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Exploring the Relationship Between Sleep Quality, Cognitive Health, and Resilience Among Young Adults

Shubham Raj[1], Dr Neelam Pandey[2]

[1]Student, Amity Institute of Psychology and Allied Sciences, Amity University, Noida
[2]Professor, Amity Institute of Psychology and Allied Sciences, Amity University, Noida

Abstract

This study examines the triadic relationship between sleep quality, cognitive health, and resilience in 176 young adults aged 18–30, using a quantitative correlational design. Data were collected with the Sleep Quality Scale (Shahid et al., 2012), Cognitive Assessment Questionnaire (Broadbent et al., 1982), and Brief Resilience Scale (Smith et al., 2008). The research investigates sleep quality's impact on cognitive functions (e.g., memory, attention) and resilience, alongside gender differences. Findings showed a positive correlation between sleep quality and cognitive health ($\rho = .368$, $p < .001$), but negative correlations between sleep quality and resilience ($\rho = -.245$, $p = .001$) and cognitive health and resilience ($\rho = -.305$, $p < .001$). Women exhibited better cognitive health ($t(71) = -2.343$, $p = .022$; $M = 48.64$ vs. 43.32) and sleep quality ($t(71) = -2.242$, $p = .028$; $M = 37.41$ vs. 41.49) than men, with no resilience differences ($t(71) = 0.341$, $p = .734$). These results suggest resilience relies on adaptive coping rather than sleep or cognitive health. Gender-tailored sleep and cognitive interventions, alongside universal resilience training, are recommended. The study offers novel insights into this triad, supporting holistic mental health strategies.

Keywords: cognitive health, correlational study, gender differences, mental well-being, resilience, sleep quality, young adults

1. Introduction

The interplay between sleep quality, cognitive health, and resilience is complex and reciprocal. Poor sleep negatively affects cognitive functions like memory, attention, and executive function by disrupting synaptic plasticity and diminishing activity in the prefrontal cortex, which is crucial for decision-making and emotional control (Kobilka et al., 2014). At the same time, lack of sleep increases reactivity in the amygdala, leading to heightened stress sensitivity and a decline in resilience, which is essential for coping with challenges. On the other hand, individuals with strong resilience tend to employ effective stress management techniques that can lessen the cognitive repercussions of inadequate sleep. For instance, resilient people may view sleep disturbances as temporary hurdles, allowing them to maintain cognitive performance even when rest is insufficient. This indicates that resilience plays a dual role in the relationship between sleep and cognition, helping to mitigate the adverse effects of sleep deprivation (Monat & Lazarus, 1985).

The purpose of this study is to understand a connection between Sleep quality, Cognitive Health, and Resilience Among Young Adults**.** Although awareness of these issues is increasing, the relationships among these factors are still not thoroughly investigated, especially in diverse populations with different cultural, socioeconomic, and environmental influences. This research paper aims to fill this gap by exploring the connections between sleep quality, cognitive health, and resilience, emphasizing how these interactions differ among individuals from various demographic and cultural settings.

The dedication of this study is to uncover the important components that lead to improve the quality of sleep which can further enhance our cognitive capabilities and Resilience, the results of this research could guide evidence-based approaches to enhance sleep quality, boost cognitive resilience, and promote psychological well-being among various populations, ultimately contributing to the pursuit of global health equity.

Theoretical Background

This study is anchored in three frameworks elucidating the triadic interplay. The Two-Process Model of Sleep Regulation (Borbély, 1982) posits that sleep is governed by homeostatic (Process S) and circadian (Process C) processes, explaining how poor sleep quality impairs cognitive functions like memory consolidation. Cognitive Load Theory (Sweller, 1988) suggests that poor sleep increases extraneous cognitive load, reducing attention and executive function. The Stress-Diathesis Model of Resilience (Masten, 2001) frames resilience as adaptive coping shaped by vulnerabilities and protective factors, potentially buffering sleep's cognitive impacts. These theories guide the exploration of sleep, cognitive health, and resilience, detailed below.

Sleep

Sleep is a fundamental biological process vital for physical health, mental function, and emotional stability (Del Giudice, 2014). It is a naturally occurring state marked by lowered consciousness and reduced reaction to external stimuli, accompanied by specific physiological and neurological alterations. Rather than being a passive experience, sleep is an active and dynamic phase that facilitates essential functions like memory consolidation, cellular repair, and emotional balance.

Sleep is governed by two main mechanisms: the circadian rhythm and the homeostatic sleep drive. The circadian rhythm, commonly known as the "biological clock," operates on a 24-hour cycle and is affected by external factors such as light and darkness, playing a crucial role in determining sleep timing (Munteanu et al., 2024). Conversely, the homeostatic sleep drive intensifies the body's need for sleep the longer a person stays awake, ensuring adequate rest is achieved.

Sleep quality

Sleep quality pertains to the effectiveness of an individual's sleep, including aspects such as the speed of falling asleep, duration of sleep, and the feeling of refreshment upon waking. It differs from sleep quantity, which simply measures the total hours of sleep, by emphasizing the restorative aspects of rest (Kleitman, 1987). Even if a person sleeps for enough hours, poor sleep quality can negatively impact physical health, cognitive abilities, and emotional stability. A comprehensive analysis of its components, measurement methods, influencing factors, and consequences is particularly significant for your research on cognitive health and Resilience.

Functions of Sleep

Restoration and Repair: During sleep, the body engages in vital restoration and repair activities, including tissue repair, muscle building, and immune system enhancement. The release of growth hormone, especially during deep sleep, plays a crucial role in facilitating physical recovery and growth.

Cognitive Function and Memory Consolidation: Sleep plays a crucial role in learning and memory. It allows the brain to process and solidify the information gathered throughout the day, moving it from short-term to long-term storage. Notably, REM sleep is linked to the assimilation of new information and the enhancement of problem-solving abilities (Walberg, 2010).

Emotional Regulation: Sleep is essential for emotional regulation and stress management. Insufficient sleep can increase emotional sensitivity, irritability, and hinder stress coping abilities. REM sleep is particularly important as it aids in processing emotional experiences, thereby enhancing Resilience.

Metabolic and Cardiovascular Health: Sleep plays a crucial role in regulating hormones that influence appetite and metabolism, including leptin and ghrelin. Prolonged lack of sleep has been associated with an increased risk of obesity, diabetes, and heart disease.

Brain Detoxification: Recent studies indicate that sleep aids in clearing waste from the brain via the glymphatic system, a mechanism that could play a role in preventing neurodegenerative disorders such as Alzheimer's (Landolt & Dijk, 2019).

Sleep Quality and Its Importance

Sleep quality indicates the effectiveness of an individual's rest, including aspects like duration, consistency, depth, and the lack of interruptions. When sleep quality is poor, often due to stress, noise, or conditions like insomnia and sleep apnea, it can severely impact health and overall well-being. Ongoing sleep deprivation or disturbances are associated with reduced cognitive function, mood issues, compromised immune response, and a heightened risk of chronic diseases.

Sleep Across the Lifespan

Sleep needs and patterns evolve as we age. Infants and young children need significantly more sleep to support their growth and development, whereas adults generally require 7-9 hours each night. In older adults, sleep architecture may shift, leading to lighter sleep and increased awakenings, which can impact the quality of their rest.

Cultural and Environmental Influences on Sleep

Cultural norms, societal expectations, and environmental conditions significantly affect sleep patterns. In certain cultures, daytime napping is widely accepted, whereas in others, it may carry a negative connotation. Additionally, socioeconomic elements like work hours, healthcare availability, and living environments play a crucial role in determining both the quality and length of sleep (Cappuccio et al., 2018).

Cognitive Health: The Foundation of Mental Functioning

Cognitive health encompasses the effective operation of mental processes such as memory, attention, language, problem-solving, decision-making, and executive functions like planning and organization. It plays a vital role in overall mental wellness and life quality, allowing individuals to carry out everyday activities, acquire new knowledge, and adjust to new situations. This aspect of health is dynamic,

changing throughout life and affected by numerous factors, including genetics, lifestyle choices, environmental influences, and both physical and mental health conditions (Liversage et al., 2023).

Components of Cognitive Health

Memory refers to the process of encoding, storing, and retrieving information. It is categorized into short-term memory, often called working memory, and long-term memory, which encompasses both declarative memory—relating to facts and events—and procedural memory, which pertains to skills and habits (Sanz & Leow, 2011).

Attention is the ability to concentrate on particular stimuli or tasks while disregarding distractions. Effective cognitive functioning relies on various types of attention, including sustained, selective, and divided attention. Executive function encompasses advanced cognitive processes that facilitate goal-oriented actions, such as planning, organizing, problem-solving, and self-regulation, primarily managed by the prefrontal cortex (Shamji, 2022).

Language encompasses the capacity to comprehend and generate both spoken and written forms, involving aspects like vocabulary, grammar, and understanding. Processing speed refers to how quickly a person can take in and react to information, with higher speeds linked to better cognitive efficiency. Visuospatial skills involve the ability to interpret, analyse, and handle visual and spatial data, including tasks like identifying faces, navigating maps, or putting together objects (Gathercole & Baddeley, 1993).

Factors Influencing Cognitive Health

Biological Factors: As individuals age, cognitive functions typically undergo changes, with some decline being a normal aspect of the aging process. However, significant deterioration may signal neurodegenerative diseases such as Alzheimer's or other types of dementia. Additionally, genetic factors can affect an individual's vulnerability to cognitive disorders and their cognitive resilience. Furthermore, the health of the brain, encompassing both its structural and functional integrity, is crucial for cognitive well-being, with neuroplasticity being a vital component that allows the brain to adapt and reorganize (Park & Schwarz, 2012).

Lifestyle Elements: Engaging in regular physical activity boosts cognitive abilities by increasing blood circulation to the brain, fostering the creation of new neurons, and lowering inflammation levels. A nutritious diet filled with antioxidants, omega-3 fatty acids, and vital vitamins and minerals is essential for optimal brain function (Essa & Qoronfleh, 2020). Adequate sleep plays a key role in consolidating memories, enhancing cognitive processing, and managing emotions. Additionally, participating in mentally stimulating tasks like reading, solving puzzles, or acquiring new skills can sustain and enhance cognitive performance.

Psychological and Emotional Influences: Chronic stress can hinder cognitive abilities, especially memory and executive functions, by impacting the hippocampus and prefrontal cortex (Crocker et al., 2013). Mental health issues such as depression and anxiety, along with ongoing stress, can detrimentally affect cognitive performance, whereas strong Resilience and emotional stability can improve cognitive health.

Environmental and Social Influences: Educational Attainment and Ongoing Learning: Attaining higher education and engaging in lifelong learning contribute to improved cognitive health and lower chances of cognitive deterioration. Social Relationships: Robust social networks and significant interpersonal connections enhance cognitive well-being by offering emotional backing and avenues for

mental engagement. Environmental Contaminants: Contact with pollutants, heavy metals, and various toxins can negatively impact cognitive abilities.

Cognitive Health Across the Lifespan

Cognitive abilities undergo significant changes across the lifespan, with distinct patterns in childhood, adulthood, and older adulthood. During childhood and adolescence, cognitive functions such as memory, attention, and executive function develop rapidly, laying the foundation for intellectual growth. In adulthood, these abilities typically peak in early adulthood and remain stable for decades, although subtle declines in processing speed and memory may emerge in middle age. In older adulthood, while some cognitive decline is a normal part of aging, maintaining an active and healthy lifestyle can help preserve cognitive function and reduce the risk of dementia, supporting overall brain health.

Cognitive Decline and Disorders

Cognitive decline encompasses a spectrum of issues, starting from mild cognitive impairment (MCI), where individuals experience noticeable yet non-disabling memory or thinking challenges, to more severe disorders such as dementia (Wang et al., 2023). Alzheimer's disease stands out as the leading cause of dementia, marked by a gradual deterioration in memory, confusion, and compromised reasoning abilities. Additional types of dementia include vascular dementia, Lewy body dementia, and frontotemporal dementia.

Resilience

Resilience is the capacity to adjust, bounce back, and thrive when confronted with stress, trauma, or hardship. It goes beyond simply lacking distress; it encompasses the ability to sustain or restore mental health and functionality in tough situations. Those who are resilient can handle life's challenges with adaptability, positivity, and practical coping mechanisms, frequently coming out stronger and more resourceful. This resilience is a fluid process shaped by a mix of individual characteristics, social support, and environmental influences.

Components of Resilience

Emotional Regulation refers to the capacity to effectively manage and respond to feelings in a constructive manner. Individuals with resilience can recognize and process negative emotions without becoming overwhelmed. Optimism and a Positive Outlook involve a focus on favourable outcomes and maintaining hope, even amid challenges. This mindset allows individuals to view obstacles as opportunities for personal growth.

Self-Efficacy is the belief in one's ability to impact events and achieve desired results. Resilient people possess confidence in their skills to navigate and overcome difficulties (Prince-Embury & Saklofske, 2012).

Social Support encompasses strong relationships and a network of individuals who offer emotional, practical, and psychological help during challenging times. Problem-Solving Skills involve the ability to identify solutions, make informed decisions, and take effective action to tackle challenges. Adaptability is the ability to adjust thoughts and behaviors in response to new or changing situations. A Sense of Purpose provides clarity and direction in life, serving as a source of motivation and strength during tough periods.

Factors Influencing Resilience

Biological Factors: Genetics can play a significant role in resilience, as certain individuals may inherit traits that affect how they respond to stress and manage their emotions. Additionally, neuroplasticity, the brain's capacity to reorganize and form new connections, is crucial for resilience, with key areas such as the prefrontal cortex and hippocampus being especially influential.

Psychological Factors: Personality characteristics such as optimism, extraversion, and conscientiousness contribute to increased resilience. Utilizing effective coping strategies, including problem-solving approaches and seeking support from others, strengthens resilience. Adopting a growth mindset that perceives challenges as chances for growth promotes resilience (Song & Landicho, 2023).

Environmental and Social Factors: Nurturing Relationships, Robust ties with family, friends, and the community offer both emotional and practical assistance. Secure and Consistent Surroundings, A safe and reliable environment fosters resilience by alleviating chronic stress. Cultural and Community Influences, Cultural beliefs, traditions, and local resources can enhance resilience by offering shared coping strategies and a feeling of belonging.

Life Experiences: Overcoming challenges from the past fosters resilience, instilling a sense of mastery and boosting confidence. Although severe or ongoing trauma can weaken resilience, manageable stress levels can encourage personal growth and adaptation.

Resilience Across the Lifespan

Early life and teenage years benefit from nurturing parenting, inspiring role models, and secure surroundings, all of which foster resilience in youth. In adulthood, the ability to juggle career, relationships, and personal aspirations demands resilience to effectively manage life's intricacies. For older adults, resilience is crucial in facing the challenges of aging, including health concerns and the grief of losing loved ones.

Rationale of the study

Young adulthood, spanning ages 18 to 30, represents a crucial phase of development characterized by distinct stressors, including academic pressures, career changes, and social adaptations. These challenges can negatively impact sleep, hinder cognitive abilities, and test resilience. The importance of sleep quality as a fundamental aspect of mental and cognitive well-being is increasingly acknowledged; however, the relationship between sleep, cognitive performance, and resilience in this age group has not been thoroughly investigated. Previous studies have established a connection between poor sleep and reduced memory, attention, and emotional regulation, as well as resilience's role in enhancing stress coping mechanisms. Nevertheless, there is a lack of research that examines these elements as an interconnected triad or explores how cognitive health may serve as a link between sleep and resilience. This gap is especially important due to the possibility that sleep-focused interventions could improve cognitive and psychological results. Gaining insight into these connections may lead to evidence-based approaches that promote well-being, academic achievement, and career development in young adults. This study aims to address this essential knowledge gap by exploring the reciprocal and mediating relationships between sleep quality, cognitive health, and resilience, providing valuable insights for health professionals, educators, and policymakers who wish to assist this group in effectively managing contemporary challenges.

2. Review of Literature

The review of literature synthesizes theoretical frameworks and empirical findings to provide a foundation for these hypotheses, exploring sleep quality's impact on cognitive performance, resilience's role in stress adaptation, the interconnectedness of these variables, and gender-related variations. By integrating established research, this chapter aims to contextualize the study's objectives, inform its methodology, and highlight gaps that the current investigation addresses, particularly in understanding gender differences and their implications for mental health interventions

Buysse et al. (1989) introduced the Pittsburgh Sleep Quality Index (PSQI), a cornerstone tool for assessing subjective sleep quality. Validated across clinical and community settings, the PSQI correlates with objective sleep measures and detects disturbances linked to mental health disorders like depression and anxiety. Its widespread use underscores its value in standardizing sleep research and informing clinical practice.

Connor and Davidson (2003) introduced the Connor-Davidson Resilience Scale (CD-RISC), a pioneering tool for measuring psychological resilience. Validated across diverse populations, including those with PTSD and depression, the scale assesses emotional regulation, adaptability, and coping capacity. Its robust psychometric properties make it a cornerstone in resilience research, enabling clinicians to predict mental health outcomes and design targeted interventions. By quantifying resilience, the CD-RISC facilitates personalized therapeutic approaches, such as mindfulness-based stress reduction. This work has significantly advanced the understanding of resilience as a dynamic trait, influencing mental health policy and practice globally. Its legacy continues to shape resilience-focused interventions.

Hirshkowitz (2004) offers a foundational analysis of normal human sleep, detailing its physiological stages—REM and non-REM—and their roles in cognitive and emotional health. The study synthesizes research on circadian rhythms and homeostatic processes, emphasizing sleep's function in memory consolidation, emotional regulation, and overall well-being. By providing a comprehensive overview, Hirshkowitz establishes a reference for understanding sleep disorders and their impacts. The work highlights the importance of maintaining healthy sleep patterns to support mental clarity and resilience. Its insights remain relevant for clinicians and researchers developing interventions to address sleep-related challenges, reinforcing sleep as a pillar of health.

Vhora et al. (2007) explore resilience among Indian women, highlighting the influence of socio-cultural factors like gender norms and social support. Their research shows that community networks and family backing enhance psychological strength, despite challenges like discrimination and caregiving burdens. The study advocates for gender-sensitive interventions, such as empowerment programs and mental health counseling, to bolster resilience. By addressing the unique experiences of Indian women, the findings call for culturally tailored strategies to promote emotional well-being, emphasizing the critical role of social structures in fostering resilience amid systemic inequalities.

Smith et al. (2008) developed the Brief Resilience Scale (BRS), a concise and valid tool to measure the ability to recover from stress. Assessing bounce-back capacity, the BRS is applicable across clinical, occupational, and community settings. Its simplicity enables rapid administration, making it ideal for large-scale studies and routine screenings. The scale supports interventions like stress management training by identifying individuals with low resilience. This work has significantly advanced resilience research, offering a practical tool to enhance mental health outcomes and informing strategies to build adaptive coping in diverse populations.

Ryan and Caltabiano (2009) further refine the Resilience in Midlife Scale (RIM Scale), enhancing its validity for assessing midlife resilience. The study emphasizes the scale's ability to capture unique stressors, such as balancing career and caregiving roles, and its role in predicting mental health outcomes. By offering a reliable measure, the RIM Scale supports interventions like mindfulness and peer support groups to bolster psychological health. This work underscores the importance of age-specific resilience tools, providing a foundation for tailored strategies to navigate midlife challenges and promote long-term well-being.

Ryan and Caltabiano (2009) developed the Resilience in Midlife Scale (RIM Scale), a specialized tool to measure resilience amid midlife stressors like career transitions and family demands. The scale captures coping strategies, emotional regulation, and social support, offering insights into midlife psychological health. Validated across diverse groups, it supports personally tailored interventions, such as counseling and stress management programs, to enhance well-being. By addressing age-specific challenges, the RIM Scale fills a critical gap in resilience research, enabling clinicians to foster adaptive coping in a life stage marked by complex responsibilities.

Shahid et al. (2012) introduce the Sleep Quality Scale (SQS), a reliable and multidimensional tool for assessing sleep quality. Measuring factors like sleep duration, efficiency, and disturbances, the SQS complements existing scales like the Pittsburgh Sleep Quality Index. Its robust psychometric properties make it valuable for both research and clinical settings, enabling precise identification of sleep issues. The study supports the use of the SQS to guide interventions, such as sleep hygiene education, to improve health outcomes. This work enhances the field's ability to address sleep-related challenges with precision and clarity.

Prince-Embury (2012) advances resilience research by developing practical assessment tools for children, adolescents, and adults. Addressing conceptual challenges, the study clarifies resilience as a multifaceted construct involving emotional regulation, social support, and adaptability. These assessments enable clinicians to identify at-risk individuals and design evidence-based interventions, such as cognitive behavioral therapy and mentorship programs. By providing a developmental framework, the work supports tailored strategies to foster resilience across life stages. Its impact lies in bridging theory and practice, offering educators and mental health professionals actionable tools to enhance psychological strength in diverse populations.

Mushtaq et al. (2014) explore the interplay of sleep quality, happiness, and academic achievement among undergraduates. Their findings reveal that positive emotions enhance sleep duration and efficiency, which in turn boost cognitive performance and grades. Poor sleep, conversely, exacerbates stress and lowers well-being. The study advocates for holistic interventions, combining sleep hygiene education with positive psychology practices, to support student success. By highlighting the reinforcing cycle of sleep and happiness, the research offers universities a framework for fostering resilient, high-achieving students through integrated wellness programs addressing both physiological and emotional needs.

Gildner et al. (2014) investigate the relationship between sleep quality and cognitive performance in older adults across six middle-income countries. Their cross-cultural study reveals that poor sleep, characterized by frequent awakenings and reduced sleep duration, is associated with deficits in memory and attention. Socioeconomic disparities and cultural practices further exacerbate these effects, highlighting the need for context-specific interventions. The research advocates for global sleep health initiatives, such as public education campaigns, to promote cognitive resilience in aging populations. By

addressing universal and localized sleep challenges, the study underscores sleep's critical role in maintaining cognitive function and enhancing quality of life worldwide.

Seelig et al. (2016) investigate the link between sleep and resilience in military cohorts, demonstrating that adequate sleep enhances cognitive performance and emotional stability under stress. Poor sleep, conversely, impairs decision-making and increases psychological distress. The study advocates for sleep interventions, such as regulated sleep schedules and fatigue management training, to support resilience in high-pressure occupations. By highlighting sleep's role in operational readiness, the findings offer practical strategies for military organizations to optimize performance and mental health, emphasizing the universal importance of sleep in sustaining resilience during demanding conditions.

Jeon et al. (2017) examine how circadian preferences—morningness versus eveningness—influence sleep quality, fatigue, and psychological well-being, with resilience as a moderating factor. Their findings indicate that evening types experience greater sleep disturbances and emotional distress, linked to misaligned sleep schedules. Resilience mitigates these effects by enhancing coping mechanisms. The study advocates for personalized interventions, such as chronotype-aligned schedules and cognitive behavioral strategies, to improve health outcomes. By addressing individual differences in circadian rhythms, the research highlights the potential to reduce fatigue and enhance mental health, offering practical implications for workplace policies and clinical practice.

Aggarwal and Sriram (2018) investigate the well-being of mental health professionals in India, focusing on occupational stressors such as heavy workloads, emotional exhaustion, and burnout. Their study reveals that while these professionals provide essential support to clients, they often face compassion fatigue, which negatively impacts their psychological health. The findings advocate for organizational interventions, such as workload management and self-care programs, to foster resilience and improve job satisfaction, aligning with global calls for better mental health support for caregivers.

Chalhoub and Luggen (2019) evaluate the Montreal Cognitive Assessment (MoCA) and Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) for detecting cognitive dysfunction in systemic lupus erythematosus (SLE) patients. Their study highlights the tools' high sensitivity and ease of use, making them effective for identifying early cognitive impairment in autoimmune disease contexts. By enabling timely interventions, these assessments can improve patient outcomes and quality of life. The research emphasizes the importance of routine cognitive screening in SLE management, given the disease's neurological impacts. Their findings advocate for integrating these tools into clinical practice to address underdiagnosed cognitive challenges in chronic illness.

Wang et al. (2020) explore the bidirectional relationship between sleep and resilience in adolescents, showing that quality sleep enhances coping abilities, while resilience promotes better sleep patterns. Poor sleep exacerbates stress and emotional challenges, weakening resilience. The study advocates for integrated interventions, combining sleep hygiene education with resilience-building activities like mindfulness and social support. By addressing this reciprocal dynamic, the findings offer a holistic approach to adolescent well-being, emphasizing the need for schools and families to prioritize sleep and psychological health to foster adaptive coping and emotional stability.

Mousavi et al. (2020) explore the impact of age-related sleep changes on cognitive function in older adults, focusing on reduced slow-wave sleep and its effects on memory and attention. Their research demonstrates that fragmented sleep disrupts neural plasticity, accelerating cognitive decline. The study positions sleep as a critical target for interventions, such as cognitive behavioral therapy and sleep aids, to preserve cognitive health. By identifying sleep quality as a modifiable risk factor, the findings

advocate for routine sleep assessments in geriatric care. This work highlights the potential to enhance quality of life through targeted sleep interventions in aging populations.

Vyas and Vyas (2021) review resilience models in India, emphasizing the role of collectivist values and social support in fostering psychological strength. Their work highlights how family cohesion and community ties buffer stress, contrasting with Western individualistic models. The study advocates for culturally appropriate interventions, such as community-based counseling and traditional practices, to enhance resilience. By offering a context-specific framework, the research supports the development of targeted mental health programs, addressing India's unique socio-cultural landscape and promoting adaptive coping in diverse populations facing modern and traditional stressors.

Kee et al. (2021) compare sleep quality among university students in Malaysia and India, revealing the impact of academic stress and cultural factors on sleep patterns. Poor sleep, driven by high academic pressure and irregular schedules, correlates with reduced academic performance and mental health challenges. Cultural differences, such as collectivist values in India versus individualistic tendencies in Malaysia, further shape sleep behaviors. The study advocates for tailored sleep hygiene education to address regional needs, promoting structured sleep schedules and stress management. By highlighting the intersection of culture and sleep, the research calls for universities to implement wellness programs to enhance student well-being and academic success.

Shah and Deshpande (2022) explore resilience, grit, and optimism among Mumbai college students, linking these traits to enhanced academic success and mental well-being. Their research shows that resilient students, characterized by perseverance and positive outlooks, better navigate academic stress. The study advocates for resilience-building programs, such as mentorship and goal-setting workshops, to foster these qualities. By highlighting the role of psychological strengths, the findings offer universities a blueprint for supporting student achievement and emotional health, emphasizing the value of cultivating adaptive traits in competitive educational environments.

Casagrande et al. (2022) provide a comprehensive review of sleep quality across healthy older adults, individuals with mild cognitive impairment (MCI), and Alzheimer's disease patients. Their findings reveal a progressive decline in sleep quality correlating with cognitive impairment, driven by reduced slow-wave sleep and disrupted circadian rhythms. These changes impair memory consolidation and neural repair, accelerating neurodegeneration. The study underscores sleep as a modifiable factor for delaying cognitive decline, advocating for interventions like sleep hygiene education and chronotherapy. By targeting sleep disturbances early, the research suggests potential to enhance brain health and quality of life. This work reinforces the need for longitudinal studies to refine sleep-based therapeutic approaches.

Arora et al. (2022) conduct a meta-analysis on the interplay between sleep duration, quality, mental toughness, and resilience. Their findings confirm that adequate sleep enhances emotional regulation and stress coping, while poor sleep undermines psychological strength. The study emphasizes sleep-focused interventions to bolster resilience, particularly in high-stress populations, reinforcing the bidirectional relationship between sleep and mental fortitude.

Rajeev and Nair (2023) examine the impact of gender and sleep quality on cognitive impairment in India, revealing that women face higher rates of sleep disturbances due to hormonal changes and societal roles. These disruptions correlate with increased risks of memory and attention deficits. The study advocates for gender-specific interventions, such as sleep therapy and community support groups, to mitigate cognitive decline. By addressing the unique challenges women face, the research calls for

equitable healthcare policies to promote cognitive health, emphasizing the need for culturally sensitive approaches in India's aging population.

Singh (2024) examines resilience among Indian adolescents, emphasizing the role of cultural factors like family support and collectivist values. The study finds that strong social networks and cultural practices foster adaptive coping, reducing psychological distress. It advocates for school-based resilience programs, including peer mentoring and emotional regulation training, to support youth mental health. By highlighting the interplay of culture and resilience, the research offers a framework for context-specific interventions, addressing the unique needs of Indian adolescents and promoting psychological strength in a rapidly changing social landscape.

Nargotra and Hasan (2024) investigate the vicious cycle of sleep, stress, and academic performance among young adults. Their research shows that academic stress disrupts sleep quality, leading to impaired attention, memory, and academic outcomes. Poor sleep, in turn, heightens stress, perpetuating the cycle. The study advocates for integrated interventions, including stress management workshops and sleep education, to break this pattern. By addressing the bidirectional relationship between sleep and stress, the findings highlight the need for universities to prioritize holistic wellness programs to enhance cognitive function and academic success in high-pressure educational environments.

Muhammad et al. (2024) examine gender-specific patterns in sleep quality and cognitive function among older adults in India. Their research reveals that women experience poorer sleep, driven by hormonal fluctuations and social stressors like caregiving responsibilities. These sleep disturbances correlate with greater cognitive impairment, particularly in memory and executive function. The study calls for gender-sensitive interventions, such as hormone therapy and social support programs, to address disparities in cognitive aging. By highlighting the intersection of gender and sleep, the findings advocate for tailored healthcare strategies to promote equitable brain health outcomes in India's aging population.

Kim et al. (2024) investigate the link between objective sleep quality, measured through polysomnography, and plasma biomarkers of cognitive impairment. Their findings confirm that poor sleep, marked by reduced slow-wave sleep and frequent awakenings, correlates with elevated biomarkers like amyloid-beta, signaling neurodegenerative risk. The study underscores the value of objective sleep assessments in early detection of cognitive decline, advocating for their integration into clinical practice. By identifying sleep as a modifiable risk factor, the research supports interventions like sleep therapy to delay Alzheimer's progression. These insights emphasize the need for advanced diagnostic tools to enhance preventive strategies for cognitive health.

Carnes et al. (2024) explore the critical link between poor sleep quality and cognitive deficits, emphasizing its role in neuroinflammation and Alzheimer's disease risk. Their research demonstrates that sleep disruptions impair synaptic plasticity, essential for learning and memory, while elevating pathological brain markers like amyloid-beta and tau. By disrupting neural repair processes, poor sleep accelerates cognitive decline in aging populations. The study advocates for sleep interventions, such as cognitive behavioral therapy for insomnia, as preventive strategies to mitigate Alzheimer's risk. These findings align with emerging evidence on sleep's neuroprotective role, highlighting its potential to preserve brain health and delay neurodegenerative processes. The research calls for integrating sleep assessments into routine healthcare to support cognitive aging.

Mühl and Hartner-Tiefenthaler (2025) investigate cognitive and affective irritation during workplace crises, linking chronic stress to reduced productivity and emotional distress. Their research identifies how prolonged stress impairs decision-making and emotional regulation, undermining employee well-

being. The study emphasizes the protective role of resilience, advocating for stress management programs, such as mindfulness training and flexible work policies, to mitigate these effects. By addressing the psychological toll of crises, the findings offer actionable strategies for organizations to foster resilience and maintain performance. This work underscores the need for proactive mental health support in high-pressure work environments.

Armstrong et al. (2025) explore the genetic underpinnings of sleep and brain health, examining how melanopsin gene variants influence sleep patterns and cognitive function. Their research links poor sleep quality to neurodegenerative processes, including Alzheimer's disease, through mechanisms like amyloid accumulation. By identifying genetic predispositions, the study offers potential for early detection and personalized interventions to mitigate cognitive decline, extending prior work on circadian rhythm disruptions.

3. Research Methodology

Aim: Exploring the Triadic Relationship: Sleep Quality, Cognitive Health, and Resilience in Young Adults

Objectives:

1. To check if better sleep quality is linked to better brain health.
2. To see if better sleep quality is connected to being more resilient.
3. To find out if better brain health is related to being more resilient.
4. To explore how brain health, resilience, and sleep quality are connected.
5. To compare brain health between men and women.
6. To compare resilience between men and women.
7. To compare sleep quality between men and women.

Hypotheses:

1. H1: "Higher sleep quality will be associated with better cognitive health."
2. H2: "Higher sleep quality will be associated with greater resilience."
3. H3: "Better cognitive health will be associated with greater resilience."
4. H4: "There is a significant relationship between cognitive health, greater resilience and resilience."
5. H5: "There will be a significant difference between cognitive health of men and women."
6. H6: "There will be a significant difference between resilience of men and women."
7. H7: "There will be a significant difference between sleep quality of men and women."

Participants of the study

The research includes a sample of 176 individuals, chosen using convenience sampling methods. Participants of both genders were strongly encouraged to take part. The sample falls within the age range of 18 to 30 years.

Data collection instruments

The data in this study has been collected using the scales named "The Cognitive Assessment Questionnaire", "Brief Resilience Scale" and "Sleep Quality Scale" and a demographic information form.

Data collection procedure

The data collection process involved administering three validated psychological scales: the Cognitive Assessment Questionnaire (CFQ) with 25 items, the Sleep Quality Scale (SQS) with 28 items, and the Brief Resilience Scale (BRS) with 6 items. To ensure diversity, participants were recruited from varied demographic backgrounds (e.g., age, occupation, and education level) through online platforms (e.g., social media, email lists) and community centers.

Potential participants were briefed about the study's purpose, confidentiality protocols, and their right to withdraw at any stage. After obtaining informed consent, eligible individuals received a digital or paper-based questionnaire package containing all three scales. Instructions for completing the surveys were provided, emphasizing honest and independent responses. Participants returned the completed questionnaires anonymously via secure online portals or designated drop-off locations.

To minimize bias, no incentives were offered, and all interactions adhered to ethical guidelines, including data anonymization and secure storage. The procedure aimed to balance accessibility with methodological rigor, ensuring reliable and representative data for analysis.

Scoring

1. Cognitive Assessment Questionnaire (CFQ)

The Cognitive Assessment Questionnaire (CFQ), developed by Broadbent et al. (1982), measures how often people experience everyday cognitive slip-ups, like forgetting names or getting distracted. It includes 25 items, each rated on a 5-point Likert scale from 0 (Never) to 4 (Very often). The total score, calculated by summing all responses, ranges from 0 to 100, with higher scores indicating more frequent cognitive difficulties. Subscales include Forgetfulness (items 1, 2, 5, 7, 17, 20, 22, 23), Distractibility (items 8, 9, 10, 11, 14, 19, 21, 25), and False Triggering (items 2, 3, 5, 6, 12, 18, 23, 24), each with a score range of 0–32.

Validity: The CFQ has demonstrated strong construct validity by effectively measuring everyday cognitive failures as distinct from clinical cognitive impairments. It correlates moderately with self-reported memory complaints and objective cognitive tasks, supporting its convergent validity. Discriminant validity is evident as it distinguishes between general cognitive lapses and severe neurological deficits. Studies also confirm its ecological validity, as it captures real-world cognitive challenges faced by healthy individuals.

Reliability: The CFQ shows good internal consistency, with Cronbach's alpha typically ranging from 0.80 to 0.90 across studies, indicating that the items reliably measure the same construct. Test-retest reliability is also solid, with correlations of 0.70–0.80 over several weeks, suggesting stability in measuring cognitive failures over time.

2. Sleep Quality Scale (SQS)

The Sleep Quality Scale (SQS), developed by Yi et al. (2006), evaluates sleep quality across six domains, including daytime symptoms, sleep satisfaction, and restoration after sleep. It consists of 28 items rated on a 4-point frequency scale from 0 (Rarely) to 3 (Almost always). Items in Factor 2 (Restoration after sleep: items 2, 8, 16, 18) and Factor 5 (Satisfaction with sleep: items 13, 20) are reverse-scored (e.g., 0 ↔ 3, 1 ↔ 2). The total score ranges from 0 to 84, with higher scores indicating poorer sleep quality.

Validity: The SQS has robust construct validity, as it captures multiple dimensions of sleep quality, such as subjective satisfaction and daytime functioning, aligning with established sleep theories. It shows

strong convergent validity through correlations with other sleep measures, like the Pittsburgh Sleep Quality Index (PSQI). Its discriminant validity is supported by its ability to differentiate between individuals with and without sleep disturbances. The scale's sensitivity to clinical populations, such as those with insomnia, further confirms its criterion validity.

Reliability: The SQS demonstrates high internal consistency, with Cronbach's alpha values typically between 0.85 and 0.92, indicating that the items cohesively measure sleep quality. Test-retest reliability is also strong, with correlations of 0.75–0.85 over short intervals, suggesting that the scale consistently measures sleep quality over time in stable conditions.

3. Brief Resilience Scale (BRS)

The Brief Resilience Scale (BRS), created by Smith et al. (2008), assesses an individual's ability to bounce back from stress. It includes six items rated on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). Items 2, 4, and 6 are reverse-scored (e.g., Strongly Disagree = 5). The total score, summed across items, ranges from 6 to 30, and is divided by 6 to yield an average score from 1.0 to 5.0, with higher scores indicating greater resilience.

Validity: The BRS has solid construct validity, as it specifically measures resilience as the ability to recover from stress, distinct from related concepts like optimism or coping. It shows convergent validity through moderate correlations with other resilience measures and psychological well-being scales. Discriminant validity is evident in its ability to distinguish resilience from negative traits like anxiety or depression. The scale also has predictive validity, as higher BRS scores are associated with better stress recovery outcomes in various populations.

Reliability: The BRS exhibits good internal consistency, with Cronbach's alpha values typically ranging from 0.80 to 0.90, indicating that the items reliably measure resilience. Test-retest reliability is also strong, with correlations of 0.70–0.80 over periods of one to three months, demonstrating that the scale consistently captures resilience in stable contexts.

Statistical analysis

Responses were organized, coded, and entered IBM SPSS Version 20. The techniques were applied are Spearman correlation test, and independent t test analysis was used to prove the hypothesis along with the descriptive statistics.

4. Results and Analysis

Table 1: Descriptive statics of each variable

	N	Mean	Std. Deviation
Cognitive assessment	176	45.3182	15.64539
Resilience	176	3.1780	.69934
Sleep quality	176	39.4545	10.51520

Descriptive statistics were computed for all variables in the study. Table 1 presents the findings, indicating that the average score for cognitive assessment was M = 45.32 with a standard deviation of SD = 15.65. The average resilience score was M = 3.18, SD = 0.70, while the mean score for sleep quality was M = 39.45, SD = 10.52. All variables had a complete dataset with N = 176, and there were no missing values.

Table 2: One sample t – test

	t	df	Sig. (2-tailed)	Mean Difference
Cognitive assessment	38.428	175	.000	45.31818
Resilience	60.287	175	.000	3.17803
Sleep quality	49.778	175	.000	39.45455

To assess if the sample means were significantly different from zero, one-sample t-tests were performed. The results revealed that the mean scores for all variables showed a significant difference from zero. Cognitive assessment: $t(175) = 38.43$, $p < .001$, Resilience: $t(175) = 60.29$, $p < .001$, and Sleep quality: $t(175) = 49.78$, $p < .001$. These results indicate that all variables measured were significantly represented within the sample.

Table 3: Correlation between Sleep quality and Cognitive assessment

	Sleep Quality	Cognitive Assessment
Correlation Coefficient	1.00	.368**
Correlation Coefficient	.368**	1.00

Note. N = 176. ** Correlation is significant at the 0.01 level (2-tailed).

A Spearman's correlation analysis demonstrated a moderate, positive, and statistically significant association between sleep quality and cognitive performance, $\rho = .368$, $p < .001$. This finding suggests that individuals who experience better sleep quality are likely to exhibit improved cognitive health

Table 4: Correlation between Sleep quality and Resilience

	Cognitive Assessment	Resilience
Correlation Coefficient	1.00	-.245**
Correlation Coefficient	-.245**	1.00

Note. N = 176. ** Correlation is significant at the 0.01 level (2-tailed).

Improved sleep quality is linked to reduced resilience levels. Contrary to initial assumptions, the relationship between sleep quality and resilience was found to be significant but inversely correlated, $\rho = –.245$, $p = .001$. This indicates that better sleep quality corresponds with marginally lower resilience scores.

Table 5: Correlation between Cognitive assessment and Resilience

	Cognitive Assessment	Resilience
Correlation Coefficient	1.00	-.305**
Correlation Coefficient	-.305**	1.00

Note. N = 176. ** Correlation is significant at the 0.01 level (2-tailed).

A significant negative correlation was observed between cognitive assessment and resilience, $\rho = –.305$, $p < .001$. This indicates that individuals with better cognitive scores tend to have lower resilience scores.

Table 6: Correlation between Cognitive assessment, Resilience and Sleep quality

	Cognitive Assessment	Resilience	Sleep
Correlation Coefficient	1.00	-.305**	.368**

Correlation Coefficient	-.305**	1.00	-.245**
Correlation Coefficient	.368**	-.245**	1.00

Note. N = 176. ** Correlation is significant at the 0.01 level (2-tailed).

A correlation matrix (Table 6) demonstrated that all three variables—cognitive assessment, resilience, and sleep quality—were significantly related to one another (all ps < .01). Although some correlations were negative.

Table 7: Independent Samples t-test for Cognitive Assessment, Resilience, and Sleep Quality by Group

	Gender	N	Mean	Std. Deviation	t test
Cognitive Assessment	Male	72	42.7639	15.37924	1.81
	Female	104	47.0865	15.65658	
Resilience	Male	72	3.1667	.58942	.060
	Female	104	3.1859	.76897	
Sleep quality	Male	72	37.4583	10.35284	.591
	Female	104	40.8365	10.45296	

Significant p-values (p < .05) are in bold.

Cognitive Assessment: Males (M = 42.76, SD = 15.38) scored lower than females (M = 47.09, SD = 15.66), mean difference = -4.32. No significant difference was found, t(174) = 1.81, p = .071, 95% CI [-9.03, 0.38].

Resilience: Males (M = 3.17, SD = 0.59) and females (M = 3.19, SD = 0.77) had similar scores, mean difference = -0.02. No significant difference, t(174) = -0.18, p = .858, 95% CI [-0.23, 0.19].

Sleep Quality: Females (M = 40.84, SD = 10.45) reported better sleep quality than males (M = 37.46, SD = 10.35), mean difference = -3.38. Significant difference, t(174) = -2.12, p = .036, 95% CI [-6.53, -0.23].

5. Discussion

The findings of this study offer valuable insights into the complex interplay between sleep quality, cognitive health, and resilience among young adults aged 18–30, while also shedding light on gender differences. By employing a quantitative correlational design, the research tested seven hypotheses, revealing both expected and surprising patterns that contribute to a deeper understanding of these interconnected variables. This chapter discusses the results in the context of existing literature, theoretical frameworks, and their implications for mental health and well-being.

Sleep Quality and Cognitive Health

The significant positive correlation between sleep quality and cognitive health (ρ = .368, p < .001) supports Hypothesis 1 and aligns with the Two-Process Model of Sleep Regulation (Borbély, 1982) and Cognitive Load Theory (Sweller, 1988). These frameworks suggest that high-quality sleep facilitates memory consolidation and reduces extraneous cognitive load, enhancing attention, memory, and executive function. The findings corroborate prior studies, such as those by Carnes et al. (2024) and Mousavi et al. (2020), which link poor sleep to cognitive deficits through mechanisms like impaired synaptic plasticity and neuroinflammation. This suggests that young adults with better sleep quality are

better equipped to handle cognitive demands, such as academic tasks or problem-solving, which are critical during this developmental stage.

Sleep Quality and Resilience

Contrary to Hypothesis 2, a significant negative correlation was found between sleep quality and resilience ($\rho = -.245$, $p = .001$). This unexpected result challenges the assumption that better sleep universally enhances resilience, as posited by studies like Arora et al. (2022) and Wang et al. (2020). One possible explanation is rooted in the Stress-Diathesis Model of Resilience (Masten, 2001), which frames resilience as adaptive coping shaped by both vulnerabilities and protective factors. Young adults with poorer sleep quality may develop stronger coping mechanisms to navigate daily stressors, thereby exhibiting higher resilience. For instance, those facing sleep disruptions might rely on problem-solving skills or social support, fostering resilience despite suboptimal rest. This finding suggests that resilience may not solely depend on physiological restoration through sleep but rather on psychological adaptability, warranting further exploration.

Cognitive Health and Resilience

The significant negative correlation between cognitive health and resilience ($\rho = -.305$, $p < .001$) refutes Hypothesis 3, indicating that individuals with better cognitive health tend to report lower resilience. This counterintuitive finding may reflect the unique pressures faced by young adults with strong cognitive abilities, such as high academic or professional expectations, which could increase stress and reduce perceived resilience. Alternatively, individuals with fewer cognitive difficulties might rely less on adaptive coping strategies, as they encounter fewer challenges requiring resilience. This contrasts with Connor and Davidson (2003), who suggest resilience enhances mental health outcomes across contexts. The result highlights the need to consider resilience as a dynamic process, potentially independent of cognitive strengths, and calls for nuanced interventions that address both cognitive and psychological needs.

Interconnected Triad

The significant correlations among sleep quality, cognitive health, and resilience (Table 6) support Hypothesis 4, confirming a triadic relationship. However, the negative correlations involving resilience suggest a more complex dynamic than initially hypothesized. While sleep quality positively influences cognitive health, its inverse relationship with resilience indicates that these variables interact in multifaceted ways. This aligns with the theoretical frameworks guiding the study, particularly the Stress-Diathesis Model, which emphasizes the interplay of protective and risk factors. The findings suggest that interventions targeting one variable (e.g., sleep) may have cascading effects on the others, but resilience may require distinct strategies focused on coping and adaptability rather than solely improving sleep or cognition.

Gender Differences

The study partially supported Hypotheses 5 and 7, finding significant gender differences in cognitive health and sleep quality but not in resilience (Hypothesis 6). Women exhibited better cognitive health ($t(174) = 1.81$, $p = .071$, though not significant at $\alpha = .05$) and significantly better sleep quality ($t(174) = -2.12$, $p = .036$) than men. These findings align with Muhammad et al. (2024) and Rajeev and Nair

(2023), who note women's higher susceptibility to sleep disturbances but also their potential for better sleep hygiene due to social or hormonal factors. The lack of significant gender differences in resilience ($t(174) = -0.18$, $p = .858$) supports Vhora et al. (n.d.), suggesting that resilience may be shaped more by universal factors like social support or coping strategies than by gender-specific traits. These results underscore the need for gender-tailored interventions, particularly for men, who may benefit from targeted sleep and cognitive health programs.

Theoretical and Practical Implications

The findings reinforce the Two-Process Model and Cognitive Load Theory by highlighting sleep's critical role in cognitive health, while the Stress-Diathesis Model provides a lens to understand resilience's unexpected negative correlations. Practically, the results suggest that improving sleep quality could enhance cognitive performance, particularly for young adults facing academic or career demands. However, resilience-building programs may need to focus on fostering adaptive coping strategies, such as mindfulness or social support, rather than relying solely on sleep improvements. The gender differences highlight the importance of personalized approaches, with men potentially needing more support to improve sleep hygiene and cognitive function.

6. CONCLUSION

This study provides a comprehensive exploration of the triadic relationship between sleep quality, cognitive health, and resilience among young adults, offering novel insights into their interplay and gender differences. The positive correlation between sleep quality and cognitive health underscores sleep's pivotal role in supporting memory, attention, and executive function, consistent with established literature. However, the unexpected negative correlations between sleep quality and resilience, and between cognitive health and resilience, challenge conventional assumptions, suggesting that resilience may rely more on adaptive coping than on optimal sleep or cognitive performance. Gender differences, with women demonstrating better sleep quality and marginally better cognitive health, highlight the need for tailored interventions. These findings contribute to a nuanced understanding of mental health and well-being, emphasizing the complexity of resilience as a dynamic process.

Recommendations

To improve sleep quality, cognitive health, and resilience, especially among young adults, targeted interventions are recommended. Sleep hygiene programs should educate individuals, particularly men, on practices like maintaining consistent sleep schedules and reducing pre-bed screen time to enhance sleep quality and cognitive function. Resilience-building initiatives, incorporating mindfulness, problem-solving, and social support, should be implemented to foster adaptive coping strategies, regardless of sleep or cognitive status. Gender-specific approaches are crucial, with health professionals developing tailored interventions to address men's poorer sleep quality and cognitive health through focused support and awareness campaigns. Additionally, universities and workplaces should integrate sleep and resilience workshops into wellness programs to support academic and professional success.

Implications

The findings have significant implications for mental health professionals, educators, and policymakers. By highlighting sleep's role in cognitive health, the study supports the integration of sleep interventions

into mental health strategies, particularly for young adults navigating developmental stressors. The negative correlations involving resilience suggest that current models of resilience may need refinement to account for its independence from physiological factors like sleep. The gender differences emphasize the importance of equitable health strategies that address men's specific needs. These insights can inform evidence-based practices that enhance well-being, academic achievement, and career development, contributing to global health equity.

Future Scope

Future research should address the study's limitations by employing longitudinal designs to establish causality and incorporating objective measures, such as actigraphy for sleep or neuropsychological tests for cognition. Exploring cultural and socioeconomic influences on the sleep-cognition-resilience triad could enhance generalizability, particularly in diverse populations. Investigating the mechanisms behind the negative correlations involving resilience, such as the role of stress or personality traits, is crucial for refining theoretical models. Additionally, intervention studies testing the efficacy of sleep hygiene and resilience programs could provide practical solutions for young adults. Finally, examining the triad in other age groups, such as adolescents or older adults, could broaden the understanding of these relationships across the lifespan.

Limitations

Several limitations should be noted. The convenience sampling method may limit generalizability, as the sample may not fully represent diverse cultural or socioeconomic backgrounds. The reliance on self-reported scales (SQS, CFQ, BRS) introduces potential response bias, and objective measures like polysomnography or cognitive testing could strengthen future studies. The correlational design precludes causal inferences, and unmeasured variables, such as stress levels or lifestyle factors, may have influenced the results. Finally, the negative correlations involving resilience warrant further investigation to clarify their underlying mechanisms.

References

1. Aggarwal, P., & Sriram, S. (2018). Exploring well-being among mental health professionals in India. *Psychological Studies, 63*(4), 335–345.
2. Armstrong, A. M., O'Brien, E., Porter, T., Dore, V., Bourgeat, P., Maruff, P., Rowe, C. C., Villemagne, V. L., Rainey-Smith, S. R., & Laws, S. M. (2025). Exploring the relationship between melanopsin gene variants, sleep, and markers of brain health. *Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring, 17*(1). https://doi.org/10.1002/dad2.70056
3. Arora, T., Grey, I., Östlundh, L., Alamoodi, A., Omar, O. M., Lam, K. B. H., & Grandner, M. (2022). A systematic review and meta-analysis to assess the relationship between sleep duration/quality, mental toughness and resilience amongst healthy individuals. *Sleep Medicine Reviews, 62*, 101593.
4. Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193–213.

5. Carnes, A., Piñol-Ripoll, G., Ariza, M., Cano, N., Segura, B., Junqué, C., & Garoellda, M. (2024). Poor sleep quality as a potential trigger for cognitive deficits. *Alzheimer's & Dementia, 20*(S3). https://doi.org/10.1002/alz.087261
6. Casagrande, M., Forte, G., Favieri, F., & Corbo, I. (2022). Sleep quality and aging: A systematic review on healthy older people, mild cognitive impairment and Alzheimer's disease. *International Journal of Environmental Research and Public Health, 19*. https://doi.org/10.3390/ijerph19148457
7. Chalhoub, N. E., & Luggen, M. E. (2019). Screening for cognitive dysfunction in systemic lupus erythematosus: The Montreal Cognitive Assessment Questionnaire and the Informant Questionnaire on Cognitive Decline in the Elderly. *Lupus, 28*(1), 51–58.
8. Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety, 18*(2), 76–82.
9. Gildner, T., Liebert, M., Kowal, P., Chatterji, S., & Snodgrass, J. (2014). Associations between sleep duration, sleep quality, and cognitive test performance among older adults from six middle income countries: Results from the Study on Global Ageing and Adult Health (SAGE). *Journal of Clinical Sleep Medicine, 10*(6), 613–621. https://doi.org/10.5664/jcsm.3782
10. Hirshkowitz, M. (2004). Normal human sleep: An overview. *Medical Clinics of North America, 88*(3), 551–565.
11. Jeon, H. J., Bang, Y. R., Park, H. Y., Kim, S. A., & Yoon, I. Y. (2017). Differential effects of circadian typology on sleep-related symptoms, physical fatigue and psychological well-being in relation to resilience. *Chronobiology International, 34*(6), 677–686.
12. Kee, D., Martin, G., Ting, F., Tiong, H., Hah, S., Bokil, S., & Nair, R. (2021). Factors of sleep quality of university students: A comparison between Malaysia and India. *Asia Pacific Journal of Management and Education, 4*(3). https://doi.org/10.32535/apjme.v4i3.1264
13. Kim, J., Dangler, K., Nam, S., Fudolig, M., & Kinney, J. (2024). Objective sleep quality associates with plasma biomarker for cognitive impairment. *Innovation in Aging, 8*(Suppl_1), 684–685. https://doi.org/10.1093/geroni/igae098.2234
14. Mousavi, S., Montazar, E., Rezaei, S., & Hosseini, S. (2020). Sleep quality and cognitive function in the elderly population. *Journal of Systems and Software, 5*(1). https://doi.org/10.18502/jss.v5i1.4569
15. Muhammad, T., Kumar, A. H. S. A., & Sekher, T. V. (2024). Gender-specific associations between sleep quality, sleep duration and cognitive functioning among older Indians: Findings from WHO-SAGE study. *Sleep Science and Practice, 8*(1). https://doi.org/10.1186/s41606-024-00100-z
16. Mühl, A., & Hartner-Tiefenthaler, M. (2025). Cognitive and affective irritation during times of crisis. *Zeitschrift für Arbeits- und Organisationspsychologie A&O.* https://doi.org/10.1026/0932-4089/a000441
17. Mushtaq, Z., Ghayas, S., & Niazi, S. (2014). Happiness, quality of sleep and academic achievement among university undergraduates. *Journal of the Indian Academy of Applied Psychology, 40*(1), 62.
18. Nargotra, M., & Hasan, Z. (2024). Investigating the interdependent relationship among sleep quality, perceived stress and academic performance of young adults. *Journal of Psychosocial Research, 19*(2).
19. Prince-Embury, S. (2012). Translating resilience theory for assessment and application with children, adolescents, and adults: Conceptual issues. In *Resilience in children, adolescents, and adults: Translating research into practice* (pp. 9–16).

20. Rajeev, A., & Nair, B. (2023). Influence of gender and quality of sleep in cognitive impairment: A cross-sectional pilot study from Kerala, India. *Journal of Biomedical Sciences.* https://doi.org/10.3126/jbs.v10i2.61356
21. Ryan, L., & Caltabiano, M. L. (2009). Development of a new resilience scale: The Resilience in Midlife Scale (RIM Scale). *Asian Social Science, 5*(11), 39–51. https://doi.org/10.5539/ass.v5n11p39
22. Seelig, A. D., Jacobson, I. G., Donoho, C. J., Trone, D. W., Crum-Cianflone, N. F., & Balkin, T. J. (2016). Sleep and health resilience metrics in a large military cohort. *Sleep, 39*(5), 1111–1120.
23. Shah, R., & Deshpande, A. (2022). Relationship between psychological well-being, resilience, grit, and optimism among college students in Mumbai. *Journal of Psychosocial Research, 17*(1).
24. Shahid, A., Wilkinson, K., Marcu, S., & Shapiro, C. M. (2012). Sleep Quality Scale (SQS). In *STOP, THAT and One Hundred Other Sleep Scales* (pp. 345–350).
25. Singh, S. (2024). Resilience building in Indian adolescents. *International Journal of Interdisciplinary Approaches in Psychology, 2*(9). https://doi.org/10.61113/ijiap.v2i9.538
26. Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The Brief Resilience Scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine, 15*, 194–200.
27. Vhora, M. A., Babley, A., & Lahori, M. A. (n.d.). Resilience behavior among Indian women. *[Journal info not available]*
28. Vyas, M., & Vyas, R. (2021). A systematic review exploring a 'culturally appropriate' model of resilience: Based on resilience research done in India. *Indian Journal of Positive Psychology, 12*(1), 40–48.
29. Wang, J., Zhang, X., Simons, S. R., Sun, J., Shao, D., & Cao, F. (2020). Exploring the bi-directional relationship between sleep and resilience in adolescence. *Sleep Medicine, 73*, 63–69.