Your job makes us lose sleep: The effect of workplace bullying on own and partner's insomnia

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Acknowledgements: This research was supported by grants PSI2017-83465-P and PID2020-117249GB-I00 by the Spanish Department of Science and Innovation (Ministerio de Ciencia e Innovación).

Accepted manuscript at Journal of Interpersonal Violence

Abstract

Exposure to bullying behaviors has been associated with a variety of negative health outcomes, such as sleep complaints. However, the current state of the knowledge is limited regarding the short-term bullying processes. Thus, we conducted research with two different time frames, to analyze short (diary) and medium-term (monthly) associations of workplace bullying with insomnia. In the first study, we used a daily diary research design, with a sample of 147 participants (N=735 occasions). In the second study, we used a longitudinal design with four waves and two months of time lag, with a sample of 139 heterosexual couples (N= 278 participants; N= 1112 occasions). Multilevel analyses showed that, in the first study, there was an indirect effect of bullying on sleep severity through rumination. In the second study, rumination transmitted the indirect effect of bullying on sleep satisfaction and sleep impact. In addition, we found a partial mediation effect of rumination between bullying and sleep severity. Furthermore, we also found a contagion of employees' and their partners' insomnia symptoms (i.e., severity and sleep impact). The results of this study provide some insight into the mechanisms underlying workplace bullying's effects on sleep and identify a differential effect based on time lag.

Keywords: workplace bullying, insomnia, longitudinal, rumination.

Introduction

Bullying at work refers to persistent unpleasant negative acts directed towards one or more targets from superiors and/or colleagues. Targets are often helpless to protect themselves (Einarsen et al., 2020). Exposure to bullying behaviors has been linked with a variety of negative health outcomes, such as sleep complaints (e.g., Nielsen & Einarsen, 2012). However, the existing literature has several limitations. First, most research has been conducted with both cross-sectional or longitudinal designs with long time lags (between one and two years). In a meta-analysis of this research literature, Nielsen et al. (2020) concluded that "*the methodological quality of the reviewed studies was rated as low to moderate*" (p. 9), mainly due to the overuse of cross-sectional approaches. Thus, the current state of the knowledge is limited regarding the of use short-time lags to examine short-term bullying processes. This is especially important considering that sleep problems are often immediate or short-term responses to stressful situations. Similarly, only a few exceptions have attempted to explore the explanatory mechanisms of the association between workplace bullying and sleep (Nielsen et al., 2020), and many of these are also based on cross-sectional designs which limit their contribution (Magee et al., 2015). Finally, there is little information about the effects of bullying beyond the individual. A growing body of research has shown that the experience of bullying can affect not only the targets but those they intimately interact with such as the partner (e.g., Rodríguez-Muñoz et al., 2017, 2022). In this research, we aimed to fill these gaps. With two different study designs, we analyze short (diary) and medium-term (monthly) associations of workplace bullying with insomnia through rumination. We also address how this situation may affect the partner's sleep problems. More broadly, the current study supports recent calls in the literature for exploring work-related strain with different time lags (Dormann, 2022;

Griep et al., 2021), to gain a better understanding of bullying-strain development processes.

Workplace bullying and sleep problems

Stressful social situations have been seen as common precipitating factors of sleep problems. In this sense, some of the most typical immediate reactions to bullying circumstances are sleep complaints (e.g., Nielsen & Einarsen, 2012). Magee et al. (2015), following a person-centered approach, showed that bullying was negatively related to low sleep quality. In a longitudinal study with a two-year time lag, Hansen et al. (2014) found that bullied employees reported more insomnia symptoms than those who were not targeted. Similar results were found in other cross-sectional (Niedhammer et al., 2009) and longitudinal studies (Nielsen et al., 2021). In this study, we will focus on insomnia as an indicator of sleep disorder. Furthermore, sleep disturbances have been observed to be a common response to bullying situations. In a weekly diary study, Rodríguez-Muñoz et al., (2020) found that insomnia symptoms persisted even after the bullying behaviors decreased. Similarly, it has been shown that insomnia is a predictor for the later development of psychiatric disorders (Hertenstein et al., 2019). According International Classification of Sleep Disorders (ICSD-3) (American Academy of Sleep Medicine, 2014), insomnia is defined as "a persistent difficulty with sleep initiation, duration, consolidation, or quality that occurs despite adequate opportunity and circumstances for sleep, and results in some form of daytime impairment".Therefore, taking into account the existing literature on the topic, we hypothesize that:

Hypothesis 1: Exposure to workplace bullying will be, both (1a) daily and (1b) monthly, positively associated with insomnia symptoms.

The context of sleep complaints

The study of the etiology of sleep has traditionally omitted the context in which it occurs. Only in recent years, it has begun to explore the interpersonal and social aspects of sleep problems. Of particular importance in this field are couples, with whom in adulthood bed-sharing is common. Partners mutually influence each other's sleep problems and in fact, the dyadic nature of sleep is specifically recognized by scholars (e.g., Gordon et al., 2017). Recent research has shown that couples tend to converge in sleep/wakefulness states and sleep stages (Walters et al., 2020). It has been shown that symptoms of insomnia are particularly contagious between romantic partners (Rogojanski et al., 2013). Several explanations have been proposed to understand this process of contagion. People tend to choose similar partners in terms of attitude, demographics, and behavior related to health, diet, and physical activity (Gordon et al., 2017). In addition, couples tend to share a common lifestyle and life events, which can directly affect various indicators of health and well-being.

In a similar vein, emerging evidence suggests that work stressors may have an impact on a person's home life by affecting them as well as their significant others, such as their family or friends (Vranjes et al. 2021; Westman, 2001). The first process, known as spillover, is an intra-individual transmission of stress, while the second process—known as crossover—refers to the transmission of stress between individuals. These effects most commonly arise when one partner suffers a negative or stressful experience (Westman, & Etzion, 2005). For example, it has been shown that workplace bullying predicts conflicts at home and low marital quality (Rodríguez-Muñoz et al., 2017), and behaviors of social undermining toward the partner (Rodríguez-Muñoz, et al., 2022). Based on these findings, we hypothesize that:

*Hypothesis 2: E*xposure to workplace bullying will be positively associated with partner insomnia symptoms (partner-reported), through own insomnia symptoms.

Rumination, bullying, and sleep

Rumination or worry are two examples of cognitive perseveration that have been proposed as a mechanism for explaining the bullying-sleep disorder association (Nielsen et al., 2020). Rumination can be defined as a maladaptive cognitive process involving repetitive thoughts and feelings about past events that are intrusive and aversive (Nolen-Hoeksema, 1991). In the current study, we will choose a specific type of rumination; anger rumination, which refers to "*unintentional and recurrent cognitive processes that emerge during and continue after an episode of anger experience*" (Sukhodolsky et al., 2001, p. 690). According to Miller et al. (2003), rumination about interpersonal aggression can reactivate the experience as if it were being relived, re-experiencing the emotions associated with the event. Cognitive, somatic, and emotional hyperarousal, has been identified as the common precipitating factor of insomnia (Bonnet & Arand, 2010). The "*hyperarousal model*" of insomnia, postulates that arousal before or during the sleep period is incompatible with good sleep.

A similar explanatory model, widely used in the work environment, is the Cognitive Activation Theory of Stress (CATS; Ursin & Eriksen, 2010), which suggests that it is not primarily the acute stress reaction that is detrimental but rather the sustained cognitive activation. This means that sustained activation may bring back to life certain emotions associated with negative work events, such as fear or anger. An activation that lasts for a long time may not be beneficial to health and well-being, even though a short-term activation is conceptualised as adaptive (Geurts & Sonnentag, 2006). There is a large body of literature considering rumination as one common

hyperarousal outcome in workplace bullying situations (e.g., Rodríguez-Muñoz et al., 2022). Evidence shows that people who have suffered bullying, at least in the initial stages, have a state of sustained cognitive activation which can translate into the development of diverse symptomatology, including insomnia (Rodríguez-Muñoz et al., 2020). Thus, this suggests a mediating effect, as proposed in hypothesis 3:

> *Hypothesis 3:* The within-individual association between workplace bullying and insomnia, will be mediated by anger rumination.

Study 1: A Daily Diary Study

Methods

Participants and procedure

Data came from different organizations located in Spain and was collected in June 2022. Participants were recruited through various social media and advertisements. First, before the week of the study, participants were asked to fill in a questionnaire with general and demographic information. Later, they had to answer a daily questionnaire for five consecutive working days. Participants were required to meet the following criteria: (1) be over 18 years old, (2) be currently employed for at least 20 hours per week, and (3) not work in shifts. Data collection was facilitated using Qualtrics.com, and the research protocol was approved by the local ethics commission.

We used a daily diary research design, with a final sample of 147 participants (75.6% female) over a period of 5 days, resulting in a total of 735 possible response days. Of these, 209 days were missed, leaving 526 completed response days. On average, participants had a completion rate of 71.5% across the 5 days. This means that each participant completed, on average, 3.57 days out of the 5 possible days. Participants' mean age was 40.6 years (SD = 11.7), and on average they worked 38.29 hours per week (SD = 10.99). The majority of the sample (70.4%) had a stable couple

with at least one child (46%), while 79.2% of the sample had a university degree or postgraduate studies. There were no shift workers in the sample. The majority of participants were employed in the services sector, with the highest percentage working in healthcare (21.1%), followed by telecommunication (15.6%) and education (12.8%).

Study 2: A longitudinal multisource design

Participants and procedure

Participants of the second study were also participants from a wide variety of organizations and sectors from Spain. Data were collected during March–December 2019. We collected data in two different phases. To begin, all participants filled out a general demographic questionnaire (e.g., gender, age, and organization). Second, participants completed questionnaires every two months, for eight consecutive months. Participants were required to meet the following criteria: (1) be over 18 years old, (2) be currently employed for at least 20 hours per week, (3) not work in shifts, (4) have been in a relationship with their partner for at least six months, and (5) cohabit with their partner full-time. We used Qualtrics.com for data collection. Using anonymous codes provided by participants, the responses of participants and their partners were linked. The local ethical committee of the first author's university approved the research. Majority of participants worked in the services sector (90.3%).

The final sample comprised 139 heterosexual couples (N= 278 participants) over 4 waves (N= 1112 occasions). Of these, 257 observations were missed, leaving 855 completed observations. On average, participants had a completion rate of 76.88%, indicating that each participant completed an average of 3.08 weeks out of the 4 possible weeks. The mean age was 46.29 years (*SD* = 10.50) and the mean job tenure was 21.73 years (*SD* = 12.04). On average, they worked 34.90 hours per week (*SD* =

12.54). 69.6% of the couples had at least one child, and 57.3% of the sample had a university degree or postgraduate studies. Participants were in stable, cohabiting relationships, but not all were married. There were no shift workers in the sample.

Measures of both studies

Workplace bullying was measured with the Spanish version (León Pérez et al., 2019) of the Short-Negative Acts Questionnaire (Notelaers et al., Einarsen, 2019). The timeframe of the original scale was adapted for capturing the day (study 1) and monthly-level (study 2) experience. Items were rated on a 6-point scale, ranging from 1 = not true at all to 6 = totally true. Example items are: "*Persistent criticism of your work and effort*" and "*Spreading of gossip and rumors about you*". The average Cronbach's alpha across waves was .84 for study 1, and .85 for study 2, respectively.

Work-related anger rumination was measured with two items from the Spanish version (Uceda et al., 2016) of the questionnaire Anger Rumination Scale (Sukhodolsky et al., 2001). Specifically, we studied the afterthoughts subdimension, which involves ruminative thoughts about a recent angry episode. Each situation was rated based on how often employees experienced it at work (e.g., " (1) W*henever I experienced anger, I kept thinking about it for a while; (2) When something made me angry, I turned this matter over and over again in my mind).* We combined both items into a single score. The timeframe of the original scale was adapted for capturing the day (study 1) and monthly-level (study 2) experience. Items were rated on a 6-point scale, ranging from 1 = *not true at all* to 6 = *totally true*. The average Cronbach's alpha across waves was .72 for study 1, and .92 for study 2, respectively.

Insomnia. The Spanish version of the Insomnia Severity Index (ISI; Fernández-Mendoza et al., 2012) was used. The ISI is a self-report questionnaire of 7 items targeting severity (sleep onset difficulties, sleep maintenance and early morning

awakening), degree of sleep satisfaction/dissatisfaction, and impact (interference with daily functioning, sleep disturbance noticeability, and concern caused by sleep problems). This measure follows the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) criteria for insomnia (American Psychiatric Association, 2013). A 5-point Likert scale is used to rate each item, from 0 (no problem) to 4 (very severe problem). Each item is scored on a five-point Likert scale from 0 ("none" or "not at all") to four ("very severe problem"). Based on the Spanish validation, which demonstrated that a three-factor structure (Sleep Severity, Sleep Satisfaction, and Sleep Impact) provides a better fit than a single summed score, we analyzed each of these components independently:

- Sleep Severity: Addressing difficulties in falling asleep, staying asleep, and waking up too early.
- Sleep Satisfaction: Capturing the degree of satisfaction with sleep.
- Sleep Impact: Considering the functional impact of sleep issues on daily life, including interference, noticeability, and distress.

Cronbach's alpha across the waves ranged from .83 to .88 for study 1, and from .87 to .80 for study 2, respectively.

General survey data

Control variables. We measured some control variables, including age and gender (1 Female; 2 Male), since existing literature has consistently shown that these variables are associated with several sleep indicators (e.g., Goel et al., 2005; Kramer et al., 1999). Additionally, following Becker et al. (2016) we used control variables only scarcely and focused on possible third variables that may have confounded the relationships of interest. In this sense, other demographic variables that have little or no

relationship with the DV (e.g., |r|<.10), were not included in the final analysis (Becker, 2005).

Data analysis

In both studies, we have a multilevel structure. In the daily study, the first level (within-person; N=735) refers to the daily measurements, and the second level (between-person; N=147) refers to each individual included in the sample. In the monthly study, the first level (within-person; N= 1112) refers to the monthly measurements, the second level (between-person; N= 278) refers to each individual included in the sample, and the third level (between-dyad; N= 139) refers to the couple. We used MLwiN software (Rasbash et al., 2002) to conduct multilevel analysis. Person-level predictors were centered around the grand mean, while time-level predictors were centered around person means.

In the first study, hypothesized relationships were examined at the within level while controlling for differences between individuals (e.g., variances were also estimated at the between-person). In the second study, to analyze our data we used the actor-partner interdependence model (APIM; Kenny et al., 2006). As individuals are nested within dyads, this method is appropriate when both members are not independent; in other words, a couple shares common variances (Kenny, & Kashy, 2011). An actor's predictor variable influences the individual's own criterion variable (actor effect) as well as the partner's criterion variable (partner effect). Partner effects in APIM models enable the test of mutual (i.e., reciprocal) influence within dyads (Kenny et al., 2006). The sleep problems of the actor are tested simultaneously with the sleep problems of the partner. In our study, the dyad members were treated as indistinguishable, as we were not interested in specific partner relationships, such as male versus female (for more details about this model, see Fitzpatrick et al., 2016).

While dyads could theoretically be treated as distinguishable, this decision was made because we were not examining gender-related effects beyond simple control variables.

For assessing mediation, we ran a Monte Carlo simulation with 20,000 replications for each hypothesized effect. Using point estimates of mediation paths and the asymptotic covariance matrix of those estimates, the Monte Carlo method creates a sampling distribution of the indirect impact (Preacher, & Selig, 2012). If the 95% confidence interval obtained does not include zero then this provides support for a statistically significant mediation effect. To test Hypotheses 1 and 2, we utilized data from both Study 1 and Study 2, while Hypothesis 3 was tested using data from Study 2.

Results

Preliminary analyses

To ensure that there is variability at both levels of analysis, we calculated intraclass correlations (ICC) for all variables in the study. In the first study, between 33.9% and 63% of the variance was attributable to within-person variations, and between 37% and 72.5% was attributable to differences between persons. In the second study, between 37.4% and 63.5% of the variance was attributable to within-person variations, between 13.6% and 54.7% was attributable to differences between persons, and between 10.8% and 24.3% was due to differences among couples. There was only one exception, the sleep satisfaction variable, which explained no variance at the couple level. Byrne (2011) states that when ICC values are larger than .10 and smaller than .90 there is a substantial amount of variance at that level and multilevel analysis should be used. These results support the use of a multilevel approach.

-Insert Tables 1 and 2 here-

Multilevel hypotheses testing

Our study hypotheses were tested using nested models. Model 1 includes the intercept and the control variables (gender and age). We introduced workplace bullying in Model 2. In Model 3, we included rumination. Tables 3 and 4 present unstandardized estimates, standard errors, and t values when insomnia symptoms are entered as dependent variable are entered as dependent variable in both studies.

-Insert Tables 3 and 4 here-

Hypothesis 1 stated that workplace bullying would be positively related to insomnia symptoms. In the daily study, this hypothesis was not supported, because bullying at work did not show a direct relationship with any of the dimensions of insomnia. In the second study, hypothesis 1 was partially supported since bullying was positively linked to month-level sleep severity ($\gamma = 0.184$, SE = 0.084, $t = 2.19$, $p < .05$).

Hypothesis 2 suggested that monthly exposure to workplace bullying would be positively associated with monthly partner-reported insomnia symptoms, through own monthly insomnia symptoms. We did not find support for the hypothesized mediating effect. Instead, we observed a direct relationship between employees' and their partners' symptom severity ($\gamma = 0.096$, SE = 0.045, $t = 2.13$, $p < .05$) and between employees' and their partners' sleep impact ($\gamma = 0.104$, SE = 0.048, $t = 2.16$, $p < .05$). However, no significant association was found between employees' and their partners' sleep satisfaction ($\gamma = 0.077$, SE = 0.040, $t = 1.92$, $p > .05$).

Furthermore, Hypothesis 3 suggests a mediation effect of employee rumination on the association between workplace bullying and insomnia symptoms - both on a daily and monthly basis. Three requirements must be met to report mediation effects in our hypotheses: (a) workplace bullying must be positively correlated with rumination; (b) rumination must be positively correlated with insomnia symptoms (i.e., severity, satisfaction, and impact); and (c) following the inclusion of the mediator, the previously

significant relationship between bullying and insomnia either ceases to be significant (full mediation) or becomes weaker (partial mediation). The association of bullying with rumination in study 1 ($\gamma = 0.416$, SE = 0.111, $t = 3.74$, $p < .01$) and study 2 ($\gamma = 0.351$, SE = 0.165, $t = 2.12$, $p < .05$) supports the first condition. Results also show support for the second condition in the second study, since employee's rumination was significantly related to the three insomnia dimensions (see Table 4). However, in the first study, employee's rumination was only related to sleep severity ($\gamma = 0.089$, SE = 0.034, $t = 2.61$, $p < .05$). Regarding specific mediation effects, the Monte Carlo test showed that rumination mediated the relationship between bullying and sleep severity in study 1 (95% CI = [LB 0.010, UB 0.070]). As there is no direct relationship between bullying and sleep severity, the requirements for mediation were not met. Mathieu and Taylor (2006) have suggested that in cases where mediation hypotheses are rejected, alternative hypotheses of indirect effects should be examined. Indirect effects are a special form of intervening effects whereby the predictor and the dependent variable are not related directly, but they are indirectly related through significant relationships with a linking mechanism. Therefore, in this case, we can talk about an indirect effect of bullying on sleep severity through rumination.

Regarding the second study, the Monte Carlo test showed that rumination mediated the relationship between bullying and sleep severity (95% CI = [LB 0.030, UB 0.080]). After the inclusion of the mediator, the relationship between bullying on sleep severity becomes weaker but was still significant, partial mediation exists. Regarding sleep satisfaction, the Monte Carlo test showed that rumination transmitted the indirect effect of bullying on sleep satisfaction (95% CI = [LB 0.020, UB 0.090]) and on sleep impact (95% CI = [LB 0.021, UB 0.061]). In these cases, we can talk about an indirect

effect, since there was no significant relationship between bullying and these two insomnia dimensions. Thus, hypothesis 3 was partially supported.

Discussion

The first objective of the current research was to examine how bullying at work impacts insomnia in two different studies with two different time lags. In addition, we also aimed to test the mediating role of rumination in this process. Our first finding suggests that bullying has an effect on sleep problems. Other studies have demonstrated that workplace bullying is a precipitating factor in sleep complaints (e.g., Nielsen et al., 2020). However, one of the contributions of this study is to identify that there was a differential effect based on time lag. The first study, with a diary design, showed a slight and indirect effect of bullying on insomnia symptons, such as sleep onset difficulties, sleep maintenance and early morning awakening. This effect became more evident over time, and in the second study, a direct effect of bullying on this dimension of insomnia was observed. In the case of satisfaction and sleep impact, there was no relationship in study 1, but in study 2 there was an indirect effect via rumination.

It seems that for the development of certain sleep problems as a consequence of exposure to bullying, time is needed. In other words, and as has been pointed out by Rodríguez-Muñoz et al. (2000), the pattern of the relationship between bullying and sleep is accumulative. These results are consistent with the accumulation Frese and Zapf's (1988) model, which postulates that the stressor's effects on strain develop over time and remain stable even when the exposure to the stressor is reduced. The current study extends earlier person-centered techniques (Magee et al., 2015) by examining the evolution of bullying-insomnia relationships over time.

This study also aimed to examine whether there was an influence of workplace bullying on partner's sleep problems, through own insomnia symptoms. Although this

hypothesis was not confirmed, an interesting relationship was found between the different dimensions of insomnia in couples. Specifically, it was shown that partners mutually influence each other's sleep severity and sleep impact. This contagion was not found for sleep satisfaction. This is reasonable since the components that assess severity such as early morning awakening are more easily susceptible to marital contagion. It has been found that one individual's awakening could cause their bedpartner to awaken (Walters et al., 2020). In a similar vein, the impact component contains interpersonal elements, such as sleep disturbance noticeability or interference with daily functioning. However, satisfaction involves more cognitive elements, so they are less susceptible to contagion.

Another contribution of the present study is to examine the role of rumination in the workplace bullying-sleep relationship. According to the Cognitive Activation Theory of Stress (CATS: Ursin & Eirksen, 2010), the stress response has negative effects on a healthy organism when it is associated with sustained arousal. Thus, rumination can be seen as a maladaptive coping strategy, which may facilitate the development of sleep problems. Previous studies have already pointed out how the hyperarousal associated with the experience of rumination may prolong the effects of bullying (e.g., Rodriguez-Muñoz et al., 2022). Brosschot et al., (2005, p. 1045) have defined rumination as "*the recurrent or chronic activation of the cognitive representation of stress-related content*". According to cognitive-behavioral models, this hyperactivity directly interferes with sleep quality. This hyperactive state may deregulate the hypothalamic–pituitary–adrenal (HPA) axis which is considered the central stress–physiological system for an organism's long-term adaptation to stress, leading to allostatic load (McEwen, 1998).

Despite the robustness of our study's design, several limitations should be noted. Firstly, the generalizability of our findings was constrained by the use of a convenience sample, despite its heterogeneity. Future studies should aim to use more representative samples to enhance the applicability of our results. Additionally, while we accounted for some aspects of diversity, we acknowledge the need for a broader consideration. For instance, our study only included heterosexual couples from a country, omitting other dimensions of sexual diversity, ethnicity, and cultural backgrounds that could provide a deeper understanding of the impact of workplace bullying on sleep patterns. For example, adult bed sharing is more common in Western countries, but this practice is not universally prevalent, which limits the generalizability of our findings. Future research could benefit from a more comprehensive exploration of these diversity factors. Our recruitment method, which involved using social media, advertisements, and participation from diverse organizations and sectors, introduces the potential for recall bias. Individuals who perceive a negative impact of bullying on their sleep—or their partner's sleep—may have been more motivated to participate, potentially skewing the results. This self-selection bias could influence the generalizability of our findings, as it might overrepresent participants with personal experiences related to the topic. Moreover, while the heterogeneity of our sample is a strength in terms of capturing diverse experiences, it may also exacerbate recall bias. Participants from various backgrounds and sectors could differ in their exposure to bullying, their interpretations of sleep disturbances, and their willingness to report these experiences. These factors, combined with the variability inherent in a broad sample, may have introduced additional bias into our data. To improve the accuracy of data collection, future studies could employ methods such as experience sampling or event sampling, which match responses directly to specific events or time periods (e.g., interactions with a partner).

Additionally, incorporating objective measures of sleep, such as actigraphy, could provide more reliable information regarding sleep patterns, including the number of awakenings and sleep latency. However, it is worth noting that existing evidence suggests a strong correlation between subjective and objective sleep measures (Armitage et al., 1997).

There are some implications for practice that can be drawn from current findings. In general, effective interventions in addressing workplace bullying can be divided into two main categories (e.g., Saam, 2010): those aimed at changing the work environment for eliminating or reducing work stressors (organizational interventions) and those aimed at developing the skills and strategies of individuals to deal more effectively with these stressors (individual interventions). The best approach will likely involve a combination of both interventions. From an individual point of view, it seems necessary that interventions incorporate arousal reduction elements, which are associated with sleep problems. In this regard, a recent meta-analysis confirms that psychological detachment interventions produce positive effects in reducing ruminative thoughts (McCarrick et al., 2021). In this sense, it seems an appropriate strategy for bullying situations, as detachment has also been shown to minimize the effects of bullying. In addition, these interventions may also consider the positive impact that may have beyond the work domain. Couple-oriented prevention programs in the context of the workplace are needed – this could help provide coping strategies to both members of the couple, which would in turn reduce rumination levels and insomnia. Schaer et al. (2008). showed that couple-oriented intervention worked better than individual-oriented coping intervention for both couple (e.g., communication) and individual-level outcomes (e.g. burnout). This is an underexplored, but very promising line.

In summary, we explore the bullying-insomnia relationship under the lens of the stressor-strain models. Our results show that the effects of workplace bullying are time-dependent, and go beyond the individual and the work setting impacting the partner's sleep. We also provide some insight into the mechanisms underlying this association over time.

References

American Academy of Sleep Medicine. (2014). *International classification of sleep disorders*. American Academy of Sleep Medicine.

Armitage, R., Trivedi, M., Hoffmann, R., & Rush, A. J. (1997). Relationship between objective and subjective sleep measures in depressed patients and healthy controls. *Depression and Anxiety*, *5*(2), 97-102. https://doi.org/10.1002/(SICI)1520-6394(1997)5:2<97::AID-DA6>3.0.CO;2-2

Becker, T. E. (2005). Potential problems in the statistical control of variables in organizational research: A qualitative analysis with recommendations. *Organizational Research Methods*, *8*, 274–289. https://doi.org/10.1177/1094428105278021

Becker, T. E., Atinc, G., Breaugh, J. A., Carlson, K. D., Edwards, J. R., & Spector, P. E. (2016). Statistical control in correlational studies: 10 essential recommendations for organizational researchers. *Journal of Organizational Behaviour, 37*, 157-167. https://doi.org/10.1002/job.2053

Bonnet, M. H., & Arand, D. L. (2010). Hyperarousal and insomnia: state of the science. *Sleep Medicine Reviews*, *14*(1), 9-15. https://doi.org/10.1016/j.smrv.2009.05.002

Dormann, C. (2022). Start even Smaller, and then more Random. Comment on "Start Small, not Random: Why does Justifying your Time-Lag Matter?" by Yannick Griep, Ivana Vranjes, Johannes M. Kraak, Leonie Dudda, & Yingjie Li. *The Spanish Journal of Psychology, 25*, e20. https://doi.org/10.1017/SJP.2022.16

Einarsen, S., Hoel, H., Zapf, D., & Cooper, C. L. (2020). The concept of bullying and harassment at work: The European tradition. In S. V. Einarsen, H. Hoel, D.

Zapf, & C. L. Cooper (Eds.), *Bullying and harassment in the workplace: Theory, research, and practice* (3rd ed., pp. 3–53). Boca Raton: CRC Press.

Fernandez-Mendoza, J., Rodriguez-Muñoz, A., Vela-Bueno, A., Olavarrieta-Bernardino, S., Calhoun, S. L., Bixler, E. O., & Vgontzas, A. N. (2012). The Spanish version of the Insomnia Severity Index: a confirmatory factor analysis. *Sleep Medicine, 13*(2), 207-210. https://doi.org/10.1016/j.sleep.2011.06.019

Fitzpatrick, J., Gareau, A., Lafontaine, M. F., & Gaudreau, P. (2016). How to use the Actor-Partner Interdependence Model (APIM) to estimate different dyadic patterns in MPLUS: A step-by-step tutorial. *The Quantitative Methods for Psychology, 12*(1), 74–86. https://doi:10.20982/tqmp.12.1.p074

Frese, M., & Zapf, D. (1988). Methodological issues in the study of work stress: Objective vs. subjective measurement of work stress and the question of longitudinal studies. In C. L. Cooper & R. Payne (Eds.), Causes, coping and consequences of stress at work (pp. 375–411). Wiley.

Goel, N., Kim, H., & Lao, R. P. (2005). Gender differences in polysomnographic sleep in young healthy sleepers. *Chronobiology international, 22*(5), 905-915. https://doi.org/10.1080/07420520500263235

Gordon, A. M., Mendes, W. B., & Prather, A. A. (2017). The social side of sleep: Elucidating the links between sleep and social processes. Current Directions in Psychological Science, 26(5), 470-475. https://doi.org/10.1177/0963721417712269

Griep, Y., Vranjes, I., Kraak, J. M., Dudda, L., & Li, Y. (2021). Start small, not random: Why does justifying your time-lag matter?. *The Spanish Journal of Psychology, 24*, e45. https://doi.org/10.1017/SJP.2021.42

Hansen, Å. M., Hogh, A., Garde, A. H., & Persson, R. (2014). Workplace bullying and sleep difficulties: a 2-year follow-up study. *International Archives of Occupational and Environmental Health, 87*(3), 285-294. https://doi.org/10.1007/s00420-013-0860-2

Hertenstein, E., Feige, B., Gmeiner, T., Kienzler, C., Spiegelhalder, K., Johann, A., ... & Baglioni, C. (2019). Insomnia as a predictor of mental disorders: a systematic review and meta-analysis. *Sleep Medicine Reviews, 43*, 96-105. https://doi.org/10.1016/j.smrv.2018.10.006

Kenny, D. A., & Kashy, D. A. (2011). Dyadic data analysis using multilevel modeling. In J. Hox & J. K. Roberts (Eds.), *The Handbook of Advanced Multilevel Analysis* (pp. 335–370). London: Taylor & Francis.

Kenny, D., Kashi, D., & Cook, W. (2006). *Dyadic data analysis.* New York: Guilford Press.

Kramer, C. J., Kerkhof, G. A., & Hofman, W. F. (1999). Age differences in sleep–wake behaviour under natural conditions. *Personality and Individual Differences, 27*(5), 853-860. https://doi.org/10.1016/S0191-8869(99)00034-3

León Pérez, J. M., Sánchez Iglesias, I., Rodríguez Muñoz, A., & Notelaers, G. (2019). Cutoff scores for workplace bullying: The Spanish Short-Negative Acts Questionnaire (S-NAQ). *Psicothema, 31 (4), 482-490.* http://dx.doi.org/10.7334/psicothema2019.137

Magee, C., Gordon, R., Robinson, L., Reis, S., Caputi, P., & Oades, L. (2015). Distinct workplace bullying experiences and sleep quality: A person-centred approach. *Personality and Individual Differences, 87*, 200-205. https://doi.org/10.1016/j.paid.2015.08.004

McCarrick, D., Prestwich, A., Prudenzi, A., & O'Connor, D. B. (2021). Health effects of psychological interventions for worry and rumination: A meta-analysis. *Health Psychology, 40*(9), 617–630. https://doi.org/10.1037/hea0000985

McEwen, B. S. (1998). Protective and damaging effects of stress mediators. *New England Medical Journal, 338,* 171-179. https://doi.org/10.1056/NEJM199801153380307

Meurs, J. A., & Perrewé, P. L. (2011). Cognitive activation theory of stress: An integrative theoretical approach to work stress. Journal of Management, 37(4), 1043-1068. https://doi.org/10.1177/0149206310387303

Niedhammer, I., David, S., Degioanni, S., Drummond, A., Philip, P., & 143 Occupational Physicians. (2009). Workplace bullying and sleep disturbances: findings from a large scale cross-sectional survey in the French working population. *Sleep*, *32*(9), 1211-1219. https://doi.org/10.1093/sleep/32.9.1211

Nielsen, M. B. & Einarsen, S. (2012) Outcomes of exposure to workplace bullying: A meta-analytic review, *Work & Stress, 26*, 4, 309-332. https://doi.org/10.1080/02678373.2012.734709

Nielsen, M. B., & Einarsen, S. V. (2018). What we know, what we do not know, and what we should and could have known about workplace bullying: an overview of the literature and agenda for future research. *Aggression and Violent Behaviour, 42*, 71-83. https://doi.org/10.1016/j.avb.2018.06.007

Nielsen, M. B., Harris, A., Pallesen, S., & Einarsen, S. V. (2020). Workplace bullying and sleep. A systematic review and meta-analysis of the research literature. *Sleep medicine Reviews, 51,* 101289. https://doi.org/10.1016/j.smrv.2020.101289

Nielsen, M. B., Pallesen, S., Einarsen, S. V., Harris, A., Rajalingam, D., & Gjerstad, J. (2021). Associations between exposure to workplace bullying and insomnia: a cross-lagged prospective study of causal directions. *International Archives of Occupational and Environmental Health*, 94(5), 1003-1011. https://doi.org/10.1007/s00420-020-01618-2

Notelaers, G., Van der Heijden, B., Hoel, H., & Einarsen, S. (2019). Measuring bullying at work with the short-negative acts questionnaire: identification of targets and criterion validity. *Work & Stress, 33*(1), 58-75. https://doi.org/10.1080/02678373.2018.1457736

Preacher, K. J., & Selig, J. P. (2012). Advantages of Monte Carlo confidence intervals for indirect effects. *Communication Methods and Measures, 6*(2), 77-98. https://doi.org/10.1080/19312458.2012.679848

Rasbash, J., Browne, W., Healy, M., Cameron, B., & Charlton, C. (2002). MLwiN (Version 1.10.006): Interactive software for multilevel analysis. Centre for Multilevel Modelling, Institute of Education, University of London.

Rodríguez-Muñoz, A., Antino, M., & Sanz-Vergel, A. I. (2017). Cross-domain consequences of workplace bullying: A multi-source daily diary study. *Work & Stress, 31*(3), 297-314. https://doi.org/10.1080/02678373.2017.1330782

Rodríguez-Muñoz, A., Antino, M., Leon-Perez, J. M., & Ruiz-Zorrilla, P. (2022). Workplace bullying, emotional exhaustion, and partner social undermining: a weekly diary study. *Journal of Interpersonal Violence, 37*(5-6), NP3650-NP3666. https://doi.org/10.1177/0886260520933031

Rodríguez-Muñoz, A., Antino, M., Ruiz-Zorrilla, P., Sanz-Vergel, A. I., & Bakker, A. B. (2020). Short-term trajectories of workplace bullying and its impact on strain:

A latent class growth modeling approach. *Journal of Occupational Health Psychology, 25*(5), 345- 356. https://doi.org/10.1037/ocp0000232.

Rogojanski, J., Carney, C. E., & Monson, C. M. (2013). Interpersonal factors in insomnia: A model for integrating bed partners into cognitive behavioural therapy for insomnia. Sleep Medicine Reviews, 17(1), 55-64. https://doi.org/10.1016/j.smrv.2012.02.003

Saam, N. J. (2010). Interventions in workplace bullying: A multilevel approach. *European Journal of Work and Organizational Psychology, 19*(1), 51-75. https://doi.org/10.1080/13594320802651403

Schaer, M., Bodenmann, G., & Klink, T. (2008). Balancing work and relationship: Couples Coping Enhancement Training (CCET) in the workplace. *Applied Psychology, 57*, 71-89. https://doi.org/10.1111/j.1464-0597.2008.00355.x

Uceda, I. M., Bleda, J. H. L., Nieto, M. Á. P., Sukhodolsky, D. G., & Martínez, A. E. (2016). Psychometric properties of the Spanish adaptation of the Anger Rumination Scale: Evidence of reliability and validity in the general population. *The Spanish Journal of Psychology, 19*, 1-9. https://doi.org/10.1017/sjp.2016.17

Ursin, H., & Eriksen, H. R. (2010). Cognitive activation theory of stress (CATS). *Neuroscience & Biobehavioural Reviews, 34*(6), 877-881. https://doi.org/10.1016/j.neubiorev.2009.03.001

Vranjes, I., Baillien, E., Erreygers, S., Vandebosch, H., & De Witte, H. (2021). You wouldn't like me when I'm angry: A daily diary study of displaced online aggression in dual-earner couples. *Applied Psychology, 70*(4), 1463-1491. https://doi.org/10.1111/apps.12283

Walters, E. M., Phillips, A. J., Mellor, A., Hamill, K., Jenkins, M. M., Norton, P. J., ... & Drummond, S. P. (2020). Sleep and wake are shared and transmitted between individuals with insomnia and their bed-sharing partners. Sleep, 43(1), zsz206. https://doi.org/10.1093/sleep/zsz206

Westman, M., & Etzion, D. (2005). The crossover of work-family conflict from one spouse to the other. *Journal of Applied Social Psychology, 35,* 1936-1957. https://doi: 10.1111/j.1559-1816.2005.tb02203.x

Table 1

Mean, standard deviations, and correlations between Study 1 variables

Variable	M (SD)	1	2	3	4	5
1. Workplace bullying	1.40 (0.93)	---				
2. Rumination	2.60 (1.40)	.30**	---			
3. Sleep severity	1.94 (0.97)	.27**	.17**	---		
4. Sleep satisfaction	3.65 (1.10)	-.12**	-.05	-.69**	---	
5. Sleep impact	1.65 (0.90)	.21**	.14**	.71**	-.61**	---

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

Table 2

Mean, standard deviations, and correlations between Study 2 variables

Variable	M (SD)	1	2	3	4	5	6	7	8
1. Workplace bullying, actor	1.25 (0.41)	---							
2. Rumination, actor	3.36 (1.56)	.30**	---						
3. Sleep severity, actor	2.12 (1.01)	.16**	.29**	---					
4. Sleep satisfaction, actor	2.68 (1.25)	-.10**	-.23**	-.67**	---				
5. Sleep impact, actor	1.88 (0.92)	.20**	.32**	66**	-.63*	---			
6. Sleep severity, partner	2.12 (1.01)	.06	.02	.03	-.00	.02	---		
7. Sleep satisfaction, partner	2.68 (1.25)	-.04	-.00	-.00	-.00	-.02	-.67**	---	
8. Sleep impact, partner	1.88 (0.92)	.11**	.02	.02	-.02	.07	.66**	-.63**	---

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

Table 3

Study 1. Multilevel estimates for models predicting sleep (actor's effects)

	Sleep severity			Sleep satisfaction			Sleep impact		
	Estimate	SE	t	Estimate	SE	t	Estimate	SE	t
Model 1									
Intercept	1.956	0.071	27.5***	3.650	0.080	45.6***	1.705	0.075	22.7***
Gender	-0.011	0.155	-0.07	0.266	0.174	1.52	-0.185	0.164	-1.12
Age	0.002	0.006	0.33	0.001	0.002	0.50	0.002	0.005	0.40
-2 X Log (lh)			999.98			1116.84			863.31
Model 2									
Intercept	1.958	0.072	27.1***	3.655	0.080	45.6***	1.689	0.073	23.1***
Gender	-0.010	0.157	-0.06	0.266	0.174	1.52	-0.165	0.159	-1.03
Age	0.002	0.005	0.40	0.001	0.002	0.50	0.002	0.005	0.40
Workplace Bullying	0.000	0.065	0.00**	-0.090	0.077	-1.16	0.034	0.049	0.60
-2 X Log (lh)			992.05			1116.84			834.21
Model 3									
Intercept	1.951	0.072	27.0***	3.651	0.081	45.07***	1.687	0.073	23.1***
Gender	-0.004	0.157	-0.02	0.260	0.176	1.47	-0.176	0.159	1.10
Age	0.002	0.005	0.40	0.001	0.003	0.33	0.002	0.004	0.50
Workplace Bullying	0.038	0.066	0.57	-0.087	0.079	-1.10	0.002	0.050	0.04
Rumination	0.089	0.034	2.61*	-0.039	0.041	-0.95	0.038	0.026	1.46
-2 X Log (lh)			822.90			1110.12			822.90

Table 4

Study 2. Multilevel estimates for models predicting sleep (actor's effects)

	Sleep severity			Sleep satisfaction			Sleep impact		
	Estimate	SE	t	Estimate	SE	t	Estimate	SE	t
Model 1									
Intercept	2.149	0.060	35.8***	2.689	0.066	40.7***	1.913	0.053	36.0***
Gender	-0.163	0.120	-1.35	0.362	0.133	2.72*	-0.350	0.098	-3.57**
Age	0.004	0.006	0.66	0.008	0.006	1.33	0.008	0.006	1.33
-2 X Log (lh)			1836.18			2263.28			1587.15
Model 2									
Intercept	2.145	0.059	36.5***	2.687	0.066	40.7***	1.909	0.052	36.7***
Gender	-0.147	0.119	-1.23	0.352	0.132	2.66*	-0.340	0.097	-3.50**
Age	0.004	0.006	0.66	0.007	0.006	1.16	0.015	0.005	3.00**
Workplace Bullying	0.233	0.083	2.80*	-0.148	0.112	-1.32	0.162	0.071	2.28*
-2 X Log (lh)			1828.41			2261.56			1582.03
Model 3									
Intercept	2.141	0.058	36.9***	2.683	0.064	41.9***	1.906	0.050	38.1***
Gender	-0.115	0.115	-1.00	0.303	0.129	2.34*	-0.309	0.094	-3.28**
Age	0.003	0.006	0.50	0.007	0.006	1.16	0.015	0.005	3.00**
Workplace Bullying	0.184	0.084	2.19*	-0.056	0.113	-0.49	0.120	0.071	1.69
Rumination	0.085	0.023	3.69**	-0.129	0.031	-4.16**	0.081	0.020	4.05**
-2 X Log (lh)			1815.27			2245.11			1565.68