The effect stress on provoking Rapid Eye movement related parasomnia among undergraduate students at University of Georgia

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Abstract

Background: Sleep is crucial for human health, closely tied to mental well-being and cognitive function. Chronic stress, characterized by persistent worry and rumination, disrupts sleep patterns, profoundly impacting physical and psychological health. This disruption extends to parasomnia like sleep paralysis, occurring during transitions between sleep and wakefulness and closely linked to stress mechanisms. Post-traumatic nightmares in PTSD highlight stress's influence on sleep disturbances, worsening symptoms and impairing daytime function due to their vivid and distressing nature. Nightmare disorder, a REM sleep-related parasomnia, exemplifies stress's detrimental effects on sleep, requiring frequent distressing dreams for diagnosis and emphasizing the subjective burden on affected individuals. Understanding the stress-parasomnia relationship is critical for unraveling connections between stress, sleep quality, and overall mental health. Recent research has illuminated triggers of parasomnia, enhancing our understanding of this complex interplay. Stress-related sleep disturbances are often accompanied by difficulties in falling asleep and frequent nighttime awakenings, which further contribute to fatigue, mood disturbances, and impaired concentration during the day.

Methods: Our cross-sectional study included 300 University of Georgia undergraduate students. An online questionnaire assessed stress levels, physical activity, concentration, finances, sleep medication use, and stress triggers linked to REM-related parasomnia. Statistical analyses explored correlations between stress and parasomnia occurrences, as well as impacts of sleep quality, physical activity, concentration, finances, and stress triggers. The study also examined how different levels of academic pressure and personal challenges, such as family issues, influenced parasomnia frequency. Participants were encouraged to reflect on both short-term and long-term stressors, providing insight into how chronic stress accumulates over time. To strengthen the analysis, responses were categorized based on the severity of stress and sleep disturbances, allowing for a more detailed understanding of individual experiences. Moreover, participants were asked about any coping mechanisms they used to manage stress, including

relaxation techniques, exercise, or social support, to determine whether these strategies had any mitigating effects on parasomnia symptoms. Ethical approval ensured confidentiality and voluntary participation.

Discussion: Our study revealed heightened stress among female students aged 25-30, driven by academic pressures, financial concerns, health issues, and reduced physical activity. This stress correlated significantly with poorer sleep quality, increased sleep aid use, and more frequent REM-related parasomnias such as nightmares and sleep paralysis, triggered by specific stressors identified in our research. Moreover, the relationship between stress and sleep disturbances was evident across various academic periods, with heightened effects during exams and project deadlines. Participants experiencing chronic stress reported persistent fatigue, difficulty concentrating, and emotional instability. These findings underscore stress's profound impact on sleep disturbances among young adults, emphasizing the need for targeted interventions to improve sleep quality and mental well-being in university settings.

Keywords: Stress, Sleep quality, REM-related parasomnias, University students

Introduction

Sleep, an indispensable aspect of human existence, intricately intertwines with mental well-being and cognitive processes (Sharpless et al., 2010). The dynamic relationship between sleep patterns and mental health encompasses multifaceted factors, with stress emerging as a significant influence in both domains (Sharpless et al., 2010). Chronic stress, characterized by persistent worry and rumination, imposes disruptions upon normal sleep patterns, precipitating a cascade of adverse consequences on physical and psychological health (Sharpless et al., 2010). Furthermore, stress's ramifications extend to parasomnia such as sleep paralysis (SP), occurring during the sleep-wake transition and entwined with stress-related mechanisms (Sharpless et al., 2010).

The ramifications of stress on sleep are vividly demonstrated in post-traumatic nightmares, hallmark symptoms of post-traumatic stress disorder (PTSD) (Phelps et al., 2017). These nightmares, haunting recollections of trauma during sleep, not only impair sleep quality but also exacerbate PTSD symptoms and hinder daytime functioning (Simos & Berle, 2023). Their intrusive nature, arising from sensory memories of traumatic events, underscores the profound influence of stress on sleep disturbances (Phelps et al., 2017).

Moreover, the emotional intensity of nightmares correlates with heightened distress and impaired well-being, emphasizing the intricate interplay between stress, sleep, and mental health (Simos & Berle, 2023). Nightmare disorder, a form of parasomnia predominantly affecting rapid eye movement related Parasomnia (REM) sleep, embodies the deleterious impact of stress on sleep (Perogamvros et al., 2019). Stress' involvement in nightmare disorder's pathophysiology disrupts emotion control and heightens emotional sensitivity, exacerbating dysphoric dream experiences (Gan et al., 2022). This heightened emotional reactivity, coupled with maladaptive coping strategies, amplifies the frequency and distress associated with nightmares, perpetuating the vicious cycle of stress-induced sleep disturbances (Gan et al., 2022). To diagnose a nightmare condition, dreams must cause clinically substantial discomfort, in addition to being frequent, emphasizing the subjective distress experienced by individuals with parasomnia (Schredl & Goeritz, 2019). Understanding the complex interplay between stress and parasomnia is paramount for unraveling the intricate connections between stress, sleep disturbances, and mental health (Sharpless et al., 2010). Recent advancements in sleep research have illuminated the origins and triggers of parasomnias, shedding light on the nuanced relationship between stress, sleep quality, and mental well-being (Wróbel-Knybel et al., 2022). Studies elucidating higher prevalence and severity of parasomnias in high-stress occupational groups underscore stress's detrimental effects on sleep (Wróbel-Knybel et al., 2022). Additionally, stress's pervasive influence extends to REM sleep behavior disorder, particularly in individuals with PTSD or traumatic brain injury, necessitating further exploration of stress-related mechanisms underlying these sleep disorders (Elliott et al., 2020). In psychiatric settings, stress's impact on sleep disturbances is further underscored, with associations observed between stress, depression, and certain medications (Lam et al., 2008).

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Sleep disturbances such as RBD, sleep-related eating disorder (SRED), and sleep-related injuries serve as clinical markers of underlying psychological distress, highlighting the importance of comprehensive assessment and management strategies (Örhan et al., 2012). Furthermore, recognizing stress's role in exacerbating sleep disorders in clinical populations informs targeted interventions aimed at improving sleep quality and overall well-being (Lam et al., 2008).

Objectives

To assess the impact of stress levels on the occurrence of REM-related parasomnia among undergraduate students, aiming to understand the relationship between stress and REM-related sleep disturbances.

Method and Analysis

Our data was gathered through an online questionnaire administered among undergraduate students from different faculties of the University of Georgia. The questionnaire covered various aspects, including stress levels, physical activity, concentration, financial concerns, use of sleep medications, and identification of stress triggers related to REM-related parasomnia. The sample size for our study consisted of 300 students (online questionnaire), ensuring a diverse representation across academic disciplines within the university. Through the analysis of this data, we sought to explore the correlation between stress levels and the occurrence of REM-related parasomnia, as well as to investigate the influence of other factors such as sleep quality, physical activity, concentration, financial concerns, and stress triggers on REM-related parasomnia symptoms. Additionally, students were asked to rate their overall mental well-being and any perceived impacts from academic workload or personal challenges. Participants were specifically queried about different types of REM-related parasomnia, including acting out dreams, sleep paralysis, and nightmares, along with stress triggers influencing these disturbances. The frequency and intensity of these parasomnias were recorded to better understand the relationship between stress and sleep disruption. A follow-up section of the questionnaire examined participants' coping mechanisms and any practices they used to manage stress. Data from this section helped us explore how stress management strategies might reduce the occurrence of REM-related parasomnia. Our study contributes significantly to the existing literature by shedding light on the complex relationship between stress and REM-related parasomnia among undergraduate students. These findings emphasize the importance of addressing mental health and sleep disturbances in university settings, offering potential pathways for intervention to improve both academic performance and well-being.

Exposure: Stress levels or stress experienced by undergraduate students.

Outcome: Parasomnia

Inclusion and Exclusion criteria:

The Inclusion criteria for this study consisted of undergraduate students aged between 18 and 30 years, currently enrolled in accredited educational institutions, exhibiting willingness to participate voluntarily, and capable of providing informed consent. Eligibility extended to students from diverse academic disciplines and backgrounds, encompassing both full-time and part-time enrollees. The study sought to achieve a comprehensive representation of the undergraduate student demographic to facilitate a thorough examination of the variables under investigation. To further ensure diversity, recruitment efforts targeted students from different academic years, ensuring perspectives from freshmen to final-year students were included. Exclusion criteria were defined to exclude individuals outside the specified age range (under 18 or over 30 years), those not enrolled in accredited institutions, individuals unwilling to participate, and those lacking the capacity to provide informed consent due to cognitive or communication impairments. Furthermore, students not actively engaged in academic coursework or on academic leave during the study period were also excluded to ensure the relevance and applicability of the data collected within the study context. Additionally, students with pre-existing diagnosed sleep disorders or conditions known to affect sleep patterns, such as severe anxiety or depression requiring clinical treatment, were excluded to minimize confounding variables and maintain focus on stress-induced sleep disturbances.

Result

The present study, conducted in 2024, aimed to investigate the correlation between stress levels and the occurrence of REM-related parasomnia, analysing a sample size of 300 cases. Data segmentation was performed based on participants' self-reported stress levels, delineated into categories of those rating their stress below 5 and those rating it above 5. The reported percentages reflect responses from individuals who answered both the stress level question, and each variable queried in the questionnaire. Among those who reported having lower stress, 81% were aged between 18 to 24 years, compared to 19% who were 25 to 30 years old. Conversely, 79.7% of the participants who reported higher stress were aged 18 to 24 years, while 20.3% were aged between 25 to 30 years. Our research interestingly showed that male and female participants were equally represented in the lower stress group. In contrast, in the higher stress group, 59.1% were females, and 40.9% were males. Comparing stress levels with academic hours of study in university (less than 20 hours, 20-40 hours, 40-60 hours, more than 60 hours), participants with low stress (LS) rated 42.2%, 45.1%, 9.8%, and 2.9% respectively, while participants in the high stress (HS) group rated 24.7%, 56.8%, 14.2%, and 4.2% respectively. Comparing stress levels with the frequency of exams in university (monthly, weekly, daily), participants rating LS reported 16.3%, 33.7%, and 50% respectively, while participants in the HS group rated 8.9%, 29.2%, and 62% respectively. Comparing stress levels with job finding difficulty (easy, moderate, difficult), participants with LS rated 20.2%, 51%, and 28.8% respectively, while

participants in the HS group rated 6.3%, 53.2%, and 40.5% respectively. Comparing stress levels with financial concerns, 30.5% of LS participants had no concern, 19% were concerned. In the HS group, 11.5% had no concern, 51.6% were concerned, and a total of 41.8% in both groups were sometimes concerned. Comparing stress levels with medical history, 85.8% of LS participants did not have a chronic condition, while 14.2% did. In the HS group, 73.7% did not have a chronic condition, and 26.3% did. Among those who reported low stress levels, 41.9% engaged in exercise 3–4 times per week, 31.4% exercised 1–2 times weekly, and 26.7% did not participate in any physical activity. In contrast, among participants with high stress levels, 24.4% exercised 3–4 times a week, 41.5% exercised 1–2 times weekly, and 34.2% did not engage in any weekly physical activity. In terms of concentration during classroom activities, 47.2% of those with low stress levels reported good concentration, 6.6% reported no concentration, and 46.2% reported occasional concentration. Among those with high stress levels, 31.1% reported good concentration, 56.8% reported occasional concentration, and 12.1% reported no concentration at all. Regarding sleep quality, among those with stress levels below 5, 51.4% reported good sleep quality, 10.5% were dissatisfied with their sleep quality, and 38.1% occasionally experienced good sleep quality. In the high stress group, 21.5% reported good sleep quality, 30.4% reported poor sleep quality, and 48.2% reported occasional good sleep quality. According to self-reports, 9.4% of those with stress below 5 used sedative pills regularly to fall asleep, while 90.6% could sleep normally without medication. In the high stress group, 14.6% used medications to aid sleep, and the rest were able to sleep without inducers. Regarding parasomnia, 27.4% of those with low stress levels experienced episodes of abnormal behaviour such as shouting, punching, or kicking during sleep, while 72.6% did not report such behaviours. Among those with high stress levels, 58.9% reported experiencing episodes of abnormal behaviour during their university years, while 41.1% did not experience such behaviours. Among the participants with lower stress, 79% did not report any acting out, compared to 21% who did. Conversely, 69.9% of participants with higher stress did not report acting out, compared to 30.1% who reported acting out during their dreams. From participants reporting low stress, 72.6% did not report sleep paralysis compared to 27.4% who did. On the other hand, 46.1% of participants with higher stress did not report sleep paralysis, compared to 53.9% who did report sleep paralysis. Investigations showed that 80.2% of participants with the lowest stress did not have nightmares compared to 19.8% who did. Conversely, 47.8% of participants with higher stress reported having nightmares, while 51.3% did not report having nightmares. Among participants with lower stress, 20.8% reported stress triggers compared to 79.2% who did not. Among participants with higher stress, 44% reported having stress triggers, while 56% did not. Our investigations showed that 46.2% of participants with lower stress reported awakenings, compared to 53.8% who did not. Among participants with higher stress, 72.5% reported having awakenings, compared to 27.5% who did not report it.

Table 1. Distribution of students

Stress \ variables	Stress < 5	Stress > 5	total
Age			
Between 18-24 years old	85[81%]	153[79.7%]	238[80.1%]
Between 25-30 years old	20[19%]	39[20.3%]	59[19.9%]
Gender			
Male	53[50%]	79[40.9%]	132[44.1%]
Female	53[50%]	114[59.1%]	167[55.9%]
Academic hour			
Less than 20 hours	43 [42.2%]	47 [24.7%]	90 [30.8%]
Between 20-40 hours	46 [45.1%]	108 [56.8%]	154 [52.7%]
Between 40-60 hours	10 [9.8%]	27 [14.2%]	37 [12.7%]
More than 60 hours	3 [2.9%]	8 [4.2%]	11[3.8%]
Exam			
Monthly	17 [16.3%]	17 [8.9%]	34 [11.5%]
Weekly	35 [33.7%]	56 [29.2%]	91 [30.7%]
Daily	52 [50%]	119 [62%]	171 [57.8%]
Job			
Easy	21 [20.2%]	12 [6.3%]	33 [11.2%]
Moderate	53 [51%]	101 [53.2%]	154 [52.4%]
Difficult	30 [28.8%]	77 [40.5%]	107 [36.4%]
Financial			
No	32 [30.5%]	22 [11.5%]	54 [18.2%]
Sometimes	53 [50.5%]	71 [37%]	124 [41.8%]
Yes	20 [19%]	99 [51.6%]	119 [40.1%]
Medical history			
No	91 [85.8%]	140 [73.7%]	231 [78%]
Yes	15 [14.2%]	50 [26.3%]	65 [22%]
Exercise			
3-4 times	44 [41.9%]	47 [24.4%]	91 [30.5%]
1-2 times	33 [31.4%]	80 [41.5%]	113 [37.9%]
None	28 [26.7%]	66 [34.2%]	94 [31.5%]
Concentration			
Yes	50 [47.2%]	59 [31.1%]	109 [36.8%]
Sometimes	49 [46.2%]	108 [56.8%]	157 [53%]
No	7 [6.6%]	23 [12.1%]	30 [10.1%]

Sleep quality			
Yes	54 [51.4%]	41 [21.5%]	95 [32.1%]
Sometimes	40 [38.1%]	92 [48.2%]	132 [44.6%]
No	11 [10.5%]	58 [30.4%]	69 [23.3%]
Medication			
No	96 [90.6%]	164 [85.4%]	260 [87.2%]
Yes	10 [9.4%]	28 [14.6%]	38 [12.8%]
Behavior			
No	77 [72.6%]	79 [41.1%]	156 [52.3%]
Yes	29 [27.4%]	113 [58.9%]	142 [47.7%]
Acting out			
No	83 [79%]	135 [69.9%]	218 [73.2%]
Yes	22 [21%]	58 [30.1%]	80 [26.8%]
Sleep paralysis			
No	77 [72.6%]	103 [53.9%]	180 [60.6%]
Yes	29 [27.4%]	88 [46.1%]	117 [39.4%]
Nightmare			
No	85 [80.2%]	99 [51.3%]	184 [61.5%]
Yes	21 [19.8%]	94 [47.8%]	115 [38.5%]
Stress trigger			
No	84 [79.2%]	108 [56%]	192 [64.2%]
Yes	22 [20.8%]	85 [44%]	107 [35.8%]
Awakening			
No	57 [53.8%]	53 [27.5%]	110 [36.8%]
Yes	49 [46.2%]	140 [72.5%]	189 [63.2%]

* Stress<5= people who rated their stress level below or equal to 5, low stress group (LS).

* Stress>5= people who rated their stress level above 5, high stress group (HS).

* total = number of people who rated their stress level in combination with the specific variable.

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