How sleep and burnout interact in the treatment of poor sleep

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Abstract
This thesis explores the interaction between sleep and burnout in the treatment of poor sleep. Sleep is vital for overall health and recovery from daily life demands, while stress is closely related to sleep disruptions. Chronic insomnia can develop from sleep disturbances caused by stress. Burnout, characterized by emotional exhaustion, physical fatigue, and cognitive weariness, is a prevalent consequence of chronic stress. Sleep quality is greatly influenced by various factors and has a significant impact on overall well-being. This study investigates how sleep quality and burnout at baseline of a short, student-led, group treatment, affect sleep quality as a treatment outcome. It hypothesizes that higher stress and poorer sleep at baseline would predict unchanged or impaired sleep quality immediately after treatment, and that poor sleep and burnout would individually have a positive relationship with sleep as a treatment outcome. The data for this study is obtained from a sleep intervention program conducted by students from the Master's Program in Clinical Psychology at Umeå University in collaboration with Region Västerbotten. The participants completed questionnaires assessing their background information, stress levels, burnout, and sleep quality at baseline and after treatment. The findings showed no interaction effects between sleep and burnout but indicate that patients with poorer sleep at intake may not benefit from the treatment program whereas high burnout does not affect the treatment outcome. The short, student-led, group treatment does not seem to benefit people with severe sleep problems.

Keywords: Sleep, Burnout, Sleep Quality, Psychology Students, Psychological Intervention

Sammanfattning
Nyckelord: Sömn, Utbrändhet, Sömnkvalitet, Psykologistudenter, Psykologisk Intervention
**Introduction**

Sleep plays an important role for stable health throughout our lifetime as humans (Buysse, 2014). It resets our body and mind and enables us to recover from daily life demands (Vyazovskiy, 2015). A higher level of stress is associated with sleep disruptions, and a decreased quantity of sleep is associated with an increased risk of stress and anxiety (Johnson, 2018). Disturbed sleep is thus closely related to stress (Akerstedt, 2006). The symptoms of short-term insomnia may be brought on by stress, but chronic insomnia can develop if the symptoms are present at least three times per week for a period of at least three months (Momin & Ketvertis, 2023). The Institute of Medicine reports that between 50 and 70 million persons in the United States suffer from some kind of chronic sleep disruption (Argyle, 2013). Stress is a day-to-day pressure individuals react to and becomes problematic when it disrupts day to day function of the bodily system (APA 2023). Stress has also been described as demands exceeding available resources, leading to negative effects on an individual's behaviour, emotions, and cognitive abilities (Lazarus & Folkman, 1985). Together stress and sleep problems can cause serious disease (see for instance Cappuccio et al., 2011).

Lack of sleep and stress are significant variables that might adversely affect work productivity. A lack of sleep may make it harder to keep concentration, lead to a loss of attentiveness, increase response time, make one more susceptible to stress, and even increase the likelihood of making mistakes and leaving things out (Henderson & Horan, 2020). Work-related stress in Sweden was reported at 38 % by Adamsson & Bernhardsson, 2018. Stress at work should be addressed since it may cause burnout and other health issues (Barck-Holst et al., 2021), and not only Swedes suffer from these consequences (Löfvander et al., 2020). Presently, people in every country throughout the world are stressed for various reasons (Slavich, 2016). Stress causes various psychological issues and can reduce sleep quality (Kalmbach et al., 2018). One study indicated that stress was a mediator between demands and burnout, and that the link was greater for Swedes compared to fellow European counterparts (Edú-Valsania et al., 2022). Burnout affected 10% of the European workforce but 17% of those outside of Europe (Demerouti et al., 2021). Burnout has also been reported to be prevalent among indigenous women in Sweden (Sundin et al., 2011) and the prevalence rate of burnout among practising physicians is 4.7% (Hagqvist et al., 2022). Individuals who encounter stress during the day may have issues falling asleep at night (Nollet et al., 2020). During the 1990s and 2000s in Sweden, burnout went from being a common topic to being classified as a mental illness and being a focus of public health policy (Barker, 2018). The origin of the burnout notion may be traced back to an essay published in 1974 (Friberg, 2009) and the concept was first recognized as a credible diagnostic in Sweden in (Socialstyrelsen, 2017). Because of burnout, thousands of individuals are compelled to take extended leaves of absence due to illness (Canacott et al., 2019). The Swedish diagnosis of exhaustion disorder emanates from the definition by Shirom (1989) and Shirom and Melamed (2006). It focuses on energy depletion due to chronic stress and manifests itself in emotional exhaustion, physical fatigue and cognitive weariness (Shirom, 1989; Shirom & Melamed, 2006). According to the study, two specific measurement tools, of Shirom Melamed Burnout Measure, SMBM-11 and SMBM-6, are recommended for assessing the core components of burnout (Sundström et al., 2022).

In psychology, "sleep satisfaction" and "sleep quality" refer to two distinct aspects of nightly rest (Pilcher et al., 1997). Sleep quality refers to a satisfying sleep experience a person gets by integrating components of sleep initiation, maintaining sleep, and waking up refreshed (Ramar et al., 2021). Indicators of sleep quality include how well you sleep, how long you sleep, how late you wake up, and
how soon you fall asleep (Nelson et al., 2021). Sleep quality is greatly and essentially determined by lifestyle-, social-, mental health- and physical factors (Wang & Bíró, 2021). Sleep among young individuals is decreasing (Ferrie et al., 2011) and sixty percent of university students experience poor sleep quality (Schlarb et al., 2017), probably because of facing academic and societal pressure (Li et al., 2020). Poor sleep quality reduces quality of life (Medic et al., 2017) and takes a toll on our body and mind.

Sleep deprivation leads to compromised immune systems (Garbarino et al., 2021). Proper sleep is important for hormone regulation (Vandekerckhove & Wang, 2017). On a psychobiological level, cortisol, which is one stress hormone, is influenced by poor sleep. When the body activates the fight and flight response, people find it too difficult to fall asleep (O’Byrne et al., 2021), because cortisol level increases when you are stressed (APA, 2020b). Also, lack of long-term sleep increases the cortisol level in humans (Krause et al., 2017). Stress causes increased heart rate and can disrupt the human sleep cycle (Kim & Dimsdale, 2007), and poor sleep quality has been linked to obesity and heart diseases (Cooper et al., 2018). Well-rested people are better to deal with pressure and keep their emotions in check (Kent, 2018). Sleep deprivation can lead to poor quality of life and greater sensitivity to stress. People with poor life quality and who are prone to stress have more difficulties falling asleep (Reffi et al., 2022). Thus, good sleep is important to be able to recover from daily stressful activities (Mukherjee et al., 2015). To manage health, it is important to prioritise good sleep (Worley, 2018). Cognitive behavioural therapy for insomnia (CBT-I) has been shown to be an effective treatment in managing different sleep disturbances (Rossmann, 2019). Short-term and goal-oriented, CBT-I targets the psychological and behavioural causes of sleep disruptions (Muench et al., 2022). CBT-I aids people in establishing healthy sleep patterns and regaining control of their sleep-wake cycle by focusing on maladaptive thoughts and actions related to sleep (Gilbert et al., 2015). Seventy to eighty percent of people with primary insomnia report improvement after CBT-I treatment (Kallestad et al., 2021).

In a collaboration with Region Västerbotten, students from the fifth semester at the Master’s Program in Clinical Psychology at Umeå University provide CBT-based, psycho-educative group therapy to patients with stress and/or sleep problems. This is done in two interventions, the so-called stress- and sleep schools. Anyone who seeks care due to stress or sleep concerns can attend the intervention which includes four times 90-minute sessions with a break included. By using data from the sleep school, this thesis aims to investigate how sleep quality and burnout at baseline affect sleep quality as treatment outcome and hypothesize that higher stress and poorer sleep in combination at baseline would predict an unchanged or impaired sleep quality immediately after treatment. Moreover, poor sleep and burnout in their own right are hypothesized to have a positive relationship with sleep as treatment outcome.

Methods and Materials

Design

This thesis is grounded in findings from the ongoing research project titled Health Education, Stress, and Sleep (HUSS). The HUSS study is a quasi-experimental design with the intention of evaluating brief, student-led, psychoeducational group therapies with the aim of preventing sleep difficulties. This practice-based study is currently being carried out in close cooperation with primary care in the Västerbotten County Council. Patients in Umeå who went to one of the collaborating health care centers and mentioned that they had issues with stress or sleeping were given the opportunity to enroll in a
student-led, group-based sleep intervention built on psychoeducation. The activities at the sleep schools began in the fall of 2020, and the data that was obtained for this thesis were gathered over the time span between the fall of 2020 and the fall of 2022. The participants were given the option to attend sleep school for a total of four sessions per week. Under the direction of licensed psychologists who worked at the health care centers and one from the university, students from Umeå University's Program for Master of Science in Psychology led the sessions at both schools. Anyone who seeks care due to stress or sleep concerns can attend the intervention which includes four times 90-minute sessions with a break included.

Procedure

Everyone who participated in the sleep schools was provided with a questionnaire that contained demographic questions as well as five validated psychometric instruments. at the outset of the very first treatment session. At the conclusion of the final treatment session, the participants were given the same self-assessment forms that they had filled out at the beginning of the program. The analytical foundation of the current investigation was comprised of the intake background data as well as the psychometric instruments at baseline and immediately after treatment.

Questionnaire

On the first occasion of treatment, questions concerning the patient's background were asked. These questions included queries about the patient's age, sex, living circumstances, job, level of education, diagnosis, and number of years with the illness. In addition, the details of prior therapy received and the reasons for enrolling in the sleep schools were gathered. The intensity of the symptoms was determined by asking the patient to assess how severe the situation was and reported by the participants using a scale that ranged from 1 (not at all) to 5 (a lot).

For measuring stress, the Swedish translation of the Perceived Stress Scale (PSS-10) was used. Cohen and Williamson (1988) were the ones who created PSS-10, while Eskin and Parr (1996) were the ones who translated it into Swedish. The scale consists of 10 items, each of which has a response choice ranging from "never" (0) to "very often" (4). This scale has questions that inquire about a person's thoughts and emotions over the preceding month. For instance, one of the questions reads, "During the preceding month, how frequently have you been upset because of something that happened unexpectedly?" The total score on the scale is added together, and high values indicate an important level of perceived stress; the highest possible score on the scale is 40. The norm values for women in Sweden come in at 14.56, while the norm values for males come in at 13.20. There are no predetermined threshold levels in place. According to Nordin and Nordin (2013), the Swedish translation of the PSS-10 has good internal reliability and construct validity.

For assessing burnout, the Shirom Melamed Burnout Questionnaire (SMBQ; Melamed, Kushnir, and Shirom 1992) was used. There are eight different elements that make up the Physical Fatigue domain, and some examples of these items are "I feel tired" and "My batteries are dead." Cognitive weariness is measured using six statements, some of which are "I feel like I am not thinking clearly" and "I have difficulty thinking about complex things." "I feel tensed" and "I feel relaxed" are two of the four items that make up the "Tension" scale. "I feel full of vitality" and "I feel alert" are two of the items that are used in the listlessness scale. On a scale from one to seven, "almost never" corresponds to point one, while "almost always" corresponds to point seven. Greater scores indicate a greater degree of burnout,
and the clinical cut-off for burnout is believed to be 4.4, according to Lundgren-Nilsson et al. (2012). The mean of the 22 questions is computed, and higher scores indicate a higher level of burnout. The SMBQ has a strong correlation with other reliable measures that evaluate burnout (Grossi et al., 2003), which indicates that it has an important level of dependability (Melamed et al., 1992).

For determining the severity of sleeping issues, the Karolinska Sleep Questionnaire (KSQ; Kecklund & Akerstedt, 1992) was completed. The KSQ is a Swedish evaluation instrument that consists of eighteen questions that evaluate four separate indices. These indices include sleep quality, issues with awakenings, sleep apnea, and drowsiness or weariness. The sleep quality index, which consists of four questions, and the scale non-restorative sleep, that deals with waking index and consists of three questions, were merged for this research into a sleep quality scale. Mean values of this combined scale served as the foundation for the study's subsequent analyses. The responses range from "never" (0) to "always" (5) on a five-point scale. The findings are interpreted by computing a mean value for each indicator, and high scores suggest that there are issues with the subject's ability to sleep. According to Nordin, Akerstedt, and Nordin's (2013) research, all of the KSQ indices exhibit high levels of reliability and validity.

Participants

The sample participating in the sleep school were 27 women and 21 men, 44.4 years old on average (SD = 18.66). Their mean PSS-10 was 20.17 (SD = 6.56) and mean SMBQ score was 4.42 (SD = 1.13) at baseline. Sleep quality was significantly improved over the treatment period (mean at baseline 3.12; SD = .99 vs. mean at post-treatment 2.50; SD = 1.00; t = 24.36; df = 47; p < .001). Table 1 describes a sample of people who attended sleep school in terms of the background information and health problems relevant to the study questions asked.

Table 1.

Demographics and background information for the participants of the stress- and sleep schools.

<table>
<thead>
<tr>
<th></th>
<th>% ( n=48)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>43.8</td>
</tr>
<tr>
<td>Women</td>
<td>56.3</td>
</tr>
<tr>
<td>Living conditions</td>
<td></td>
</tr>
<tr>
<td>With partner without children</td>
<td>35.4</td>
</tr>
<tr>
<td>With partner with children</td>
<td>20.8</td>
</tr>
<tr>
<td>Single with children</td>
<td>8.3</td>
</tr>
<tr>
<td>Single</td>
<td>29.2</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>37.5</td>
</tr>
<tr>
<td>University/college</td>
<td>56.3</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
</tr>
</tbody>
</table>
Employed 47.9
Study 12.5
Looking for a job 8.3
Sick leave/retirement 27.1
Sick leave due to stress or sleep problems 18.8
Previous treatment from stress or sleep problems
    Yes 52.1
Years with ill-health
    Less than 1 year 17.0
    1 year 17.0
    More than 1 year 66.0
How serious is the problem
    Small -
    Moderate 4.2
    Quite serious 12.5
    Serious 4.2
Big or quite big motivation to participate 77.1
Alcohol consumption
    Never 22.9
    Rarely 29.2
    2-4 times per month and less 41.7
    2-3 times per week and more 6.3
Physical exercising
    Never 10.4
    Rarely 16.7
    2-4 times per month and less 43.8
    2-3 times per week and more 29.2
Medicine intake for mental health issues
    Antidepressants 25.0
    Anti-anxiety 4.8
    Sleeping pills 39.5
    Pain killers 4.8
Diagnosis by physician
    Yes 50.0
Which diagnosis
    Hypertension 29.3
    Pain in muscles, joints, 7.3
<table>
<thead>
<tr>
<th>Condition</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma, allergy</td>
<td>16.7</td>
</tr>
<tr>
<td>Exhaustion syndrome (Burnout)</td>
<td>23.3</td>
</tr>
<tr>
<td>Depression</td>
<td>25.0</td>
</tr>
<tr>
<td>Anxiety</td>
<td>12.5</td>
</tr>
<tr>
<td>Panic attacks</td>
<td>2.1</td>
</tr>
<tr>
<td>PTSD</td>
<td>4.2</td>
</tr>
<tr>
<td>Somatof orm disease</td>
<td>14.6</td>
</tr>
<tr>
<td>Irritable bowel syndrome</td>
<td>7.3</td>
</tr>
<tr>
<td>Tinnitus</td>
<td>10.4</td>
</tr>
<tr>
<td>Migraine</td>
<td>7.3</td>
</tr>
<tr>
<td>Hypersensitivity (all types)</td>
<td>8.3</td>
</tr>
<tr>
<td>Chronic pain</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Statistical Analyses

IBM SPSS Statistics version 28.0.0.0 was used throughout the process of carrying out the statistical computations. To fill in the gaps left by missing data, an algorithm called the Markov chain Monte Carlo (MCMC) imputation technique was used (Takahashi, M., 2017).

Pearson’s correlation analysis was used for the selection of confounding variables. A multiple, hierarchical regression analysis was carried out. The interaction analysis is going to be used to explore the influence of how stress, burnout, and sleep interact with one another. The regression analysis consisted of two models: In the first model, the confounding factors were part of the original set of predictors. They were picked because of their presumed connections to both the predictors and the treatment result. The danger of skewed findings may be mitigated by adding these confounding factors to the model and allowing for an analysis of their impact on the outcome. An interaction term was included with the primary predictor variables in the second model. The impact of many predictors on a single outcome variable is reflected by an interaction term. It permits testing the hypothesis that the original factors’ link to the result is level-dependent. For post-treatment sleep, the interaction term here represents the combined impact of burnout and sleep issues.

Ethical considerations

Before the very first measurement, each participant in the study signed a document indicating that they understood the nature of the investigation and consented to take part in it. The form for giving informed permission included information regarding the voluntary nature of involvement, as well as the fact that participation might be terminated on the participant’s request at any moment without any explanations. The participants were also notified that, in line with the general data protection regulation (GDPR), they have the right to request extracts of the personal data that they contributed for study. This data includes things like names, email addresses, and phone numbers. At the Department of Psychology at Ume University, the gathered information was rendered anonymously and then archived in a manner that was compliant with the data protection rules. The Swedish Ethical Review Authority has given its blessing to the study endeavor, and the reference number for that clearance is 2020-00168.
Results

Table 2 details the findings of the hierarchical regression analyses that investigated the association between burnout, the presence of sleep issues, and the effectiveness of treatment outcomes within the context of a sleep school intervention. In the sleep sample SMBQ (r = .66; p < .001), PSS-10 (r = .30; p < .01), sex (r = 33; p < .05), sick leave, due to stress or sleep (r = .30; p < .05), sleeping pills (r = .35; p < .05) at baseline correlated with KSQ at baseline and were selected as confounding variables. No correlation was found between employment, age, education and living conditions and sleep problems. The confounding variables are presented in the regression analyses models in model I.

Table 2.

Burnout and sleep problems at baseline predicting sleep problems as treatment outcome post treatment in the sleep school. Results from hierarchical regression analyses.

<table>
<thead>
<tr>
<th>Sleep school</th>
<th>Model I</th>
<th>Model II</th>
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<tbody>
<tr>
<td>R2</td>
<td>.07</td>
<td>.47</td>
</tr>
<tr>
<td>Beta</td>
<td>.36</td>
<td>-.15</td>
</tr>
<tr>
<td>p</td>
<td>&lt;.05</td>
<td>.30</td>
</tr>
<tr>
<td>PSS-10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sick leave due to stress</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>-.15</td>
<td></td>
</tr>
<tr>
<td>Sleeping pills</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>Burnout*Sleep problems</td>
<td>-.15</td>
<td></td>
</tr>
<tr>
<td>Burnout</td>
<td>.25</td>
<td></td>
</tr>
<tr>
<td>Sleep problems</td>
<td>.57</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Based on the findings of Model I, Perceived Stress Scale (PSS-10) predicts the success of the therapy for sleep quality (Beta = .36, p < .05). This suggests that greater levels of perceived stress at the beginning of therapy are related to worse treatment results for sleep quality after the treatment has been completed. The use of sick leave owing to stress is not a significant predictor (Beta = .02, p < .89). In addition, the variables sex (with a beta of -.15) and sleeping medications (with a beta of .14) do not achieve statistical significance, suggesting that neither of these factors is a significant predictor of the outcome of therapy for sleep quality using this model.
In model II, the predictors have been expanded to include the interaction term of the z-transformed sleep quality and burnout variables along with these variables separately. According to the R2 value of .47, the predictors in Model II explain an additional 40% of the variation in the treatment result for burnout post-treatment. The interaction between burnout and sleep quality is not significant (Beta = -.15, p < .28). In addition, burnout by itself is a factor that is not significant to treatment results (Beta = 0.25, p = 0.20) in model I. Model II, sleep issues are identified as the most significant predictor, displaying a directional positive association with treatment outcome (Beta = 0.57, p < 0.001).

Discussion

This study aimed to investigate the interaction between sleep and burnout in the context of sleep quality treatment. Recognizing the fundamental importance of sleep for overall health and recovery from daily life demands, as well as the close relationship between stress and sleep disturbances, the research focused on understanding how burnout, characterised by emotional exhaustion, physical fatigue, and cognitive weariness, could influence the outcomes of interventions aimed at improving sleep quality. Additionally, the study explored whether poor sleep quality at the outset of treatment could predict unfavourable outcomes following the intervention. This investigation was based on data obtained from an intervention program conducted by psychology students in collaboration with the Västerbotten Region, with the aim of providing a solid foundation for understanding the complex relationships among these factors. The results showed that sleep problems at baseline were the strongest predictor of treatment outcome for sleep problems post-treatment, while burnout at baseline did not have a significant effect. This suggests that improving sleep quality is the strongest key factor in reducing sleep problems among individuals who suffer from sleep problems. The interaction between burnout and sleep problems was also not significant, indicating that the effect of sleep problems on treatment outcome was not moderated by the level of burnout. A study also found that sleep quality is associated with lower burnout-scores (N. R. Grossi et al., 2021)

Perceived Stress Scale (PSS-10) emerged as a significant predictor of sleep quality after treatment. This suggests that higher levels of perceived stress at the outset of treatment are associated with less favourable treatment outcomes regarding sleep quality. Burnout did not prove to be a significant predictor of sleep quality after treatment. This result contrasts with initial expectations, suggesting that the impact of burnout may be less pronounced compared to perceived stress. The change in variance between the models can be explained by the difference in the number and significance of the variables included in each model. Model I only included the control variables, which were not very related to the outcome variable (sleep problems post treatment). Model II added the main effects variables (burnout and sleep problems at baseline), which were strongly related to the outcome variable. Therefore, Model II was able to explain more of the variance in the outcome variable than Model I. The change in variance can be quantified by the difference in the R-squared values of the two models, which is 0.47 - 0.07 = 0.40. This means that adding the main effects variables increased the explained variance by 40%.

This current study was grounded in previous research highlighting the relationship between stress, burnout, and sleep quality. The literature has emphasized the impact of stress on sleep quality (Kalmbach et al., 2018), recognizing that stress disrupts sleep patterns and increases susceptibility to sleep disorders. On the other hand, burnout is often considered a consequence of stress (Shirom & Melamed, 2006), incorporating emotional exhaustion, physical fatigue, and cognitive weariness. Furthermore, other studies support the notion that burnout and sleep problems are interrelated and
mutually reinforcing phenomena (Söderström et al., 2012). Burnout can cause sleep problems by increasing stress, anxiety, and rumination, while sleep problems can worsen burnout by impairing cognitive functioning, emotional regulation, and recovery (Van Dijk et al., 2020). Therefore, addressing both burnout and sleep problems in a holistic and integrated manner is essential for improving well-being and performance.

One of the main strengths of this study is the utilization of a comprehensive and well-documented sample, consisting of participants who sought treatment for sleep and stress-related issues. This provided a solid foundation for robust statistical analyses. Additionally, the inclusion of relevant confounding variables, such as the Perceived Stress Scale (PSS-10), allowed for a more precise analysis of the relationships between variables. Another strength is the use of validated assessment instruments, such as the PSS-10, SMBQ, and KSQ, which increased the reliability and validity of the collected data. This methodological choice contributed to the robustness of the conclusions.

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Moreover, the collaboration with the Västerbotten Region and the implementation of the intervention program by psychology students in the real community underscore the practical applicability of the results of this study. This suggests that the findings may have significant implications for the treatment of individuals with sleep and burnout problems in real-life settings. However, it is important to acknowledge some limitations of this study. A possible way to write the limitation is:

One of the major limitations of this study is the small sample size, which reduces the generalizability of the findings. A small sample size may lead to spurious results, as it may not reflect the characteristics and variability of the target population, which in this case are people with sleep problems who seek care. Therefore, the results of this study should be interpreted with caution, and further research with larger and more representative samples is needed to confirm the validity and reliability of the findings.

A subsequent assessment would have allowed for a more comprehensive understanding of the long-term effects of the interventions under study. Despite these limitations, the results of this study provide valuable insights into the complex relationships between stress, burnout, and sleep quality in an intervention context. Hierarchical regression analyses revealed that, in the final model.

In conclusion, the results indicate that sleep quality is a key factor for the effectiveness of interventions targeting sleep problems; a previous study found this (Albakri et al., 2021). However, the current study suggests that those who have poor sleep quality before the intervention may not improve as much as expected. This may be because poor sleep quality hinders the ability to learn new skills, implement behavioral changes, and benefit from cognitive restructuring (Medic et al., 2017). Therefore, screening for sleep problems before the intervention and providing tailored support for improving sleep quality may be necessary to optimize treatment outcomes.
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