 2019). However, our present results did not confirm these indications. Gluschhoff et al. also used three subsequent waves with 2 years in between the measurements (2017). Their results, adjusted for gender and age, were somewhat stronger, but as they did not consider if participants had sleep problems prior to exposure to violence, and examined teachers as a specific occupational group, their results are not fully comparable to our present study (Gluschhoff et al., 2017).

One explanation for the lack of a clear association in the three-wave approach when covariates were included might be that the relatively few participants experiencing both onset of workplace violence and onset of sleep disturbances limit the power for analyses, and another might be the longer time-lag. Previous studies used a range of follow-up periods, from 3 months to 5 years (Eriksen et al., 2008; Gluschhoff et al., 2017; Hogh et al., 2003).

A study on the Norwegian working population by Johannessen and Sterud (2017) examined reverse and reciprocal associations, and explored the role of sex by stratification (2017). Among other psychosocial work factors, they found that men exposed to violence or threats of violence had higher odds of reporting sleep problems prospectively than unexposed men. Findings for women were statistically non-significant. While our present results showed no statistically significant sex differences, men had higher point estimates than women. A study on bullying and sleep problems had similar findings, where men who were exposed to bullying had higher ORs of developing subsequent sleep problems than women exposed to bullying (Lallukka et al., 2011). Further research is needed to support and explain these findings.

Previous research, with a three-wave design on job strain (combination of high demands and low control at work) and sleep disturbances, showed that onset of job strain increased the risk of subsequent insomnia symptoms (Halonen et al., 2017). Åkerstedt et al. found that demands at work predicted sleep impairment 5 years later and that a change to increasing demands was also associated with increasing sleep impairments (2012). This suggests that these psychosocial work characteristics precede the onset of sleep disturbances. In addition, it is likely that workers in certain occupations, such as in healthcare or with frequent client contacts, are commonly exposed to workplace violence (Viitasara et al., 2003). At the same time, these kinds of professions can have poor working conditions and a high workload (Viitasara et al., 2003).

Having little control at work was associated with being bullied in an early Norwegian study (Einarsen et al., 1994). A multilevel
Prospective study on psychosocial work characteristics and workplace violence and threats showed that quantitative demands were strongly associated with subsequent exposure to violence at work 1 year later in four different human service sectors (Andersen et al., 2018). A similar study indicated that high demands and low control at work might be more consistently associated with threats of violence than with actual violence (Andersen et al., 2020). Job strain and low social support have also been associated with the occurrence of aggression in healthcare workers (Magnavita, 2014). Indications for a bidirectional association between these factors and workplace violence in healthcare workers were also found (Magnavita, 2013, 2014).

As demands, control and also support may be associated with workplace violence and sleep disturbances, and were measured prior to onset of workplace violence, these variables were included as potential confounders, rather than mediators in our present study. If these factors are mediators of a relationship, adjustment for these factors may be inappropriate leading to an underestimation of the effects of workplace violence (Niedhammer et al., 2009). However, due to the lack of a fourth wave and limited statistical power for mediation analyses, we cannot make certain conclusions in this regard. Although there were indications of interactions, the interaction analyses were not statistically significant. Further research on this is warranted. Thus, we suggest that the role of job demands and social support in the relationship between workplace violence and sleep problems should be given more attention in future studies.

4.1 | Strengths and limitations

The main strength of the present study was the use of three consecutive waves and several inclusion/exclusion criteria, which provide more certainty about temporality. By looking at the onset of workplace violence and subsequent onset of sleep disturbances, the study mimics an intervention that usually provides stronger evidence than other traditional observational studies. Researchers have concluded that the uncertainty about the direction of associations on work characteristics and sleep needs more attention and research (Johannessen & Sterud, 2017; Magnavita et al., 2019). However, with the two-wave approach, reverse causality cannot be ruled out as the onset of outcome and exposure were measured simultaneously.

Another strength of the present study is the use of a nationally representative large study sample and the repeated measurements of exposure and outcomes. Nevertheless, it should be acknowledged that our present study samples are overrepresented by women, older employees, highly educated, and married employees. As exposure and outcome variables are self-reported, it is important to additionally acknowledge the possibility of common method variance (Halanen et al., 2017).

Other possible limitations are that the measure of workplace violence is a single-question measurement and that it does not distinguish between actual violence and threats of violence. Information on other dimensions of exposure such as perpetrator, severity, and duration are also lacking. Yet, a single-question measurement for workplace violence is commonly used in research (Eriksen et al., 2008; Gluschkoff et al., 2017; Hogh et al., 2003). Our measurement for sleep disturbances is validated and has good psychometric properties (Åkerstedt et al., 2002, 2008).

The inclusion of variables for night/evening work, demand, control, and support dimensions in the analyses is not often considered in previous studies and can thus be regarded another strength. However, it should also be mentioned that the measures of, e.g., social support and workplace violence may overlap and there is a risk that adjustment for these covariates may mask an association between workplace violence and sleep disturbances.

The lack of adjustment for covariates such as health conditions or behaviours could be another limitation. However, other lifestyle factors such as health behaviours may also be mediators of the relationship between workplace violence and sleep disturbances, and may thereby attenuate any association between violence and sleep. Therefore, adjustment for such factors may be inappropriate.

Although data were also available for examining the prospective relationship between sleep disturbances and workplace violence, the numbers of cases were too few for meaningful analyses. Hence, our present approach cannot provide information on possible reciprocal or bidirectional associations as suggested in prior research (Johannessen & Sterud, 2017; Linton, 2004). There is evidence that poor sleep can also predict workplace violence or poor social support at work (Johannessen & Sterud, 2017; Magnusson Hanson et al., 2011). Further research is needed, with another methodological approach that can also capture these directions of associations.

5 | CONCLUSION

The present study did not conclusively show that onset of any workplace violence predicts subsequent development of sleep disturbances. However, frequent exposure to workplace violence may be a risk factor and should be given more attention in future research. It remains to be clarified whether certain groups with certain occupations or work characteristics are particularly sensitive to workplace violence. Further research also seems warranted to rule out reverse causation and to elucidate the role of other working conditions.

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CONFLICT OF INTEREST

No conflicts of interest declared.

AUTHOR CONTRIBUTIONS

Study design: LMH and MH. Data analysis: MH. Manuscript draft: MH. All authors contributed to the interpretation of the data.
critical revision of the work and gave final approval of the version to be published. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

ETHICAL APPROVAL

This study has been approved by the Regional Ethics Board in Stockholm.

DATA AVAILABILITY STATEMENT

The data are not publicly available due to privacy or ethical restrictions. A strategy for data access has been developed, striving to satisfy legal requirements and ethical principles. Requests for data for specific research questions or collaboration are welcome via email: data@slosh.se. For more information, visit www.slosh.se.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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