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Lost Sleep, Lost Minds: A Comparative Study of Sleep Deprivation, Ruminative Thoughts, and Gender Differences among College Students

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Abstract

This study, titled "Lost Sleep, Lost Minds: A Comparative Study of Sleep Deprivation, Ruminative Thoughts, and Gender Differences among College Students," examines the prevalence of sleep deprivation and ruminating thoughts among undergraduate arts and science college students, and explores the correlation between the two genders. The research employs a mixed method design, incorporating both quantitative and qualitative analyses, with a sample of 142 college students aged 18-25 years from various disciplines, including science, arts, and management. The findings reveal that women experience higher levels of sleep deprivation and ruminative thoughts compared to men, which aligns with existing literature. Additionally, a significant positive relationship between sleep deprivation and rumination is observed. The study delves into potential reasons for these gender differences, such as hormonal and physiological factors, providing a comprehensive understanding of the relationship between sleep patterns and ruminative thoughts across different genders.

Keywords: Sleep Deprivation, Rumination, Gender Differences, College Students

1. Introduction

Sleep Deprivation

Sleep deprivation is the condition of getting insufficient sleep. Sleep deprivation isn't a specific illness. Sometimes people may not realize it. Students, for example, may stay up all night to study for an important test the next day. In doing so, they will lose more information than they gain, as a good night's sleep is important for memory and the ability to think well (Gillen-O'Neel et al., 2012). Sleep deprivation occurs as a result of illness, shift work, or lifestyle considerations (e.g., having a newborn, staying up late to study). It can also be induced for research or interrogation purposes.

Increasingly, sleep deprivation is becoming widespread. Many people attempt to fit more activities into their day, often sacrificing sleep.

As people age, sleep deprivation tends to become a larger issue. While older adults likely require as much sleep as younger individuals, they usually experience lighter and shorter sleep. About 50% of those over 65

frequently face sleep difficulties. Research indicates that losing just one night of sleep significantly impacts physical and mental performance. Participants exhibit notably lower scores on tests assessing judgment and simple reaction time, as well as reduced daytime alertness and memory. Additionally, sleep deprivation may negatively affect the immune and endocrine systems.

Sleep is a process in which important physiological changes [e.g., shifts in brain activity, slowing of basic bodily functions] are accompanied by major shifts in consciousness (Baron, 2008). Sleep is divided into four unique stages, each marked by specific changes in the brain's electrical activity.

Sleep is categorized into four primary stages: N1, N2, N3, and REM. The N1 to N3 stages are known as non-rapid eye movement (NREM) sleep, with each stage progressively leading to deeper sleep. Around 75% of sleep is spent in NREM, with most of this time in the N2 stage. A typical night involves 4 to 5 sleep cycles, transitioning through the stages in the following sequence: N1, N2, N3, N2, and REM. Each sleep cycle typically lasts around 90 to 110 minutes.

Sleep is crucial for good health and well-being, supporting brain function, physical health, and growth and development in children and teens. Inadequate sleep increases the risk of chronic health problems, and affects cognitive functions, mood, and social interactions. Chronic lack of quality sleep raises the risk of heart disease, stroke, obesity, and dementia. Quality sleep involves sufficient duration, quality, and a consistent schedule. During non-REM sleep, blood pressure and heart rate drop, while during REM sleep and waking, they rise. Poor sleep increases the risks of heart disease and high blood pressure. Sleep also affects hormone release, influencing alertness and growth.

Circadian rhythms help regulate fat digestion, and poor sleep affects hunger hormones and insulin response, contributing to obesity. Additionally, sleep affects breathing patterns and immune cell activity, impacting conditions like asthma and susceptibility to infections. Sleep aids learning and memory formation, and lack of sleep leads to concentration issues and impaired daily performance. For general health and functioning, getting enough good sleep is crucial.

The intricate connection between sleep and mental health is highlighted across several conditions. Depression, affecting over 300 million globally, often coexists with insomnia, with evidence suggesting a bidirectional relationship where poor sleep can worsen depression. Seasonal affective disorder, linked to reduced daylight, disrupts circadian rhythms and impacts sleep. Anxiety disorders, affecting 20% of U.S. adults and 25% of teenagers, are strongly associated with sleep problems due to hyperarousal and anticipatory anxiety. PTSD, particularly in veterans, frequently causes insomnia and nightmares, further compounding anxiety. Bipolar disorder leads to significant sleep disruptions during manic and depressive episodes. Schizophrenia involves insomnia and circadian rhythm disorders, with poor sleep exacerbating symptoms. ADHD, prevalent in children and persisting into adulthood, results in difficulty falling asleep and frequent awakenings. Autism Spectrum Disorder (ASD) sees higher rates of sleep disturbances, worsening overall symptoms and quality of life. Addressing sleep issues is crucial for mitigating the effects of these mental health conditions.

Stages of Sleep

N1 [Stage 1]; EEG recording shows theta waves with low voltage. This is the initial, lightest stage of sleep where more than half of the alpha waves give way to low-amplitude mixed-frequency (LAMF) activity. During this stage, muscle tone persists in the skeletal muscles, and breathing remains steady. This phase lasts for about 1 to 5 minutes, accounting for 5% of the total sleep duration.

N2 [Stage2]; EEG recording shows sleep spindles and K complexes. This stage signifies deeper sleep, with

heart rate and body temperature decreasing. The presence of sleep spindles and K-complexes characterizes this stage. Sleep spindles are short, intense bursts of neuronal activity in various brain regions, promoting calcium influx into cortical pyramidal cells. Research indicates that sleep spindles play a vital role in memory consolidation, especially for procedural and declarative memory. K-complexes are lengthy delta waves lasting about one second, recognized as the longest and most distinct brain waves. They are believed to aid in maintaining sleep and memory consolidation. Stage 2 sleep lasts around 25 minutes during the first cycle and extends with each subsequent cycle, eventually making up about 45% of total sleep.

N3 [Stage 3]; N3, also called slow-wave sleep (SWS), is the deepest stage of sleep, characterized by low-frequency, high-amplitude delta waves. This stage is the hardest to wake up from. As individuals age, they spend less time in this slow-wave sleep and more time in stage N2 sleep.

Although N3 has the highest arousal threshold, waking up during this stage causes a brief period of mental foginess known as sleep inertia. In this stage, the body undertakes tissue repair and regrowth, bone and muscle building, and immune system strengthening.

REM [Rapid Eye Movement]; EEG recording shows beta waves, resembling those during wakefulness. REM sleep is linked to dreaming and isn't considered a restful sleep stage. While the EEG resembles that of a wakeful state, skeletal muscles are atonic and immobile, except for the active eyes and diaphragmatic muscles. Breathing becomes more erratic and irregular during this stage. REM usually begins 90 minutes after falling asleep, with each REM cycle lengthening throughout the night. The first REM cycle typically lasts 10 minutes, while the final cycle can extend up to an hour.

Table 1: Daily recommended hours of sleep needed recommended by U.S Centers for Control and Prevention [CDC]

Age	Hours of Sleep Needed
0-3 months	14-17
4-12 months	12-16, including naps
1-2 years	11-14, including naps
3-5 years	10-13, including naps
6-12 years	9-12
13-18 years	8-10
18-60 years	7 or more

Theories of Sleep

Indeed, sleep patterns can differ widely among individuals and cultures. Psychologists have identified several reasons why sleep evolved which comprise theories of sleep.

The Adaptive Theory

The Adaptive Theory of Sleep, as proposed by Webb in 1992, suggests that sleep is a product of evolution. According to this theory, both animals and humans have evolved distinct sleep patterns to avoid being active during their predators usual hunting times, which are typically at night. For instance, if a human or a prey animal ventures out at night, they are at a higher risk of being hunted. Conversely, if they are asleep and conserving energy during these dangerous hours, they are more likely to remain safe.

This theory implies that prey animals would primarily sleep at night and for shorter durations, whereas predator animals, with fewer natural threats, would sleep during the day and for extended periods. This appears true for predators like lions, who have minimal natural enemies and sleep nearly 15 hours a day. In contrast, animals such as gazelles, which are prey for lions, sleep only about 4 hours a day, often in brief naps.

The Restorative Theory

The Restorative Theory of Sleep suggests that sleep is crucial for maintaining the body's physical health. During sleep, depleted chemicals from the day's activities are replenished, excess chemicals that could become toxic are eliminated, and cellular damage is repaired. Additionally, sleep enhances brain plasticity. Evidence shows that most bodily growth and repair happen during the deepest stages of sleep when enzymes responsible for these functions are secreted in greater amounts (Saper et al., 2001).

Sleep also plays a crucial role in memory formation. Research has demonstrated that the physical changes in the brain associated with memory formation are strengthened during sleep. Sleep enhances synaptic connections among neurons, increasing brain plasticity—the brain's ability to adapt to experiences (Aton et al., 2009; Bushey et al., 2011; Cirelli et al., 2012; Frank & Benington, 2006). Furthermore, sleep may reduce the activity of neurons associated with forgetting, thereby aiding memory retention (Berry et al., 2015). Individuals who learn tasks just before sleeping tend to recall and execute those tasks better than if they hadn't slept afterward.

The Energy Conservation Theory

The Energy Conservation Theory proposes that sleep's main purpose is to reduce a person's energy expenditure during periods when it is less efficient to search for food. This theory is supported by evidence that the body's metabolic rate can decrease by up to 10% during sleep. Essentially, sleep aids in conserving energy by lowering our metabolic needs when being active and seeking food is less practical.

Causes of Sleep Deprivation

Sleep Disorders

Sleep disorders are conditions that impact the quality, quantity, and timing of your sleep. Common examples of sleep disorders include insomnia, restless legs syndrome, narcolepsy, and sleep apnea. Insomnia. It is characterized by difficulty in initiating or maintaining a restorative sleep to a degree in which the severity and persistence of the sleep disturbance causes clinically significant distress, impairment in a significant area of functioning, or both. It refers to being mindful of your sleep duration and quality. This concern may arise from difficulties in falling or staying asleep. Reports of sleeping issues, dissatisfaction with sleep quality, and daytime fatigue are common.

Restless Leg Syndrome. Restless legs syndrome (RLS), also referred to as Willis-Ekbom disease, is characterized by a compelling urge to move the legs, often triggered by an unpleasant sensation.

This usually occurs during night when one is seated or sleeping. RLS can onset at any age and generally worsens as one gets older. It can disrupt sleep, thereby affecting daily activities.

Narcolepsy. Narcolepsy is a disorder affecting the brain and nervous system, impairing one's ability to regulate wakefulness and sleep. Individuals with narcolepsy experience severe, uncontrollable daytime sleepiness and may abruptly fall asleep during any activity. People with narcolepsy enter REM sleep almost immediately in their sleep cycle and can even do so while awake.

Sleep Apnea. Sleep apnea interrupts your breathing during sleep, prompting your brain to wake you up just enough to resume breathing. This occurs either due to a blockage in your airway (obstructive sleep apnea) or because your brain doesn't regulate breathing properly (central sleep apnea). A lack of oxygen triggers a survival reflex that wakes you up just enough to resume breathing. While this reflex keeps you alive, it also disrupts your sleep cycle, preventing restful sleep. Over time, this can place stress on your heart and may become life-threatening if left untreated.

Aging

As people age, their sleep patterns often shift. Many individuals find it more challenging to fall asleep, and they tend to wake up more frequently during the night and earlier in the morning. Many of these changes result from alterations in the body's internal clock. Situated in a part of the brain called the hypothalamus. The internal clock comprises around 20,000 cells and these cells form the suprachiasmatic nucleus (SCN). The SCN regulates 24-hour daily cycles known as circadian rhythms, which influence hunger, hormone release, and when a person feels sleepy or alert. As people age, their sleep patterns change due to the effects of an aging SCN. The deterioration of SCN function can disrupt circadian rhythms, affecting when people feel tired and alert.

Illness

Even those who believe they sleep well can experience sleep deprivation due to various underlying medical conditions. Sleep disturbances may signal a health issue or be a side effect of treatments for these issues. Chronic illness stress can also result in insomnia and daytime drowsiness. Common conditions often linked to sleep problems include heartburn, diabetes, cardiovascular disease, musculoskeletal disorders, kidney disease, mental health issues, neurological disorders, respiratory problems and thyroid disease. Mental health conditions like general anxiety disorder, depression, schizophrenia, bipolar disorder, dementia, phobias etc can lead to sleep deprivation. Additionally, numerous prescription and over-the-counter medications for these and other health issues can negatively impact sleep quality and quantity.

Technology

Research indicates that having a cell phone in your sleeping area can increase daytime sleepiness, reduce sleep quality, make it harder to fall asleep and stay asleep, and cause you to wake up during the night. Using a computer before bedtime is linked to experiencing drowsy driving, daytime sleepiness, and less restful sleep. Similarly, playing video games before bed can make it harder to fall asleep. It's not just the noise that disrupts sleep; electronic devices emit light that can interfere with the body's production of melatonin, a natural sleep

aid.

Different types of content can also significantly affect sleep. For instance, research shows that engaging in exciting or violent video games can elevate heart rate, making it more difficult to fall asleep and reducing overall sleep quality.

Other Factors

Our environment, work shifts, lifestyle habits, substance abuse etc. are some of the other factors which comprise the causal factors of sleep deprivation. Our bodies use environmental cues like light to regulate the sleep-wake cycle. Exposure to bright lights, particularly in the evening, can suppress melatonin production and delay the body's readiness for sleep by tricking the internal clock. Changes in surroundings, such as sleeping in a new place or an unfamiliar environment, can make it harder to fall asleep easily. Traveling across different time zones disrupts the body's circadian rhythm, leading to jetlag. Similarly, shift-based work schedules with varying sleep timings can confuse the body clock, affecting the quality and consistency of sleep. Certain medications and substances, like caffeine, nicotine, and some prescription drugs such as antidepressants, can interfere with sleep by altering neurotransmitter activity or stimulating the nervous system, impacting sleep duration and quality.

Symptoms of Sleep Deprivation

Sleep deprivation manifests through various symptoms, some of the most common being: Daytime sleepiness, Fatigue, Irritability, Difficulty with thinking, focusing, and remembering Slowed reaction times, Headaches. As sleep deprivation persists, symptoms become more severe, often mimicking the effects of alcohol intoxication. These severe symptoms include "Microsleeps" (brief moments of falling asleep for only seconds), Uncontrollable eye movements (nystagmus), Difficulty speaking clearly, Drooping eyelids (ptosis), Hand tremors, Visual and tactile (touch-based) hallucinations, Impaired judgment, Impulsive or reckless behavior

Ruminating Thoughts

Ruminating involves repeatedly thinking about distressing feelings and their causes and consequences. It's common for people to have ruminating thoughts, particularly when they are anxious or feeling down. For instance, someone might dwell on their fears about an upcoming medical appointment or test, while a student nearing graduation may worry incessantly about failing their final exams. This ongoing negative focus can worsen existing conditions and contribute to the development of depression or anxiety. According to the American Psychological Association, rumination is obsessional thinking involving excessive, repetitive thoughts or themes that interfere with other forms of mental activity. According to Martin and Tesser (1996, p. 7), rumination is defined as follows: A class of conscious thoughts known as rumination occurs when there are no immediate external constraints on the thoughts and they center on a common instrumental theme. The great accessibility of goal-related notions suggests that indirect environmental cueing is likely to occur, even though the occurrence of these thoughts is not dependent on direct environmental cueing. While repeated cueing from the external environment can sustain any thought, ruminative thought maintenance is independent of such cueing.

Ruminating thoughts occur when our minds fixate on certain thoughts, typically negative ones, and we can't seem to stop thinking about them. It's like an endless loop playing in our heads. When we have ruminating thoughts, we repeatedly relive past events or worry about things that haven't yet happened. This can leave us

feeling extremely overwhelmed and anxious, and can negatively impact our self-esteem. Ruminating thoughts are unhelpful because they trap us in a cycle of negative and repetitive thinking. This can deteriorate our mental health by increasing stress, making us feel sad or angry, and affecting our ability to concentrate or make decisions.

Theories of Rumination

Response Styles Theory

The most prominent theory of rumination is Nolen-Hoeksema's (1991) Response Styles Theory. According to the response styles theory (Nolen-Hoeksema, 1991), rumination is defined as the repetitive and passive contemplation of one's depressive symptoms, along with the potential causes and consequences of these symptoms. These thoughts do not result in proactive problem-solving aimed at addressing the issues identified during rumination. Instead, people simply remain in cycles of ruminative thinking. The response styles theory suggests that this type of rumination, when associated with depressive symptoms, exacerbates and prolongs these symptoms. It increases the chances of the symptoms becoming chronic and elevates the risk of moderate depressive symptoms developing into major depressive episodes.

Stress Reactive Model

The Stress-Reactive model of rumination can complement the Response Styles Theory (RST) by highlighting that rumination on negative, event-related inferences occurs after experiencing a stressful event (Alloy et al., 2000; Table 1). One benefit of this model is its similarity to RST, which may help identify ruminative phenomena before the onset of negative emotions. However, a potential drawback is that this model assumes ruminative content focuses solely on thoughts related to the stressor. It might miss other significant ruminative themes, such as memories of other stressors or self-deprecating thoughts unrelated to the initial stressor. It is variable closely related to negative cognitive style, defined as "the tendency to ruminate on the negative inferences following stressful events" (Robinson and Alloy 2003, p. 276). Alloy and colleagues (Alloy et al. 2000; Robinson and Alloy 2003) introduced this concept to explain the onset and duration of depression, hypothesizing that the impact of negative inferences on depression is more harmful when these inferences are actively rehearsed (i.e., ruminated upon). Indeed, Alloy and colleagues found that individuals with a negative cognitive style, combined with a tendency to ruminate on negative inferences, were particularly susceptible to developing depressive episodes (Alloy et al. 2000; Robinson and Alloy 2003).

The Goal Progress Theory

The Goal Progress Theory of rumination states that the realization that one has not reached or is not making sufficient progress toward a desired goal is what triggers rumination (Martin, 1999; Martin, Shrira, & Startup, 2004; Martin, Tesser, & McIntosh, 1993). This theory offers a distinctive viewpoint on rumination by seeing it as a response to the inability to achieve a goal, rather than a reaction to an emotional condition. Studies have demonstrated that ruminating can continue even in the absence of actual or perceived failure, despite the theory's assertion that both depression and rumination are fueled by the experience of failure (Nolen-Hoeksema & Morrow, 1991; Spasojevic & Alloy, 2001). Furthermore, cognition, meta-cognitions regarding rumination (whether it is distracting or distressing), and motivation are all included in the Scott McIntosh Rumination Inventory (SMRI), which is used to measure rumination in this model. As a result, rumination is viewed in this paradigm as a wide-ranging, complex activity that combines cognitive and action- oriented

components. Rumination has also been separated into a number of dimensional subtypes in this model. For instance, Martin and Tesser (1996) propose that rumination may be categorized according to the aspects of time (past, present, or future), emotional valence (good or negative), and mental emphasis (achievement of the objective or deviation from the goal). Thus, unless positive affect is viewed as a higher order aim, rumination does not always occur in response to sadness or negative affect.

Self-Regulatory Executive Function Theory

The Self-Regulatory Executive Function (S-REF) theory of rumination provides a comprehensive perspective, embedded within the broader S-REF model of emotional disorders, which encompasses attention, cognitive regulation, beliefs about emotion regulation strategies, and interactions among various levels of cognitive processing (Wells & Matthews, 1994, 1996). This model incorporates metacognitive beliefs into its understanding of rumination, which may significantly contribute to the development of rumination as a consistent response style. This model's overlap with other categories, such as concern, intrusive thoughts, and coping, might be a problem, though. Furthermore, although rumination is regarded as a subset of concern, it has been shown to differ from worry in significant ways, therefore it must be distinguished from worry (for more information, see the section on worry).

Types of Ruminating Thoughts

Some people engage in ruminating thoughts after experiencing trauma. Others mistakenly believe that by understanding a situation better, they can gain control over it, thinking that rumination will prevent the situation from happening again. Additionally, some individuals ruminate to seek validation or to absolve themselves of responsibility. While ruminating thoughts are always marked by obsessive thinking, different ruminative patterns exist. Research identifies four distinct types of ruminating thoughts:

Brooding

Brooding is a form of ruminating thoughts which involves passively dwelling on one's mood or current situation. Although commonly linked to adolescents, brooding can occur at any age. When brooding, individuals tend to view themselves negatively, focusing on their perceived mistakes and shortcomings.

Brooding rumination is seen as a core element of midlife depression. Since older individuals often reflect on their past, the tendency to ruminate may be especially significant in later life, as it can impede their ability to adequately assess previous events. From a neurobiological perspective, brooding ruminating thoughts are linked to dysfunctions in front-limbic circuits. This is primarily evident through increased, "hyperresponsive" amygdala activation (Siegle et al., 2002; Cooney et al., 2010; Mandell et al., 2014), while the dorsolateral prefrontal brain regions often show decreased activity in response to emotional stimuli (Ray et al., 2005; Brassen et al., 2012). These findings suggest impaired cognitive control over heightened emotional reactivity.

Reflection

Reflection differs from brooding in that it involves a deliberate inward examination of the reasons behind one's feelings. Ruminating thoughts are often used by individuals to understand why things are the way they are and to seek solutions to their problems. Reflection is a structured process of examining your thoughts, feelings, and experiences with the intent to understand them better. It involves looking inward to identify the reasons behind your emotions and behaviors. Reflecting allows for growth and learning, as it encourages constructive

thinking and finding solutions.

Intrusive Ruminating Thoughts

Intrusive rumination refers to unintentional and often uncontrollable thoughts about a stressful event. Despite one's desire to stop thinking about the specific event, it can be extremely challenging to do so. These thoughts often play on a loop and can be distressing, making it challenging to focus on other tasks. They often stem from stressful events or situations and can impact your mental well-being by creating a continuous cycle of anxiety and distress. Intrusive ruminating thoughts differ from normal ruminations as they are often unbidden and harder to control.

Deliberate Ruminating Thoughts

Deliberate rumination involves actively contemplating a situation to understand it from every angle. The individual is attempting to "get to the bottom of it" and make sense of everything happening, aiming to reach a conclusion. It is the intentional process of thinking through events to comprehend their causes and significance. It is generally regarded as a positive form of reflection. Studies have shown that deliberate rumination involves an active cognitive process, which includes restructuring existing schemas to promote post-traumatic growth and yield positive outcomes following a traumatic experience.

Causes of Ruminating Thoughts

Brain Structure

Some individuals are more susceptible to rumination due to their brain structure, which may be influenced by genetic factors. This means that certain neural pathways in their brains are more prone to repetitive, persistent thoughts. As a result, these individuals may find it harder to disengage from negative thinking patterns. This tendency to ruminate can run in families, suggesting a hereditary component. If a person has close relatives who also struggle with rumination, it indicates that there may be a genetic predisposition at play.

Anxiety Sensitivity

When individuals with anxiety sensitivity experience the physical sensations of anxiety, they often become hyper-focused on these sensations, fearing that they signify something harmful. This heightened awareness and fear can lead to ruminating thoughts. For someone with anxiety sensitivity, this means they might constantly worry about their anxiety symptoms, repeatedly analyzing them and questioning what they could mean. This self-analysis and internal dialogue can become a cycle of ruminating thoughts, where the individual keeps revisiting the same fears and concerns without finding a resolution. By continuously engaging in self-analysis and self-talk, individuals with anxiety sensitivity inadvertently reinforce their ruminating thoughts, making it difficult to manage their anxiety and move past the distressing sensations.

Certain Mental Health Conditions

Rumination, which involves persistent, repetitive thoughts, is not a mental illness on its own. However, it frequently appears as a symptom in various mental health issues. This persistent thinking pattern is commonly observed in mood disorders, anxiety, and trauma-based disorders.

It is particularly prominent in conditions like depression and obsessive-compulsive disorder (OCD). In mood disorders, such as depression, individuals may engage in rumination by continuously reflecting on their negative emotions and experiences. In anxiety disorders, ruminating thoughts often involves excessive worry about potential threats or negative outcomes. In trauma-based disorders, such as post-traumatic stress disorder (PTSD), ruminating thoughts can manifest as persistent, distressing thoughts about the traumatic event. In OCD, ruminating thoughts are often linked to obsessions—unwanted, intrusive thoughts that cause significant distress.

NEED FOR THE STUDY

College students frequently experience sleep deprivation due to academic pressures, social demands, and extracurricular activities, which negatively affect their cognitive, emotional, and physical well-being. This issue often exacerbates ruminative thinking, a tendency to dwell on negative thoughts, which increases the risk of mental health challenges like anxiety and depression. While research highlights gender differences in the ways individuals respond to sleep deprivation and ruminative patterns, there is limited exploration of how these factors interact, particularly in a college demographic. Investigating these relationships is vital to bridge gaps in existing literature, enhance understanding of their combined impact on academic performance and well-being, and inform interventions tailored to gender-specific needs, ultimately supporting the success and mental health of students.

2. Literature review

Jacob A Nota and Meredith Coles (2021): Sleep disturbance is associated with less emotional reactivity in individuals with heightened repetitive negative thinking

Research has increasingly recognized the link between repetitive negative thinking, anxiety, and sleep disruptions. However, the mechanisms behind this relationship remain unclear. This review examines whether emotional reactivity is related to sleep in individuals with repetitive negative thinking. The study involved fifty-two participants with high levels of transdiagnostic repetitive negative thinking and varying degrees of sleep disruption. They passively viewed emotionally-valenced (positive and negative) and neutral images, with their pupil diameter measured as they viewed the images, and rated their subjective reactions.

Findings showed that poorer sleep quality was associated with less pupil dilation in response to all novel stimuli, regardless of emotion. Shorter habitual sleep duration and longer sleep onset latency were linked to lower subjective unpleasantness when viewing all stimuli. These results suggest that sleep disturbance may be connected to repetitive negative thinking through differences in emotional reactivity.

Keisuke Takano, Shinji Shakamoto and Yoshihiko Tanno (2014): Repetitive thought impairs sleep quality: an experience sampling study The association between presleep negative cognitive activities and poor sleep quality has been highlighted in previous research, but evidence regarding this relationship in real-life settings is limited. This study used experience sampling and long-term sleep monitoring with actigraphy to explore the connections between negative repetitive thought, mood, and sleep problems. Over a 1-week period, 43 undergraduate students recorded their thought content and mood eight times a day at semi random intervals. Participants also wore actigraphy on their wrists to measure sleep parameters. Multilevel modeling analyses revealed that repetitive thought in the evening was significantly associated with longer sleep-onset latency,

decreased sleep efficiency, and reduced total sleep time.

Furthermore, impaired sleep quality was significantly linked to reduced positive affect the next morning, which in turn was indirectly associated with increased repetitive thought in the evening. These findings suggest a self-reinforcing cycle involving repetitive thought, mood, and impaired sleep quality, underscoring the importance of cognitive and emotional factors in maintaining good-quality sleep.

Bunmi O Olatunji and Kelly A Knowles (2023): Linking repetitive negative thinking and insomnia symptoms: A longitudinal trait-state model.

Sleep disturbance is highly debilitating, and extensive research suggests that repetitive negative thinking (such as rumination and worry) may contribute to the development and maintenance of maladaptive sleep patterns, including insomnia symptoms. Repetitive negative thinking is often conceptualized as a 'trait' risk factor for anxiety-related disorders. However, it is unclear whether it consists of time-varying (TV) or state-like features versus time-invariant (TI) or trait-like characteristics. Furthermore, it remains uncertain whether the TV or TI components of repetitive negative thinking contribute to insomnia symptoms commonly observed in anxiety-related disorders.

A 6-wave, 5-month longitudinal study with community participants ($N = 1219$) examined measures of rumination, worry, transdiagnostic repetitive negative thinking, and insomnia symptoms. A latent variable (trait-state-occasion) model was applied to the measures of repetitive negative thinking. The results showed that although both TI and TV factor variances were significant for latent repetitive negative thinking, worry, and rumination, the proportion of TI factor variance (0.82–0.89) was greater than the TV factor variance (0.11–0.19). Although TV factor stability was statistically significant for latent repetitive negative thinking, rumination, and worry, the magnitude of the coefficients was small. Furthermore, regression weights for the latent repetitive negative thinking, rumination, and worry TI factors were significant and larger than those for the TV factors in predicting insomnia symptoms at each of the six time points. These findings suggest that repetitive negative thinking is largely TI, and it is this TI component that contributes to insomnia symptoms.

Dr Marcus Harrington and Jenifer E Ashton (2021): Losing Control: Sleep Deprivation Impairs the Suppression of Unwanted Thoughts

Unwanted memories often emerge into conscious awareness when individuals encounter reminders. There is significant variability in individuals' abilities to suppress these memory intrusions, but the factors that govern suppression ability are not well understood. This study tested the hypothesis that successful memory control requires sleep. Participants, either having had overnight sleep or total sleep deprivation, attempted to suppress intrusions of emotionally negative and neutral scenes when faced with reminders. The sleep-deprived group experienced significantly more intrusions (unsuccessful suppressions) compared to the sleep group. Deficient control over intrusive thoughts had notable consequences: while rested participants showed reduced behavioral and psychophysiological indices of negative affect for aversive memories through suppression, sleep-deprived participants did not experience these benefits. The findings suggest that sleep deprivation may disrupt prefrontal control over medial temporal lobe structures that support memory and emotion. This underscores the important role of sleep disturbance in maintaining and exacerbating psychiatric conditions characterized by persistent, unwanted thoughts. Thus, these results highlight the necessity of considering sleep quality in the context of emotional and cognitive health.

Yaqoot Fatima and Suhail AR Doi (2016): Exploring Gender Difference in Sleep Quality of Young Adults: Findings from a Large Population Study

This study explores the gender difference in sleep quality, examining whether it is due to the higher prevalence of depression in females and whether socio-demographic and lifestyle factors affect sleep quality differently in males and females. Using youth self-reports and the Pittsburgh Sleep Quality Index, the study assessed sleep quality and associated risk factors. Logistic regression analyses were conducted to determine the association between various risk factors and poor sleep quality. Data from 3,778 young adults (average age 20.6 ± 0.86 years) showed a higher prevalence of poor sleep quality in females than in males (65.1% vs. 49.8%). The gender difference in poor sleep quality appeared to be independent of depression, socio-demographics, and lifestyle factors. Even after adjusting for these factors, females had higher odds of poor sleep quality (OR: 1.53, 95% CI: 1.23- 1.90). Lifestyle factors, such as smoking, were associated with sleep quality only in males (OR: 1.91; 95% CI: 1.05-3.46). The findings suggest that female vulnerability to poor sleep quality should be investigated beyond psycho-social disparities. Exploring whether the predisposition to poor sleep quality in females originates at the biological level could provide further insights.

Shelley D Hershner and Ronald D Chervin (2014): Causes and consequences of sleepiness among college students

Daytime sleepiness, sleep deprivation, and irregular sleep schedules are highly prevalent among college students, with 50% reporting daytime sleepiness and 70% attaining insufficient sleep. The consequences of these sleep issues are particularly problematic for college students, as they can result in lower grade point averages, increased risk of academic failure, compromised learning, impaired mood, and increased risk of motor vehicle accidents. This study examines the current prevalence of sleepiness and sleep deprivation among college students, the contributing factors, and the role of sleep in learning and memory. It also explores the impact of sleep and sleep disorders on academics, grade point average, driving, and mood. Furthermore, the review discusses effective and viable interventions to decrease sleepiness and sleep deprivation through sleep education classes, online programs, encouragement of naps, and adjustment of class times. The paper emphasizes the importance of addressing sleep issues, which are often not considered as a risk factor for depression and academic failure. Promoting university and college policies and class schedules that encourage healthy and adequate sleep could significantly impact the sleep, learning, and health of college students. Future research should prioritize investigating effective and feasible interventions that disseminate sleep knowledge and encourage healthy sleep habits among college students in a timely and cost-effective manner.

Arcady A Putilov, Dmitry S. Sveshnikov and Zarina B. Bakaeva (2021): Differences between male and female university students in sleepiness, weekday sleep loss, and weekend sleep duration

Research has shown that men and women experience sleep differently, with differences in intrinsic sleep desire potentially underlying some of the observed disparities. This cross-sectional questionnaire study aimed to determine gender differences in self-reported sleepiness and sleep- wake patterns among university students. The study utilized five questionnaires completed by 1,650 students from four Russian universities. Female students reported lower subjective sleep quality scores, higher morning sleep ability scores, and lower nighttime and daytime walkability scores compared to male students. They more frequently reported excessive daytime sleepiness and expected to be sleepier at any time of the day, with the largest gender difference observed around the times of sleep onset and offset. On free days, female students reported longer sleep durations and earlier sleep onsets. The free-weekday difference was larger for sleep duration and

smaller for sleep onset. These male-female differences were similar to those observed in university and high school students from various countries. There was no significant gender difference in weekly averaged sleep duration, weekday sleep duration, hours slept, midpoint of sleep on free days, free-weekday difference in sleep offset, social jetlag, and morningness-eveningness score. Therefore, studies relying on these self-reports might not immediately reveal the most salient gender differences.

Christine A. Calmes and John E. Roberts (2012): Repetitive Thought and Emotional Distress: Rumination and Worry as Prospective Predictors of Depressive and Anxious Symptomatology

Repetitive thought processes have been linked to vulnerability to both anxiety and depression. This study used a prospective design to examine the predictive ability of worry and rumination for these forms of emotional distress over time. The sample consisted of 451 college students (273 females) who completed self-report measures of rumination, worry, depression, and anxiety at two time points separated by 6-8 weeks. The results indicated that both worry and rumination prospectively predicted anxiety, but neither predicted depressive symptomatology.

Gender did not moderate these effects, although females reported higher levels of worry and rumination than males.

These findings suggest that repetitive thought in the form of worry and rumination contributes to anxiety but not depressive symptomatology in this sample. Post-hoc analyses raised the possibility that previously documented associations between rumination and depression might have been partially driven by criterion contamination between measures of these constructs.

Daniel P Johnson and Mark A Whisman (2014): Gender differences in rumination: A meta- analysis

Research indicates that starting in adolescence and continuing into adulthood, women are twice as likely as men to experience depression. According to response styles theory (RST), this gender difference in depression may be partly due to women's tendency to ruminate more than men. A meta-analysis conducted to evaluate gender differences in rumination in adults ($k = 59$; $N = 14,321$) and an analysis of rumination subtypes brooding and reflection ($k = 23$) provides some insights. Fixed effects analyses revealed that women scored higher than men in rumination ($d = .24$, $p < .01$, $SEd = .02$), brooding ($d = .19$, $p < .01$, $SEd = .03$), and reflection ($d = .17$, $p < .01$, $SEd =$

$.03$). There was no evidence of heterogeneity or publication bias across studies for these effect sizes. Although the gender differences in rumination were statistically significant, they were small in magnitude. The results of this meta-analysis support the tenets of response styles theory. Across pooled samples of 14,321 individuals (for rumination), 4,873 individuals (for brooding), and 4,644 individuals (for reflection), it was found that rates of rumination, brooding, and reflection were higher in women than in men. These findings are consistent with qualitative reviews of the rumination literature (e.g., Nolen-Hoeksema, 2012; Nolen-Hoeksema et al., 2008) and etiological models of gender differences in depression (e.g., Cambron, Acitelli, & Pettit, 2009; Hyde et al., 2008).

Ranjeeta Kumari and Kapil Jain (2020): Sleep quality assessment among college students using Pittsburgh Sleep Quality Index in a municipal corporation area of Uttarakhand, India

Poor sleep quality has been widely reported among adults globally and is increasingly noted among college

students. This study aimed to assess sleep patterns and identify associated factors among college students to enable effective and timely interventions during these habit-forming years. This cross-sectional study was conducted among college students enrolled in various courses in the Rishikesh municipal corporation area, in Dehradun district, Uttarakhand, India. Sleep quality was assessed using the validated Pittsburgh Sleep Quality Index (PSQI), which comprises seven components, while stress was measured using the Perceived Stress Scale-10. The study found that 66% of respondents reported poor sleep quality. The mean sleep latency was 27.2 minutes (SD 20.75 min), with a median of 20 minutes and mode of 60 minutes. Logistic regression analysis revealed that yoga/meditation, recognized as effective relaxation techniques for ages, were positively associated with better sleep quality (OR 0.47, 95% CI 0.26-0.84). Stress (OR 4.10, 95% CI 1.71- 9.83) and mobile use before bedtime (OR 1.956, 95% CI 1.02-3.75) were also significant predictors of poor sleep quality.

Muhammad Kamd Salim Hossain and Mal Uddin (2020): Sleep Deprivation and Sleep Quality of Healthcare Shift Workers in Bangladesh

Shift work is an essential aspect of industrialized society, and this study aimed to investigate sleep deprivation and sleep quality among healthcare shift workers in Bangladesh. A total of 462 healthcare shift workers, including 152 males and 310 females aged 19 to 65, were recruited from 30 hospitals and medical centers across five districts in Bangladesh using a convenience sampling technique. Data were collected using the Bangla version of the Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS). The study found that sleep deprivation and shifts were marginally dependent ($\chi^2 = 11.56$, $p = 0.07$), whereas sleep quality was found to be independent of shifts ($\chi^2 = 4.31$, $p = 0.12$). Further analysis indicated that rotating shift workers experienced higher sleep deprivation ($\mu = 7.56$) and poorer sleep quality ($\mu = 3.78$) compared to fixed and regular shift workers. Additionally, sleep quality was better outside of metropolitan areas ($t = -3.258$, $p < 0.01$).

Sultan Almutairi and Riyaz Shaik (2025): Rumination and distress post COVID-19 in Riyadh, Saudi Arabia

This study aimed to assess the level of rumination and distress post-COVID-19 among the population of Saudi Arabia. A descriptive cross-sectional research design was employed, using a modified German version of the Perseverative Thinking Questionnaire (PTQ) and a modified German version of the Peritraumatic Distress Inventory (PDI) to assess current COVID-19-related distress. The study sample included 872 participants, with females ($n = 496$, 56.9%) and young adults aged 20-30 years ($n = 507$, 58.1%) being the majority. Most participants held university degrees ($n = 604$, 69.3%). The mean scores for rumination and COVID-19-related distress were 16.6 (SD = 14.3) and 13.2 (SD = 11.3), respectively. Rumination levels were comparable between females (Mdn = 13.00, IQR = 5.00-26.00) and males (Mdn = 13.50, IQR = 4.50-27.00; p -value = 0.849). However, distress levels were significantly higher in females (Mdn = 12.00, IQR = 4.00- 21.00) compared to males (Mdn = 9.00, IQR = 4.00-18.00; p -value = 0.017). Analysis of educational levels showed significant differences in rumination scores (p -value = 0.036). Multiple regression analysis identified significant demographic predictors of COVID-19-related distress. Gender was a significant predictor, with males reporting lower distress levels compared to females ($\beta = -0.082$, p - value = 0.016, 95% CI [-3.408, -0.349]). Age analysis indicated that participants aged over 51 years reported significantly lower distress levels ($\beta = -0.098$, p -value = 0.005, 95% CI [-6.743, -1.187]). The study revealed moderate levels of COVID-19-related rumination and distress among participants. While rumination patterns were similar across demographic groups, distress levels showed significant variations.

Yee Lok Wong and Shirley Xin Li (2024): Depression Moderates the Effect of Repetitive Negative Thinking

on Set-shifting Ability in Youth with Insomnia

Repetitive negative thinking (RNT), a known perpetuating factor of insomnia, is often associated with adverse outcomes such as depression. According to the Attentional Scope Model of Rumination, RNT is linked to a narrowed attentional scope, leading individuals with higher levels of RNT to exhibit stable attention toward task-relevant information. Previous research has indicated that RNT is associated with better set-shifting ability in adolescents, but this evidence is primarily based on studies related to mood disorders and remains limited and inconclusive in the context of insomnia. This study aimed to examine the relationship between set-shifting ability and RNT, as well as to explore the role of depression in this relationship among adolescents with insomnia.

Adolescents diagnosed with DSM-5 insomnia disorder were recruited for the study. Participants completed self-reported questionnaires, including the Perseverative Thinking Questionnaire (PTQ) for measuring RNT, the Insomnia Severity Index (ISI), and the Beck's Depression Inventory-Short Form (BDI-SF). Additionally, they were administered the Wisconsin Card Sorting Test (WCST). A score of ≥ 10 on the BDI-SF indicated the presence of depression. The number of Perseverative Responses (PR) and Perseverative Errors (PE) on the WCST were used to reflect set-shifting ability. Among the 115 participants with insomnia (mean age 18.34 ± 1.56 , age range 14-20, 65.22% female), the prevalence of depression was 51.30%. PTQ scores were significantly associated with PR and PE. The effect of PTQ on PR, but not PE, was moderated by the presence of depression.

Lower PTQ scores were associated with greater PR among participants with depression, but this association was not observed in those without depression. Insomnia symptoms, presence of depression, age, and gender were not associated with PR and PE.

Kana Okano, Jakub R Kaczmarzyk and Neha Dave (2019): Sleep quality, duration and consistency are associated with better academic performance in college students.

Despite numerous survey studies indicating links between sleep and cognitive function, there is still a shortage of quantitative data using objective measures to directly assess the association between sleep and academic performance. In this study, wearable activity trackers were provided to 100 students in an introductory college chemistry class (with 88 students completing the study).

These trackers allowed for various sleep metrics to be correlated with in-class performance on quizzes and midterm exams. Overall, better quality, longer duration, and greater consistency of sleep were associated with higher grades. However, no correlation was found between sleep metrics on the single night before a test and test performance. Instead, sleep duration and quality for the month and the week leading up to a test were correlated with better grades. Sleep metrics accounted for nearly 25% of the variance in academic performance.

These findings provide quantitative, objective evidence that better quality, longer duration, and greater consistency of sleep are strongly linked to improved academic performance in college students. Females exhibited better sleep quality ($t(88) = 2.63$, $p = 0.01$) and less sleep inconsistency ($t(88) = 2.18$, $p = 0.03$) throughout the semester compared to males, although there was no significant difference in sleep duration between the two groups ($t(88) = 1.03$, $p = 0.3$). Sleep duration and sleep quality were significantly correlated in both males ($r(41) = 0.85$, $p < 0.00001$) and females ($r(43) = 0.64$, $p < 0.00001$), but this correlation was

stronger in males ($Z = -2.25$, $p = 0.02$), suggesting that long-duration sleep may be more important for males to achieve good quality sleep. Additionally, sleep inconsistency and sleep quality were significantly negatively correlated in males ($r(41) = -0.51$, $p = 0.0005$) but not in females ($r(43) = 0.29$, $p > 0.05$), indicating that maintaining a regular sleep schedule may be more crucial for males to obtain good quality sleep. Females scored higher on the overall score compared to males ($t(88) = -2.48$, $p = 0.01$), but a one-way analysis of covariance (ANCOVA) revealed no significant difference in overall performance between females and males when controlling for sleep quality ($F(1, 85) = 2.22$, $p = 0.14$). Sleep inconsistency and overall score were negatively correlated in males ($r(41) = -0.44$, $p = 0.003$) but not in females ($r(43) = -0.13$, $p = 0.39$), suggesting that maintaining a regular sleep schedule may be more important for males to perform well academically, whereas this may be less critical for females. No other gender differences were found between other sleep metrics and overall scores.

Jinsong Tang, Yanhui Liao and Brian C Kelly (2017): Gender and regional differences in sleep quality and insomnia; a general population-based study in Hunan province of China

Insomnia and sleep disturbances greatly affect people's health and well-being. However, systematic estimates of their prevalence and distribution in the general population of China are still lacking. A population-based cluster sampling survey was conducted in the rural and urban areas of Hunan, China, (sampling 26,851 subjects from the general population. Using the Pittsburgh Sleep Quality Index (PSQI), the survey assessed sleep quality and insomnia (defined as a PSQI score >5). The overall prevalence of insomnia was found to be 26.6%, with minimal differences between males (26.3%) and females (27.0%). The mean PSQI score was $4.26 (\pm 2.67)$, with females having a significantly higher mean score (4.32 ± 2.70) compared to males (4.21 ± 2.64 , $p = 0.003$). Rural residents reported higher PSQI scores (4.45 ± 2.81) than urban residents (4.18 ± 2.60) ($p < 0.001$), with insomnia prevalence at 29.4% in rural areas compared to 25.5% in urban areas ($p < 0.001$).

Multiple logistic regression analysis revealed that female gender, older age, higher education level, being unmarried, living in rural areas, cigarette smoking, and alcohol consumption were associated with increased insomnia rates. The study provides valuable information for general and mental health research. Female participants tended to have higher scores than males in multiple PSQI component scores. Significant differences were observed in PSQI components such as subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, and sleep disturbances between men and women ($p < 0.0001$). However, there were no significant gender differences in the components of need for sleep medications ($p = 0.437$) and daytime dysfunction ($p = 0.220$). While females had a higher overall PSQI score than males ($p = 0.003$), the rate of poor sleepers was not significantly different between males (26.3%) and females (27.0%) ($p = 0.232$).

Notably, the lowest PSQI component score was "need for sleep medications" across all participants (0.11 ± 0.38), with less than 10% of participants reporting a need for sleep medications in the month prior to the survey.

Mingxuan Zou, Bin Liu and Jing Ji (2025): Gender difference in rumination subtypes connecting to depression

The higher prevalence of depression in women compared to men may be due to women's greater tendency to ruminate. However, there is limited evidence on which rumination symptoms are most strongly associated with depression in women. According to the network theory of mental disorders, understanding the complex interaction between different subtypes of rumination and depressive symptoms is challenging. This study

employed network analysis to examine the connections between different subtypes of rumination and depressive symptoms across gender groups, exploring gender differences in rumination-depression networks. A total of 798 Chinese university students (50.5% males, 49.5% females) completed the Rumination Response Scale (RRS) and the Beck Depression Inventory-Second Edition (BDI-II) via an online survey platform. The networks were constructed and analyzed using scale dimensions as nodes.

The results showed that the Brooding and Negative attitude nodes had the highest BEI values in the female group, while the Reflection and Negative attitude nodes had the highest BEI values in the male group. The findings indicated that males and females in the rumination-depression network had distinct rumination bridge nodes (male: Reflection; female: Brooding) but shared a common depression bridge node (Negative attitude). The connection between different types of rumination and depressive symptoms was more pronounced in the female network, providing insights into gender differences in the co-occurrence of rumination and depression and highlighting specific subtypes for targeted intervention in rumination.

Parwinder Singh and Navneet Mishra (2023): Rumination Moderates the Association between Neuroticism, Anxiety and Depressive Symptoms in Indian Women

The higher prevalence of depressive symptoms among women necessitates a comprehensive investigation of potential mechanisms through which these symptoms may arise. Identifying modifiable factors could provide new avenues for targeted interventions. This study explored the relationships between neuroticism, rumination, anxiety, and depressive symptoms, and tested a moderated mediation model with anxiety acting as a mediator between neuroticism and depressive symptoms, and rumination acting as a moderator of the neuroticism-anxiety relationship. Conducted on 671 adult women residing in Punjab, India, participants completed translated versions of standardized questionnaires assessing neuroticism, rumination, anxiety, and depressive symptoms. The mean age of the sample was 23.71 years. The results indicated that anxiety significantly mediated the relationship between neuroticism and depression, while rumination moderated the effect of neuroticism on anxiety. Women with high neuroticism but low rumination tendencies exhibited lower levels of anxiety and depression compared to those with high rumination tendencies.

These findings suggest that reducing rumination may help women, especially those with high neuroticism, manage their susceptibility to anxiety and depressive symptoms. Since personality traits are relatively stable, targeting the reduction of rumination, which is both trans-diagnostic and modifiable, could effectively address the rising prevalence of common mental disorders such as anxiety and depression through well-designed interventions.

Yasemin Hosgoren and Jamal Hsanli (2023): Effect of Gender on the Relationship Between Ruminative Thinking and Depressive Symptoms

Rumination involves passively and repeatedly dealing with one's own feelings and thoughts, and it comes in two forms: reflection and brooding. Rumination creates a conducive environment for various mental disorders, especially depression. Women are reported to have a higher incidence of depressive symptoms than men, and it has been suggested that the frequency and severity of depression may be increasing due to higher rumination levels in women. Research has often focused on brooding as a single type of rumination. Reflection, generally viewed as a positive coping style linked to problem-solving, has shown inconsistent results in its impact on depression. Our study aimed to examine the effect of gender on depression by separately considering reflection and brooding, rather than evaluating rumination solely through brooding.

We invited 227 university students to participate, and 196 agreed. Participants completed a sociodemographic form, the Ruminative Responses Scale, and the Patient Health Questionnaire (PHQ- 9). The data were analyzed using correlation analyses and linear regression. Brooding and reflection scores were positively correlated with PHQ-9 scores. Women scored higher on both brooding and reflection scales compared to men. Although women had higher PHQ-9 scores than men, this difference was not statistically significant. Linear regression analyses revealed that brooding and reflection scores significantly predicted PHQ-9 scores. Women exhibit higher depressive symptoms and are more ruminative, but only ruminative thinking (both brooding and reflection) can predict depressive symptoms. Therefore, interventions targeting both brooding and maladaptive reflection are recommended to treat major depression.

Yusuke Umegaki and Naoki Yoshinaga and Osamu Kobori (2024): Examination of Cross- National and Gender Differences in Rumination and Its Association with Depression: A Cross- Sectional Comparison Between Residents of the United Kingdom and Japan

Rumination often results in maladaptive outcomes, and some studies highlight cross-national differences in the extent to which people ruminate and its consequences. This study aimed to measure the disparities in rumination between European (United Kingdom) and East Asian (Japan) countries and compare its relationship with depression. Gender differences were also explored. An online questionnaire survey targeting residents aged 20 to 69 years was conducted in July 2022. Data from 3,551 participants (UK: 1,891; Japan: 1,660) were statistically analyzed using 2×2 multivariate analysis of variance and moderation analyses. The results indicated that UK residents had a greater tendency to ruminate than those in Japan. The association between rumination and depression was more pronounced in the UK. In both countries, females exhibited a higher tendency to ruminate. A strong link between rumination and concurrent depression was found in both the UK and Japan. The study discusses the implications of these findings and suggests directions for future research.

Dorthe Kirkegaard Thomsen, Mimi Yung Mehlsen and Søren Christensen (2003): Rumination—relationship with negative mood and sleep quality

Rumination is connected to various negative emotions, such as depression, anxiety, and anger. However, due to the interrelated nature of these emotions, it is unclear whether rumination is independently associated with each of them. Previous research has indicated a relationship between rumination and poor sleep quality or sleep disturbances, as well as between negative emotions and sleep disturbances. Yet, because of the link between rumination and negative emotions, it is challenging to determine if both are independently associated with sleep quality. The aims of this study were to explore how rumination is related to different negative moods and to examine whether rumination and negative mood are independently associated with subjective sleep quality at a non- clinical level. The study involved 126 students who completed questionnaires assessing rumination, mood, and sleep quality. The findings revealed that rumination was independently associated with both angry and depressive moods. There were significant associations between rumination, negative mood, and subjective sleep quality. Even after accounting for negative mood, rumination was still found to be significantly associated with subjective sleep quality.

Danica C Slavish and Jennifer E Graham (2014): Rumination Mediates the Relationships between Depressed Mood and both Sleep Quality and Self-Reported Health in Young Adults

The exact psychological mechanisms through which a depressed mood can lead to impaired sleep and poorer

overall health are not well understood. This study aimed to investigate how rumination contributes to the associations between depressed mood, sleep quality, and self-reported health in 165 healthy young adults. Self-reported measures of anxiety, depressed mood, rumination, sleep quality, and general health were collected at two different points in time, approximately two months apart. Using structural equation modelling, the study found that rumination, measured at the earlier time point, mediated the relationships between depressed mood and both sleep quality and health at the later time point. The model fit the data well, $\chi^2 (50, N = 165) = 103.08, p < .001$; RMSEA = .08 (.06 – .10), TLI = .91, CFI = .94. The results were consistent whether or not anxiety was controlled. These findings suggest that rumination may serve as a psychological mechanism by which negative mood leads to impaired sleep and poorer perceived health.

Adam J. Guastella and Michelle L. Moulds (2007): The impact of rumination on sleep quality following a stressful life event

This study explored the relationship between rumination and sleep quality by examining the effects of pre-sleep rumination about a negative event on self-reported sleep quality. After experiencing a stressful event (a mid-session exam), undergraduate students with high ($N = 59$) and low ($N = 55$) tendencies to ruminate were assigned to either a pre-sleep rumination or distraction condition. Participants provided ratings of their pre-sleep intrusive thoughts about the exam and their sleep quality. As expected, high-trait ruminators reported more pre-sleep intrusive thoughts and poorer sleep quality. The findings showed that instructions to ruminate had a particularly harmful impact on sleep quality for high-trait ruminators compared to low-trait ruminators. The results suggest that rumination during the pre-sleep period following a stressful event negatively affects sleep quality for individuals with a tendency to ruminate. Future research should investigate the interaction between rumination and stressful life events.

Hui Yu, Zhanbiao Shi and Mei Zhao (2024): The Relationship between Metacognition, Rumination, and Sleep in University Students with a Tendency toward Generalized Anxiety Disorder

People with generalized anxiety disorder (GAD) often experience sleep problems, and studies have shown correlations between metacognition, rumination, and sleep. However, the interaction between metacognition and rumination in individuals with a tendency toward GAD remains unclear. This study aims to investigate the relationships between metacognition, rumination, and sleep in university students prone to GAD and to explore the mediating role of rumination in the effect of metacognition on sleep.

Using the Generalized Anxiety Disorder Scale (GAD-7), Meta-Cognition Questionnaire (MCQ-30), Ruminative Responses Scale (RRS), and Insomnia Severity Index (ISI), 566 university students at Anyang Normal College were surveyed. Correlation analysis revealed significant positive correlations among metacognition, sleep, and ruminative thinking in students with a tendency toward GAD. Mediation analysis indicated that rumination partially mediated the effect of metacognition on sleep, with the mediating effect accounting for 51.1% of the total effect. In conclusion, there is a strong correlation between metacognition, rumination, and sleep in university students with a tendency toward GAD. Both metacognition and rumination can predict sleep quality, with metacognition affecting sleep through the mediating role of rumination.

Lucy Bryan and Dr. Audrey Wells (2024): How Is Sleep Different for Men and Women?

Research indicates that sleep needs and patterns differ between men and women. Generally, adults are recommended to get at least seven hours of sleep per night, with females tending to sleep slightly more than

males by about 11 minutes on average. Biological and social influences play a role in these differences. For instance, males tend to fall asleep faster but spend more time in lighter sleep stages (Stages 1 and 2), whereas females experience more deep sleep and longer stretches of deep sleep, which decrease further in males as they age. REM sleep duration tends to be longer in males, although older females may have more REM sleep than older males. Circadian rhythms also differ, with females experiencing the urge to sleep earlier and stronger melatonin influxes, while males are more likely to be "night owls." Hormonal fluctuations during menstruation, pregnancy, breastfeeding, and menopause can disrupt sleep for females, increasing the likelihood of sleep disorders. Poor sleep in males can lead to low testosterone levels, affecting mood and sex drive.

Both obesity and chronic pain, which are more prevalent in males and females respectively, can interfere with sleep.

Mental health issues such as depression and anxiety, more common in females, also impact sleep quality, highlighting the complex interplay between biological, social, and psychological factors in sleep differences between genders.

Michael J. Breus, and Jennifer Soong (2010): How Sleep Loss Affects Women More Than Men

Recent research highlights the significant health risks that women face due to sleepless nights compared to men. A study conducted by Duke University Medical Center found that women with poor sleep are at an elevated risk for heart disease, type 2 diabetes, and depression, possibly due to hormonal differences. According to a 2007 survey by the National Sleep Foundation, two-thirds of women reported sleep problems several nights a week, which can negatively impact health and potentially shorten life spans. Women with poor sleep have higher levels of markers linked to high blood pressure and heart disease, impaired glucose tolerance, and increased risk of type 2 diabetes.

They also experience increased appetite and weight gain, with those having sleep issues being more overweight than men with similar problems. Additionally, sleep deprivation in women is associated with impaired thinking, memory, and greater feelings of anger, hostility, and depression. This review underscores the importance of addressing sleep issues to improve overall well-being, particularly for women.

Ahmad Mamoun Rajab Tawfik Mamoun Rajab (2021): Gender Differences in Sleep and Mental Health among Saudi Adolescents In adolescents, mental health issues such as stress and depressive symptoms negatively impact sleep. This study investigated whether the association between mental health and sleep varied between genders among Saudi adolescents. A total of 2206 school students (grades 7-12) from 40 randomly selected schools in four cities of Al-Qassim province in Saudi Arabia participated in this cross-sectional study. The survey included assessments of demographics, lifestyle, sleep (12-item Medical Outcomes Study Sleep Scale), depression (Depression, Anxiety, Stress Scale (DASS-21)), and stress (10-item Perceived Stress Scale). Adjusted associations with sleep were tested using linear and logistic regressions. Among the sample, 55% were girls, and their average sleep score was lower than that of the boys (58.7 vs. 63.4, $p < 0.001$). Girls exhibited worse mental health than boys; the proportion of girls with both severe stress and severe depressive symptoms was three times higher than that of the boys (12% vs. 4%, $p < 0.001$). Both boys and girls with severe depressive symptoms only, or with both severe depressive symptoms and severe stress, had significantly lower sleep scores compared to those without these conditions (reference group). Among those with severe stress only, the sleep score was significantly lower for girls ($p = 0.002$) than for boys ($p = 0.19$).

Overall, girls had significantly lower sleep scores and worse mental health than boys. The association between mental health and sleep varied significantly between genders. Severe stress was negatively associated with sleep in girls but not in boys.

Manish Rawat, Dr. Smriti Sethi (2024): Impact of Affect and Rumination on Quality of Sleep in Youth

Rumination is characterized by persistent, repetitive, and depressive thinking that typically occurs in response to a negative state of mind. This inclination involves recurring, uncontrollable, and intrusive thoughts. Research has demonstrated a connection between rumination and negative affect, indicating that these cognitive patterns can further exacerbate psychological problems in an individual's life. Rumination and affect (emotions) are integral aspects of daily life, particularly among the youth. The objective of the current research is threefold: to study the relationship between Rumination and Quality of Sleep, to study the relationship between Affect and Quality of Sleep, and to examine gender differences in rumination, affect, and quality of sleep. This research employed the Rumination Response Scale, the Positive and Negative Affect Schedule (PANAS), and the Pittsburgh Sleep Quality Index to assess the variables. The sample consisted of 200 participants, equally divided into 100 females and 100 males, with an age range of 18 to 25 years.

The results indicated a significant relationship between Rumination and Quality of Sleep. Similarly, a significant relationship was found between negative Affect and Quality of Sleep. However, there was no significant gender difference in the variables of Affect, Rumination, and Quality of Sleep.

Marcus O. Harrington and Jennifer E. Ashton (2020): Losing Control: Sleep Deprivation Impairs the Suppression of Unwanted Thoughts

Unwanted memories frequently surface in conscious awareness when individuals encounter reminders. The ability to suppress these memory intrusions varies widely among people; however, the factors influencing this ability are not well understood. We hypothesized that successful memory control relies on sleep. After either an overnight sleep or total sleep deprivation, participants attempted to suppress intrusions of emotionally negative and neutral scenes when exposed to reminders. The sleep-deprived group experienced significantly more intrusions (unsuccessful suppressions) than the sleep group.

Deficient control over intrusive thoughts had notable consequences: while rested participants experienced reduced behavioral and psychophysiological indices of negative affect through suppression, sleep-deprived participants did not benefit in the same way. Our findings suggest that sleep deprivation disrupts prefrontal control over medial temporal lobe structures that support memory and emotion. These results highlight the critical role of sleep disturbance in perpetuating and exacerbating psychiatric conditions characterized by persistent, unwanted thoughts.

Gurjeet Kaur (2018): A Study on the Sleep Quality of Indian College Students

The quality of sleep significantly affects an individual's physical and psychological health. Poor sleep quality deteriorates the academic and cognitive performance of college students. The objective of this study was to assess the quality of sleep and its determinants. The study was conducted among 1215 undergraduate students using the Pittsburgh Sleep Quality Index (PSQI) and a sociodemographic survey.

Approximately one third (33.8%) of the study participants had poor sleep quality, with a higher prevalence observed in female college students (χ^2 test, $p = 0.001$, OR 1.514). The study reported a probable relationship

between poor sleep quality and factors such as female gender, physical inactivity, smoking, and caffeine/tea intake. The prevalence of poor sleep quality was significantly associated with female sex. However, no significant association was observed between stream of study, year of study, and the prevalence of poor sleep quality. There was a statistically significant difference in the prevalence of poor sleep quality between males and females (χ^2 test, $p = 0.001$), with females having 1.514 times higher odds of experiencing poor sleep quality.

Lisa K. Tamres, Denise Janicki, and Vicki S. Helgeson (2002): Sex Differences in Coping Behavior: A Meta-Analytic Review and an Examination of Relative Coping Using meta-analysis, we examined recent studies on sex differences in coping strategies.

Women were more likely than men to engage in most coping strategies. The most prominent effects indicated that women were more inclined to use strategies involving verbal expressions, such as seeking emotional support, ruminating about problems, and engaging in positive self-talk. These sex differences were consistent across studies, supporting the dispositional level hypothesis. Other sex differences depended on the nature of the stressor, aligning with role constraint theory. We also explored whether stressor appraisal (i.e., women's tendency to appraise stressors as more severe) accounted for sex differences in coping. Some support for this idea was found. To address this issue, we provided data on relative coping, demonstrating that sex differences in relative coping align more closely with our intuitions about how men and women cope with distress.

Women were also significantly more likely than men to engage in two coping strategies that were ambiguous in terms of problem-focused or emotion-focused distinctions: seeking nonspecific social support and using religion. No sex differences were observed in denial, isolation, venting, or self-blame. Although there were significant sex differences for 11 of the 17 coping strategies (all favoring women), the effect sizes were quite small. Only three effect sizes exceeded -0.15: seeking social support for emotional reasons, rumination, and positive self-talk.

3. Methodology

Aim

The aim of this study is to investigate gender differences in sleep deprivation and ruminating thoughts among men and women undergraduate arts and science students, and to examine the correlation between sleep deprivation and ruminating thoughts.

Objective

To analyze the prevalence of sleep deprivation and ruminating thoughts among undergraduate arts and science college students.

To study the correlation between sleep deprivation and ruminating thoughts among undergraduate arts and science college students.

Hypothesis

H 1: There would be a significant difference in Sleep deprivation among men and women undergraduate

arts and science college students.

H 2: There would be a significant difference in rumination among men and women undergraduate arts and science college students.

H3: There would be a significant positive relationship between sleep deprivation and rumination.

Research Design

The present study employs mixed method research design with quantitative and qualitative analysis. The design includes gender comparison and variable correlation. It aimed to analyze the relationship between sleep deprivation and ruminating thoughts considering the gender differences among arts and science undergraduate students using standardized tools. Convenience sampling techniques were used to collect samples.

Operational Definitions

Sleep Deprivation

Sleep deprivation is getting less than 7–9 hours of sleep per day (Pittsburgh University,1989).

Rumination

Rumination or repetitive negative thinking (RNT) is defined as a style of thinking about one's problems or negative experiences with three key characteristics: the thinking is repetitive, it is at least partly intrusive, and it is difficult to disengage from. Two additional features of RNT are that individuals perceive it as unproductive and it captures mental capacity.

Emerging Adulthood

A developmental stage that is neither adolescence nor young adulthood but is theoretically and empirically distinct from them both, spanning the late teens through the twenties, with a focus on ages 18 to 25. Emerging adulthood is distinguished by relative independence from social roles and from normative expectations. Having left the dependency of childhood and adolescence, and having not yet taken on the responsibilities that are normative in adulthood, emerging adults engage in identity exploration, a process of trying out various life possibilities (e.g., in love, work, and worldviews) and gradually moving toward making enduring decisions. During this period, individuals have the highest rates of residential instability (change) of any age group and see themselves neither as adolescents nor entirely as adults. [proposed in 2000 by U.S. developmental psychologist Jeffrey Jensen Arnett]

Variables

Independent Variable: Genders (Male and Female), sleep deprivation

Dependent Variable: Ruminating thoughts, level of sleep deprivation

Control Variables: Age, academic year, stress level, lifestyle factors (e.g., substance abuse, use of technology etc.).

Materials

Sociodemographic details

Sociodemographic details included variables such as initials, age, gender, educational qualification, marital status, religion, occupation (if any), area of residence, family income, and medications (if taken) is crucial for providing a comprehensive view of participants' backgrounds. These factors help in understanding the influence of different demographic elements on sleep patterns and ruminating thoughts. Age and gender are particularly relevant for analyzing differences in sleep deprivation and rumination. Educational qualification, marital status, and occupation offer insights into stress levels and additional responsibilities. Religion and area of residence provide context for cultural practices and living conditions that might affect sleep quality. Family income highlights socioeconomic status, which can impact stress and access to resources, while information on medications helps control for external influences on sleep and mental health.

Pittsburgh Sleep Quality Index:

The Pittsburgh Sleep Quality Index (PSQI) evaluates overall sleep quality, particularly in clinical populations with psychiatric disorders. It includes 19 self-reported items divided into seven categories: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Additionally, five questions assessed by the respondent's roommate or bed partner are included for clinical purposes but are not scored. Initial psychometric analysis involved individuals aged 24-83 years, and the PSQI has been validated in various clinical groups such as those with major depressive disorder, sleep initiation and maintenance disorders, excessive somnolence, cancer, and fibromyalgia. This self-report tool takes approximately 5 to 10 minutes to complete.

The PSQI has demonstrated good reliability and validity, with an internal reliability of $\alpha = .83$, a test-retest reliability of .85, a sensitivity of 89.6%, and a specificity of 86.5%. Responses range from 0 to 3 for each item, with higher scores indicating more severe sleep disturbances. A global score cutoff of 5 has been suggested, correctly identifying 88.5% of the patient group in the validation study.

Perseverative Thinking Questionnaire

The Perseverative Thinking Questionnaire (PTQ), a content-independent self-report measure of repetitive negative thinking (RNT), was utilized to evaluate RNT in my study. The PTQ is a 15-item questionnaire validated through two studies with a total of 1,832 participants, encompassing both non-clinical and clinical groups. Confirmatory factor analyses supported a second-order model with one higher-order factor representing RNT in general and three lower-order factors representing the core characteristics of RNT (repetitiveness, intrusiveness, and difficulties with disengagement), perceived unproductiveness of RNT, and RNT capturing mental capacity.

The PTQ demonstrated high internal consistencies and retest reliability for the total scale and all three subscales. Its validity was supported by substantial correlations with existing measures of RNT and associations with symptom levels and clinical diagnoses of depression and anxiety. These results suggest that the PTQ is a useful tool for researching RNT as a transdiagnostic process and was therefore appropriate for assessing repetitive negative thinking in my study on sleep deprivation and ruminating thoughts among college students.

Sampling

The aim of this study is to investigate gender differences in sleep deprivation and ruminating thoughts among men and women undergraduate arts and science students, and to examine the correlation between sleep deprivation and ruminating thoughts. The sample consists of 142 college students aged 18-25 years old, studying various streams including science, arts, management and other disciplines. This diverse group includes both men and women participants, providing a comprehensive view of the relationship between sleep patterns and ruminating thoughts across different genders.

Inclusion Criteria

Participants must be undergraduate arts and science students. Participants must be undergraduate arts and science students aged 18-25. Participants must be able to read and write English.

Exclusion Criteria

Participants who did not give consent for the study.

Participants who have been diagnosed with psychiatric or psychological disorders. Participants who are currently taking medication that affects sleep or cognition.

Participants who are not currently enrolled in undergraduate arts and science college.

Procedure

The aim of this study is to investigate gender differences in sleep deprivation and ruminating thoughts among men and women undergraduate arts and science students, and to examine the correlation between sleep deprivation and ruminating thoughts. The participants were young adults aged 18-25 years old, all of whom were college students studying various streams including science, arts, commerce, and other disciplines. The sample consisted of 142 participants, including both men and women students. Data collection was conducted using an offline mode. The researcher personally approached students, either individually or in groups, and provided instructions for completing the questionnaires. A convenience sampling technique was used to gather data.

The data collection instrument included a set of paper-based questionnaires consisting of the Informed Consent Form, Socio-Demographic Detail Sheet, Pittsburgh Sleep Quality Index (PSQI) and Perseverative Thinking Questionnaire (PTQ). The participants were asked to fill out these questionnaires, and the completed forms were collected by the researcher. After data collection, the responses were scored, coded, and analyzed to determine the correlation between sleep deprivation and ruminating thoughts, with a focus on gender differences among the participants.

Statistical Tool

The data was gathered and scored following the respective norms for the scale used in this study. The compiled data was processed in Excel and subsequently exported to SPSS (Statistical Package for the Social Sciences) Statistics 22 for analysis. Kolmogorov-Smirnov was conducted to determine if the data followed a normal distribution. Hypothesis testing was performed using the independent sample t-test.

Significance and Scope of the Study

The significance of this study lies in its ability to deepen our understanding of the relationship between sleep deprivation and ruminating thoughts, with a particular focus on gender differences among undergraduate arts and science students. By examining these aspects, the study aims to highlight how sleep quality affects mental health and cognitive processes in young adults during a crucial period of their development. The study encompasses a diverse sample of 142 college students aged 18-25 years, representing various academic disciplines such as science, arts, and commerce.

The data collection was conducted offline, with the researcher personally engaging with the students and providing instructions for completing validated questionnaires like the Pittsburgh Sleep Quality Index (PSQI) and the Perseverative Thinking Questionnaire (PTQ). The results are expected to offer valuable insights into the connection between sleep patterns and cognitive processes, ultimately guiding interventions and strategies to enhance mental health and well-being among college students

4. Analysis and discussion

The aim of this study is to investigate gender differences in sleep deprivation and ruminating thoughts among men and women undergraduate arts and science students, and to examine the correlation between sleep deprivation and ruminating thoughts. The researcher collected samples from various colleges across Idukki and Ernakulam districts in Kerala. The total sample size consisted of 142 individuals, divided equally with 71 women and 71 men, all of whom were single. The participants were young adults from the general population, ranging in age from 18 to 25. Data collection was carried out through both online and offline methods.

The researcher gathered data through offline questionnaires. This chapter centers on analyzing the responses collected from the participants, which will aid in further understanding the data. The aim of this study is to investigate gender differences in sleep deprivation and ruminating thoughts among men and women undergraduate arts and science students, and to examine the correlation between sleep deprivation and ruminating thoughts. To gather the data, a convenience sampling technique was employed. The data was then analyzed using the Statistical Package for the Social Sciences (SPSS). The t-test was conducted to compare sleep deprivation and ruminating thoughts between men and women.

Table 1: Show the distribution of gender in the study

Gender	Number of Participants	Percentage of Participants
Women	71	50%
Men	71	50%
Total	142	100%

Figure 1: Depiction of distribution of gender in the study

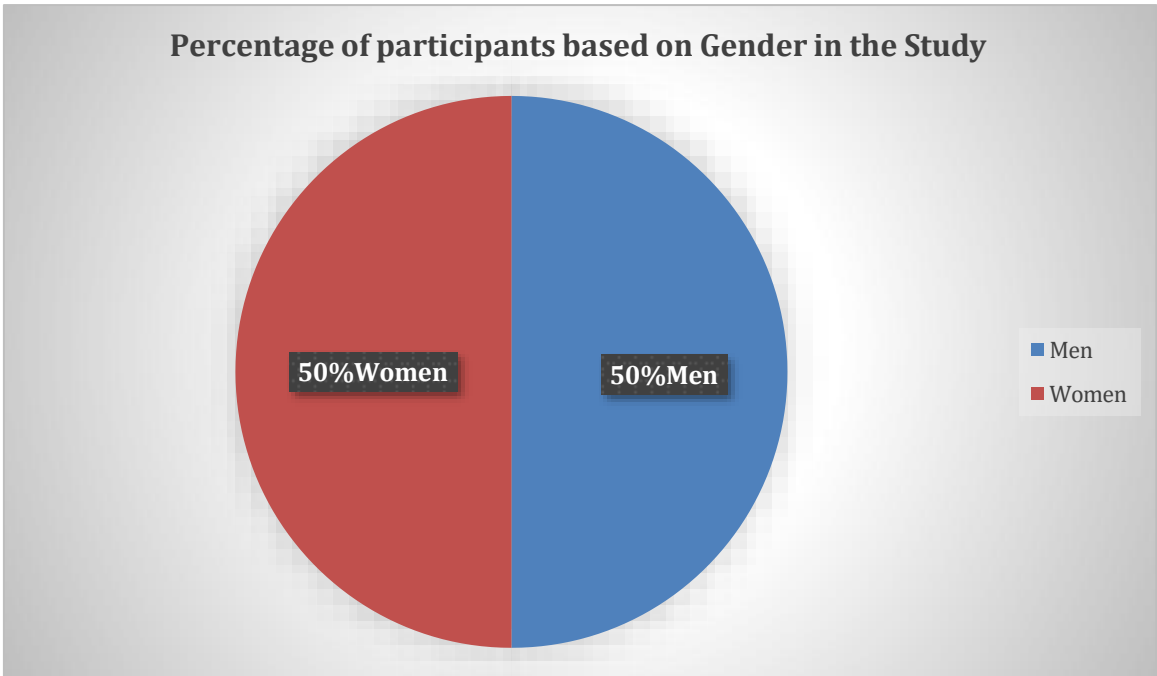


Table 1 and Graph 1 illustrate the participation of men and women in the study, with 71 men and 71 women. This demonstrates equal participation, with both men and women each comprising 50% of the total sample.

Table 2: Show the Distribution of Area of Residence among the Participants in the Study

Rural	Urban
92	50

Figure 2: Show the Distribution of Area of Residence among the Participants in the Study

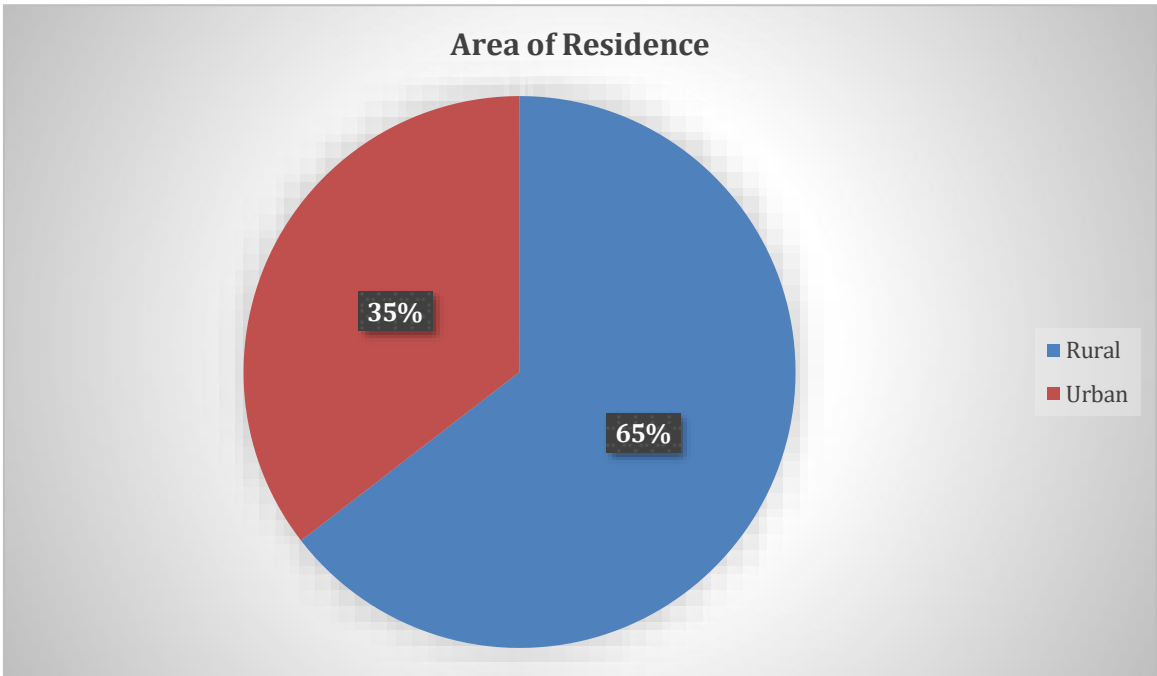


Table 2 and Graph 2 illustrate the distribution of participants' area of residence in the study. The study involves a total of 142 participants, with 92 individuals residing in rural areas and 50 individuals residing in urban areas. This demonstrates that a substantial majority (approximately 64.5%) of participants live in rural areas, while a minority (approximately 35.5%) live in urban areas.

Table 3: Show the Mean, Standard Deviation and t-score for Sleep Deprivation among Men and Women

Sleep Deprivation	N	Mean	S.D	t table
Women	71	5.89	3.040	.011*
Men	71	4.72	2.306	

* Significant at 0.01 Level

** Significant at 0.05 Level

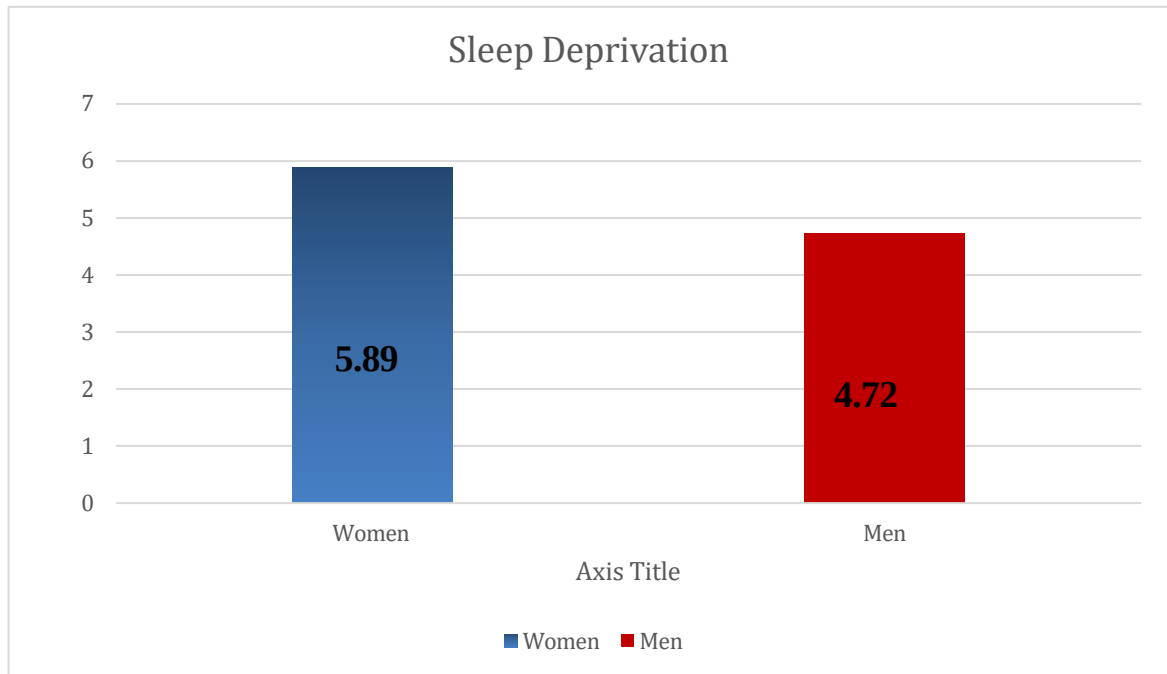


Figure: 3: Show the mean score of Sleep Deprivation among Men and Women

Table 3 presents the Mean, Standard Deviation, and t-score for sleep deprivation among men and women. The sample size for each gender was 71, making a total of 142 participants. The mean score for women was 5.89 with a Standard Deviation of 3.040. For men, the mean score was 4.72 with a Standard Deviation of 2.306. The t-value for sleep deprivation is 0.11, which is significant at the

0.01 level. This indicates that the hypothesis stating "There would be a significant difference in Sleep deprivation among men and women undergraduate arts and science college students" has been proven. Figure 3 illustrates the mean scores for sleep deprivation levels among females and males. The mean score for women is 5.89, represented by the blue bar, while the mean score for men is 4.72, represented by the red bar.

Table 4: Show the Mean, Standard Deviation and t-score for Rumination among Men and Women

Rumination	N	Mean	S. D	t table
Women	71	29.35	12.244	.038*
Men	71	24.89	13.172	

Note:

* Significant at 0.01 Level

** Significant at 0.05 Level

Figure 4: Show the mean score of Rumination among Men and Women

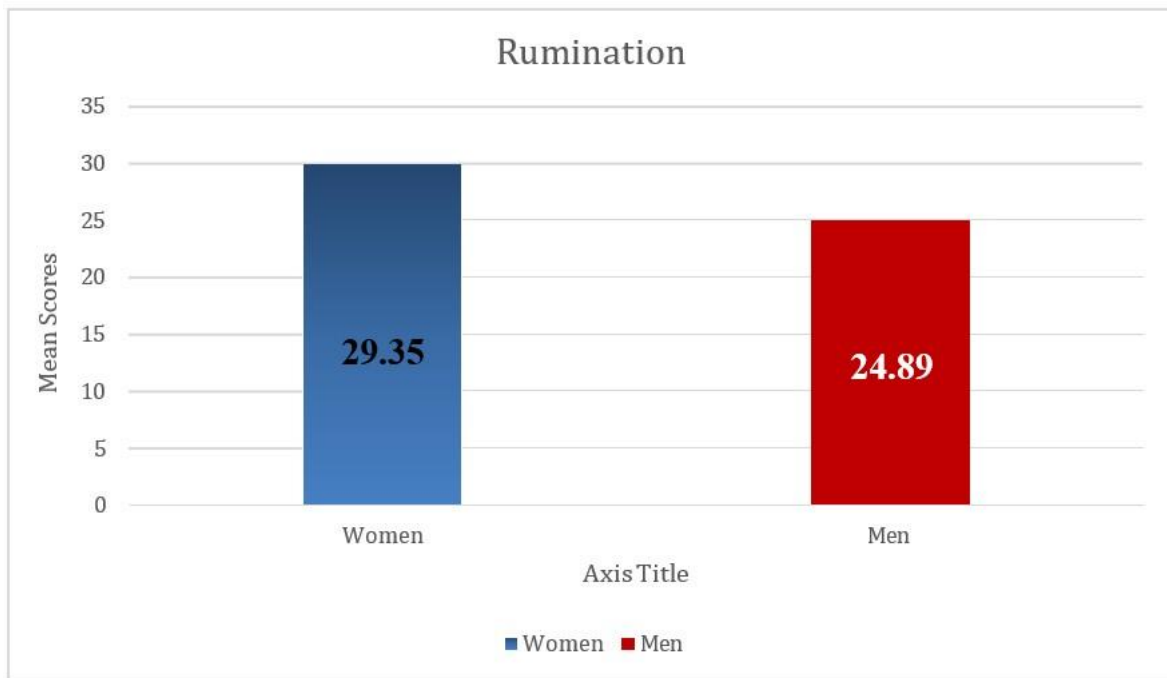


Table 4 presents the Mean, Standard Deviation and t-score for rumination among men and women. The mean score for women was 29.35 with a Standard Deviation of 12.244. For men, the mean score was 24.89 with a Standard Deviation of 13.172. The t-value for rumination is 0.38, which is significant at the 0.01 level. This indicates that the hypothesis stating "There would be a significant difference in rumination among men and women undergraduate arts and science college students" has been proven. Figure 4 illustrates the mean scores for rumination among men and women. The mean score for women is 29.35, represented by the blue bar, while the mean score for men is 24.89, represented by the red bar.

Table 5: Show the Pearson Correlation Coefficient Between Sleep Deprivation and Rumination

Variable	N	1	2
Sleep Deprivation	142		.369**
Rumination	142	.369**	

Note: **Correlation is significant at the 0.01 level (2 tailed)

Table 5 shows the correlation between sleep deprivation and rumination among men and women. The Pearson's correlation coefficient (r) between sleep deprivation and rumination is 0.369, which indicates a moderate positive correlation. This correlation is significant at the 0.01 level ($p < 0.01$). These values suggest that as sleep deprivation increases, rumination also increases.. This indicates that the hypothesis stating "There would be a significant positive relationship between sleep deprivation and rumination" the hypothesis

was supported.

Discussion

H1: There would be a significant difference in Sleep deprivation among men and women undergraduate arts and science college students. From the participants' responses, there appears to be a difference in sleep deprivation between men and women. The scores indicate that women experience higher sleep deprivation than men. These findings align with previous studies, such as Kaur, G. (2018), which reported that female college students generally report higher sleep deprivation than male college students.

The increased prevalence of poor sleep quality among women may be attributed to their unique hormonal and physiological makeup. Sex differences in sleep begin at an early age, with women typically reporting poorer sleep quality. Various life stages in women involve significant physiological and hormonal changes that disrupt normal sleep patterns, thereby increasing the risk of sleep disturbances. The menstrual cycle and other hormonal changes significantly affect women's sleep patterns. For instance, menstrual cycle fluctuations impact the sleep cycle, with women experiencing severe premenstrual syndrome reporting a decline in subjective sleep quality. During the luteal phase, there is a notable increase in sleep onset latency and a decrease in both sleep efficiency and quality.

H2: There would be a significant difference in rumination among men and women undergraduate arts and science college students. According to the responses of the participants, there is a significant difference in rumination among men and women college students. The data collected indicate that women have higher rumination compared to men. These results are consistent with qualitative reviews of the rumination literature. Women are more prone to rumination than men (Tamres et al. 2002).

Studies have shown that women tend to ruminate and focus on themselves more when dealing with various problems, while men are more likely to use problem-solving approaches (Broderick, 1998). Nolen-Hoeksema suggested that women are more attuned to risks and environmental factors because they experience more adverse and uncontrollable events compared to men (Nolen-Hoeksema, 2001).

The previous studies suggest that sex hormones like estradiol and progesterone play an important role in emotion regulation for women. As these hormones fluctuate throughout the menstrual cycle, they may influence women's tendency to ruminate and the impact of rumination on their emotions. The researchers found that higher estradiol levels are associated with increased rumination, potentially explaining why women ruminate more than men. The negative effect of rumination on mood was observed only in women with lower estradiol levels, suggesting that fluctuations in estradiol may affect psychiatric symptom severity.

H3: There would be a significant positive relationship between sleep deprivation and rumination. In this study there is a significant positive relationship between sleep deprivation and rumination which align with the existing review of literature (Thomsen, D, K. Mehlsen, M, Y. et.al., (2003)).

College students, facing unique stressors and having less emotional regulation compared to older adults, may be particularly vulnerable to health issues caused by rumination. Research indicates that repetitive thoughts, similar to tasks requiring significant cognitive effort, can impair sleep onset by occupying attentional resources. Studies have shown that induced rumination reduces performance on effortful tasks like random number generation. Therefore, it is plausible that repetitive thoughts might prevent the automatic process of falling asleep.

Summary of the Study

This study, titled "Lost Sleep, Lost Minds: A Comparative Study of Sleep Deprivation, Ruminative Thoughts, and Gender Differences among College Students," delves into the widespread challenges of sleep deprivation and rumination among undergraduate students pursuing arts and science. By involving 142 students aged 18-25 from various disciplines, the research sheds light on how these issues disproportionately affect women, who report higher levels of both sleep deprivation and ruminative thoughts compared to their male counterparts. Furthermore, the study highlights a notable positive correlation between sleep deprivation and rumination, emphasizing the interconnected nature of these struggles. Drawing on possible hormonal and physiological explanations for these gender disparities, the research offers a nuanced understanding of how sleep and thought patterns differ between genders and their broader implications.

Implication

The research titled "Lost Sleep, Lost Minds: A Comparative Study of Sleep Deprivation, Ruminative Thoughts, and Gender Differences among College Students" aimed to analyze the prevalence of sleep deprivation and ruminating thoughts among undergraduate arts and science college students.

The objectives of the study were to examine differences in prevalence between men and women students, to study the correlation between sleep deprivation and ruminating thoughts, and to identify any gender differences in this correlation. The study's sample size consisted of 142 students, with an equal number of 71 men and 71 women. The findings indicate a significant difference in sleep deprivation and rumination between men and women, with women undergraduate arts and science students experiencing more sleep deprivation and rumination than their men counterparts.

Additionally, a positive correlation between sleep deprivation and rumination was found.

These findings highlight the urgent need for targeted interventions to address sleep deprivation and its associated mental health concerns, particularly among women students. Future research should focus on developing gender-specific strategies and support systems to mitigate the negative impact of sleep deprivation and ruminative thoughts on students' academic performance and overall well-being. Additionally, integrating sleep hygiene education into college curriculum and fostering mental health awareness can create a more nurturing and supportive academic environment.

Limitations

Despite the valuable insights provided by this study, there are several limitations that must be acknowledged. The study is limited by the following constraints:

1. The study relies on self-reported data from participants, which can be prone to bias, inaccuracies, or exaggerations. Students may not accurately recall or honestly report their sleep patterns and ruminative thoughts.
2. The study focuses solely on undergraduate arts and science college students, which may not capture the experiences of students from other academic disciplines or education levels.
3. The study may not account for cultural, environmental or lifestyle factors that could influence sleep patterns and ruminative thoughts. These factors might differ significantly in other regions or among different demographic groups.

4. The selection of scales, Pittsburgh Sleep Quality Scale (1989) and Perseverative Thinking Questionnaire (2015) may have influenced the results of this study, as their development dates may not fully capture contemporary experiences and factors affecting sleep and rumination.
5. The study does not explore the long-term consequences of sleep deprivation and rumination on students' mental health, academic performance, and overall quality of life.
6. The study does not examine the effectiveness of existing interventions or coping mechanisms that students might be using to manage sleep deprivation and rumination.

Suggestions for Further Research

To build on the findings of this study, future research could explore the long-term impact of sleep deprivation and ruminative thoughts on students' mental health, academic performance, and overall quality of life through longitudinal studies. Furthermore, examining the effectiveness of existing interventions and coping mechanisms over time could yield valuable insights. Broadening the research to encompass students from diverse academic disciplines and education levels would offer a more comprehensive perspective on sleep deprivation and rumination. Cross-cultural studies investigating the influence of cultural, environmental, and lifestyle factors on these issues could also provide context-specific interventions. It is essential to develop gender-specific strategies and support systems to address sleep deprivation and ruminative thoughts, as well as to study the role of psychosocial factors. Methodological enhancements, including mixed-methods approaches and updated scales, would improve the depth and accuracy of future research. These directions could significantly contribute to understanding and mitigating the negative effects of sleep deprivation and ruminative thoughts among college students.

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship and publication of this article.

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