

Interplay between insomnia, anxiety, and depression

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Abstract

Insomnia, anxiety, and depression have become critical mental health issues exacerbated by the coronavirus disease 2019 pandemic, highlighting the importance of understanding their interrelationships. This article evaluates the study by Li *et al*, which investigates the links between insomnia, anxiety, and depression while examining the mediating role of cognitive failures and the moderating effect of neuroticism. The study employed a cross-sectional design with 1011 participants, using validated scales to measure insomnia severity, neuroticism, cognitive failures, and mental health indicators. Li *et al* found that approximately 40% of participants exhibited symptoms of anxiety, depression, and insomnia, with most cases being mild. The results demonstrated that cognitive failures play a mediating role in the relationship between insomnia and both anxiety and depression. Furthermore, neuroticism moderated the relationship between insomnia and cognitive failures, with a stronger effect observed in individuals with lower levels of neuroticism. These findings underscore the importance of considering personality traits and cognitive processes in understanding mental health outcomes. This study emphasizes the critical need for interventions aimed at reducing cognitive failures and enhancing emotional stability to mitigate the impact of insomnia on mental health. Strategies to improve sleep quality, boost cognitive resilience, and regulate emotional responses could significantly enhance individuals' mental well-being. Moreover, integrating personality assessments into mental health services could facilitate more effective and personalized interventions. This article provides an original perspective on the effects of the coronavirus disease 2019 pandemic on global mental health. The content of the article addresses the complex relationships between sleep disorders, cognitive function losses, and neuroticism in light of data compiled from existing literature and current research. In addition, how these relationships have deepened during the pandemic and the effectiveness of proposed treatment methods for these phenomena are discussed in comparison with previous studies. The arguments in the article offer new perspectives and suggestions aimed at filling gaps in the literature, and make an important contribution to both clinical practice and public health policies. Li *et al*'s study provides a comprehensive framework for understanding the connections between insomnia, cognitive failures, and

neuroticism, as well as their influence on anxiety and depression. The findings offer valuable implications for public health strategies, emphasizing the necessity of holistic approaches to address post-pandemic mental health challenges.

Key Words: Insomnia; Anxiety; Depression; Cognitive failures; Neuroticism; Mental health resilience

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Core Tip: The interplay between insomnia, anxiety, and depression highlights the significance of cognitive and personality factors in mental health. Li *et al* identify cognitive failures as mediators and neuroticism as a moderating factor in these relationships. The study provides actionable insights into tailoring interventions, such as cognitive-behavioral therapy and personality-informed care, to improve mental health outcomes in diverse populations. This article emphasizes the necessity of holistic and interdisciplinary approaches to mental health, especially in a post-pandemic context.

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TO THE EDITOR

The coronavirus disease 2019 pandemic has brought unprecedented challenges to global mental health, intensifying the prevalence and severity of insomnia, anxiety, and depression. These interconnected conditions create a vicious cycle where poor sleep exacerbates cognitive dysfunctions, leading to heightened emotional distress. Li *et al*[1] provide a critical examination of these dynamics, exploring cognitive failures as mediators and neuroticism as a moderator in the relationship between insomnia and mental health outcomes. Cognitive failures, defined as lapses in memory, attention, and task execution, represent a significant pathway through which insomnia adversely affects mental health[2-4]. Sleep disturbances impair the brain's executive functioning, leading to emotional dysregulation and increased vulnerability to anxiety and depression. Chronic sleep deprivation has been reported to cause cognitive dysfunction and increase oxidative stress and inflammation. This negatively affects learning and memory performance[5-7]. Furthermore, neuroticism - a personality trait characterized by heightened emotional reactivity - modulates these relationships, with individuals exhibiting lower levels of neuroticism demonstrating a stronger association between insomnia and cognitive failures[1]. There is a complex and bidirectional relationship between cognitive decline, sleep disorders, and mental health problems. A better understanding of this relationship is important for the development of effective prevention and treatment strategies.

The pandemic has further amplified these effects. Lockdowns, social isolation, and economic uncertainties disrupted sleep patterns, increasing the prevalence of cognitive impairments and emotional distress[8]. This confluence of factors creates a feedback loop where insomnia and psychological vulnerabilities perpetuate each other, leading to worsening mental health outcomes over time. The study by Li *et al*[1] underscores the need to break this cycle by targeting its cognitive and emotional underpinnings. Addressing cognitive deficits and integrating personality assessments into routine mental health care can tailor interventions to individual needs. Sleep hygiene education - emphasizing regular sleep schedules, reduced screen time, and stress management - represents a foundational strategy[8,9]. Sleep hygiene education is often used as part of a more comprehensive treatment approach. Sleep hygiene education alone may be limited in its effectiveness. Therefore, sleep hygiene education is an important component, but is generally more effective when used in conjunction with other treatment methods.

Cognitive-behavioral therapy (CBT), widely regarded as the gold standard for treating insomnia, has demonstrated efficacy in improving sleep quality and reducing associated cognitive failures[10]. Group CBT for anxiety disorders in women during the perinatal period has been shown to significantly reduce anxiety, worry, perceived stress, and depressive symptoms[11]. In a long-term study, the positive effects of CBT on insomnia continued even after 3-7 years. After an average of 5 years of treatment, 50% of patients did not meet the diagnostic criteria for insomnia and 60% had a significant improvement in insomnia severity[12]. This demonstrates the long-term effectiveness of CBT. CBT is the first recommended treatment method for insomnia in patients with alcohol use disorder[13]. The acceptance of CBT as the gold standard in the treatment of insomnia is supported by its long-term effectiveness, applicability to various patient groups, and fewer side effects compared to drug therapy. However, the fact that approximately 40% of patients do not fully respond to treatment emphasizes the heterogeneous nature of insomnia and the importance of individualized approaches[14]. This situation shows that individuality can change the effectiveness of different treatment methods, therefore, the importance of different methods. It is known that technology-supported cognitive behavioral therapy increases sleep efficiency, reduces insomnia severity, improves sleep quality, and is effective in the treatment of insomnia [15]. However, face-to-face cognitive behavioral therapy has been reported to be more effective than technology-supported therapy[16]. Technology-supported CBT methods have shown promising results in the treatment of insomnia, but face-to-face therapy is still the most effective method. More current research is needed to evaluate the effectiveness of

artificial intelligence-supported methods.

Furthermore, resilience training and mindfulness-based interventions can strengthen coping mechanisms, particularly among individuals with low neuroticism[17]. These strategies hold particular promise for mitigating the long-term psychological impacts of the pandemic. Public health campaigns promoting sleep hygiene should be tailored to target high-risk groups, such as frontline workers and individuals with pre-existing mental health conditions[18]. Educational programs can highlight the importance of sleep and offer practical tools for managing stress and anxiety[19]. Additionally, integrating personality assessments into public health frameworks can identify individuals at greater risk of cognitive impairments and emotional distress, allowing for early and personalized interventions[20].

Future research should prioritize longitudinal studies to unravel the causal pathways linking insomnia, cognitive impairments, and mental health outcomes. Additionally, emphasis should be placed on interdisciplinary approaches, such as collaborations between psychology, computer science, and neuroscience, to investigate the physiological and psychological mechanisms of insomnia, cognitive failures, and neuroticism. Collaborations between neuroscience, psychology, and computer science are critical to elucidating the mechanisms underlying these complex phenomena. For example, studies examining the effects of sleep deprivation on cognitive performance highlight the importance of dopaminergic signaling. Variations in the sodium-dependent dopamine transporter 1 and dopamine receptor D2 genes have been found to modulate the neurobehavioral and neurophysiological consequences of sleep loss[21]. In addition, meta-analysis studies have shown a strong relationship between neuroticism and anxiety during the coronavirus disease 2019 pandemic[22].

The integration of neuroimaging, genetic, behavioral, and computational approaches has great potential to elucidate the complex relationships between insomnia, cognitive failures, and neuroticism. These interdisciplinary approaches can contribute to the development of targeted interventions that take individual differences into account and to a better understanding of sleep disorders. Additionally, Neuroimaging techniques could provide deeper insights into the neural mechanisms underlying these relationships, illuminating how disrupted sleep impacts brain regions involved in emotion regulation and cognitive control[5]. This understanding can guide the development of targeted pharmacological and non-pharmacological interventions to address insomnia and its psychological sequelae[18]. By addressing these challenges, society can mitigate the cascading effects of insomnia on mental health and foster resilience in individuals facing these intertwined conditions. The study by Li *et al*[1] offers a vital framework for clinicians and public health professionals to collaboratively tackle the enduring impacts of the pandemic on global mental health.

Conclusion

The study by Li *et al*[1] underscores the intricate interplay between insomnia, cognitive failures, and neuroticism in shaping mental health outcomes. These findings highlight the necessity of adopting holistic interventions that target cognitive and emotional vulnerabilities. CBT, resilience training, and public health initiatives promoting sleep hygiene emerge as pivotal strategies to alleviate the burden of insomnia-related mental health challenges[8]. Moreover, integrating personality-informed care into mental health services could enhance the precision and efficacy of interventions[17]. Future research should focus on longitudinal studies to unravel the causal pathways linking insomnia, cognitive impairments, and mental health. Neuroimaging techniques could provide deeper insights into the neurobiological underpinnings of these relationships, further advancing the development of targeted interventions. Addressing these challenges is not only critical for individual well-being but also for fostering societal resilience in the face of ongoing global health crises.

FOOTNOTES

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