

Article

Not peer-reviewed version

---

# Innovative Strategies to Address the Impact of Staying Up Late (Begadang) on Cognitive Function and Adolescent Mental Health

---

Miles Vince \*

Posted Date: 11 July 2025

doi: 10.20944/preprints202507.0946.v1

Keywords: staying up late (Begadang); cognitive function; mental health; innovative action; adolescent sleep patterns



Preprints.org is a free multidisciplinary platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This open access article is published under a Creative Commons CC BY 4.0 license, which permit the free download, distribution, and reuse, provided that the author and preprint are cited in any reuse.

Disclaimer/Publisher's Note: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

Article

# Innovative Strategies to Address the Impact of Staying Up Late (Begadang) on Cognitive Function and Adolescent Mental Health

Miles Vince

Independent Researcher; milesvince01@gmail.com

**Abstract:** Sleep patterns represent a vital physiological need essential for optimal bodily and mental function. The phenomenon of begadang, defined as a deviation from normal sleep duration and circadian rhythm, has become a widespread habit among adolescents and young adults with serious implications. This study identifies the multifaceted impacts of begadang, including a decline in cognitive function (focus, memory, decision-making) due to the dysregulation of brain networks such as the DMN and FPN, as well as an increased risk of chronic physical diseases like cardiovascular and metabolic conditions. Psychologically, begadang triggers a decrease in emotional stability, stress, anxiety, and depression, as indicated by the high prevalence of mental disorders in the productive age group in Indonesia. Triggering factors include academic pressure, excessive gadget use, and a social environment that supports begadang. Although these impacts have been extensively studied, there remains a significant gap in the literature regarding innovative, engaging, and effectively behavioral change-inducing interventions. The low awareness and reading interest of adolescents regarding the dangers of begadang are major obstacles. This qualitative research adopts a systematic-interpretive literature review approach, analyzing comprehensive secondary data from scientific journals, reference books, official institutional reports, and case studies. Data collection procedures include keyword identification, systematic searches in scientific databases, strict source selection and verification, full-text reading, and critical information extraction with accurate note-taking and citation. Data are analyzed through reduction, thematic categorization, comparative analysis, and conceptual synthesis. The discussion integrates findings with theoretical frameworks, clarifies relationships between concepts, and highlights the urgency of innovative interventions. This research fills the gap by formulating critical and creative ideas, such as the development of the "SleepSync Buddy" application, the #IstirahatKeren (Cool Rest) social media campaign, the establishment of campus-based "Sleep Health Hubs," and the integration of "Sleep Literacy" curriculum. These ideas emphasize proactive, preventive, and community-based approaches to foster a healthy sleep culture. In conclusion, begadang has extensive damaging impacts. Innovative digital and community-based solutions are essential to bridge the knowledge gap and trigger positive behavioral change. This research has limitations as it does not involve quantitative data or longitudinal measurements. Further studies are suggested to explore the actual impact on behavior using mixed methods or field experiments.

**Keywords:** staying up late (Begadang); cognitive function; mental health; innovative action; adolescent sleep patterns

---

## 1. Introduction

### 1.1. Background

Sleep is a fundamental physiological necessity vital for the optimal physical and mental functioning of human beings. As a recurring biological process, sleep allows for cell regeneration, memory consolidation, hormone regulation, and the restoration of cognitive and emotional functions (Sakhawah, 2023). However, in this modern era, especially among adolescents and young adults,

healthy sleep patterns are often neglected due to various academic, work, social demands, and technology use. The phenomenon of begadang, defined as a deviation from recommended sleep duration and the body's natural circadian rhythm (Pradhan et al., 2024; Sakhawah, 2023), has become a widespread habit with serious implications for both physical and mental health.

Various studies have elucidated the multifaceted impacts of begadang. Neurologically, sleep deprivation has been proven to impair focus, affect the balance of brain networks such as the Default Mode Network (DMN) and Fronto-Parietal Network (FPN), and diminish working memory capacity and memory consolidation (Khan & Al-Jahdali, 2023). This directly impacts academic performance, decision-making, and emotional control, even triggering impulsive behavior (Yoo et al., 2007; Krause et al., 2017; Nurlela et al., 2023). Furthermore, poor sleep patterns are closely physically linked to an increased risk of chronic diseases such as cardiovascular, metabolic (hypertension, obesity, type 2 diabetes), and liver dysfunction (Rachmadina et al., 2025; Handayani, 2021). This condition also suppresses the immune system and disrupts vital hormone regulation (Irwin et al., 2019; Spiegel et al., 2004).

From a mental health perspective, begadang triggers a decline in emotional stability, increased stress, anxiety, and depression. Data on the prevalence of mental disorders in Indonesia, particularly within the productive age group (15-24 years), show alarming figures (Kemenkes RI, 2024; Nurmawati et al., 2025; Rivaldi, 2024). External factors such as academic pressure (Ramadita et al., 2023), excessive gadget use affecting circadian rhythm (Nurmawati et al., 2025; Wijaya, 2023), and other unhealthy lifestyle patterns further exacerbate this phenomenon. Case studies also indicate that despite partial awareness of the dangers of begadang, efforts to adapt healthy behaviors are still suboptimal among university students (Karlina & Fitriani, 2022).

Current phenomena, such as the proliferation of 24-hour coffee shops serving as places for adolescents to begadang while working on assignments or socializing, illustrate how the environment contributes to shaping this habit (Wijaya, 2023). Although the literature has extensively identified the impacts and risks of begadang, and some case studies show efforts toward healthy behavioral adaptation, there remains a gap in the literature regarding interventions that are innovative and engaging, capable not only of increasing awareness but also of encouraging real behavioral change in the productive age group. Wijaya (2023) specifically highlights adolescents' low awareness of the dangers of begadang and minimal reading interest as primary obstacles in disseminating information. Therefore, this research is crucial to bridge this gap by focusing on developing critical and creative ideas that can generate inspiring and applicable solutions to address irregular sleep patterns.

### 1.2. Problem Formulation

Based on the background outlined, this research formulates the following research questions:

1.2.1. How do irregular sleep patterns and begadang affect cognitive function (focus, memory, decision-making) in individuals of productive age?

1.2.2. How does begadang contribute to an increased risk of physical health disorders (cardiovascular, metabolic, immunological) and hormonal dysfunction?

1.2.2. How do poor sleep patterns relate to a decrease in emotional stability and mental health issues (stress, anxiety, depression) in adolescents and young adults?

1.2.3. What are the relevant actual phenomena and case studies describing the problem of begadang and its impacts in society, particularly among university students and the younger generation?

1.2.4. How can the concepts and strategies of "innovative, engaging, and action-driving interventions" be formulated to increase awareness and motivate healthy sleep behavior changes in the younger generation, based on the identified literature gap?

1.2.5. What concrete recommendations can be provided to address the problem of begadang through interventions that are creative and adaptive to the target audience's lifestyle?

### 1.3. Research Objectives

In line with the problem formulation above, this research aims to:

1.3.1. Analyze the impact of irregular sleep patterns and begadang on cognitive function (focus, memory, decision-making) in individuals of productive age.

1.3.2. Identify the contribution of begadang to an increased risk of physical health disorders (cardiovascular, metabolic, immunological) and hormonal dysfunction.

1.3.3. Examine the relationship between poor sleep patterns and a decrease in emotional stability and mental health issues (stress, anxiety, depression) in adolescents and young adults.

1.3.4. Describe relevant actual phenomena and case studies concerning the problem of begadang and its impacts in society, particularly among university students and the younger generation.

1.3.5. Formulate concepts and strategies for “innovative, engaging, and action-driving interventions” to increase awareness and motivate healthy sleep behavior changes in the younger generation, based on the identified literature gap.

1.3.6. Present concrete recommendations to address the problem of begadang through interventions that are creative and adaptive to the target audience’s lifestyle.

### 1.4. Research Benefits

This research is expected to provide the following benefits:

#### 1.4.1. Theoretical Benefits

- Enrich the body of scientific knowledge regarding the multifaceted impacts of begadang and irregular sleep patterns from psychological, health science, and social perspectives.
- Bridge the literature gap by identifying the need for more innovative and action-oriented interventions to trigger healthy sleep behavior changes.
- Provide a conceptual framework for developing more effective and engaging educational models or health campaigns, especially for the younger generation

#### 1.4.2. Practical Benefits

- For Individuals (especially the younger generation): Increase awareness of the dangers of begadang and motivate them to adopt healthier sleep patterns, which in turn can improve their quality of life, physical health, mental well-being, and academic/professional performance.
- For Institutions/Government/Educators: Provide a basis for designing more relevant, creative, and impactful intervention programs or health campaigns to address the problem of begadang in society.
- For the Author: Deepen understanding in composing innovative, high-quality scientific works suitable for academic forums, and enhance the ability to process original ideas into structured writing.
- For Students (in general): Offer an example of structured and high-quality scientific writing, and provide inspiration for producing research with practical impact.

## 2. Literature Review

### 2.1. Conceptualization of Terms: Begadang in Psychological and Health Science Perspectives

According to Sakhawah (2023), sleep is defined as a recurring physiological process that occurs over a specific period. Sleep duration is measured from the moment someone falls asleep until they wake up, while sleep quantity refers to the total optimal sleep time, adjusted for an individual’s age and physical condition (Sakhawah, 2023, citing Pinalosa et al., 2018; Nailufar et al., 2022).

Within the body’s mechanisms, the sleep cycle involves the critical role of homeostasis, where neuron cell activity in the brainstem and neurotransmitter functions produced by the hypothalamus are interconnected. The primary regulation of sleep duration and timing is controlled by the

suprachiasmatic nucleus (SCN), a part of the brain that triggers drowsiness at night. Effective management of this sleep-wake cycle significantly influences the body's behavioral and physiological responses (Sakhawah, 2023, citing Reza et al., 2019).

Sakhawah (2023) explains that short sleep is generally defined as a sleep duration of less than seven hours, often not even reaching five hours per day. Sleep patterns in the adolescent to young adult age group (16-30 years) exhibit different characteristics compared to other age groups, partly influenced by changes in hormonal conditions at the end of puberty (Sakhawah, 2023, citing Pinalosa et al., 2018).

Referring to various recommendations, Sakhawah (2023) highlights that the ideal sleep duration varies according to age group. Generally, young adults (18-25 years) and middle-aged adults (26-64 years) are recommended to sleep for 7-9 hours. Meanwhile, the elderly (aged  $\geq 65$  years) require approximately 7-8 hours per day, although individuals aged over 60 years ( $>60$  years) often sleep around 6 hours daily (Sakhawah, 2023, citing Hasiando et al., 2019). The latest recommendations from the National Sleep Foundation, also cited by Sakhawah (2023), reinforce that young adults (18-25 years) and adults (26-64 years) ideally sleep 7-9 hours, with a minimum of 6 hours if optimal duration cannot be achieved (Sakhawah, 2023, citing Damay, 2018).

More specifically, Sakhawah (2023) also outlines sleep needs by age according to the Indonesian Ministry of Health (Kemenkes RI, 2018a): infants aged 0-1 months require 14-18 hours; 1-18 months require 12-14 hours; 18 months-3 years require 11-13 hours; 3-6 years require 11 hours (including naps); 6-12 years require 10 hours (including naps); 12-18 years require 8-9 hours; 18-40 years require 7-8 hours; 40-60 years require 7 hours; and seniors  $>60$  years require 6 hours per day (Sakhawah, 2023).

The sleep patterns and duration of each individual vary based on age group. For young adults (18-40 years), normal sleep duration is not significantly different from adolescents, typically 7-8 hours per day with 20-25% REM (Rapid Eye Movement) phase. For middle-aged adults (40-60 years), the total sleep duration is similar, 7-8 hours per day with approximately 20% REM phase. Meanwhile, for older adults ( $>60$  years), the total sleep duration is 6 hours per day with 20-25% REM phase, although it is often accompanied by sleep disturbances such as insomnia and frequent awakenings (Sakhawah, 2023, citing Alfi & Yuliwar, 2018). In Sakhawah's own research, the recommended normal sleep duration for adults refers to the Kemenkes RI standard, which is 7-8 hours per day (Sakhawah, 2023).

Complementing the understanding of sleep duration, circadian rhythm also plays a crucial role in regulating human physiological and behavioral processes, significantly impacting quality of life (Pradhan et al., 2024). Pradhan et al. (2024) explain that humans experience daily and seasonal cycles caused by the Earth's rotation on its axis and its revolution around the sun. Nearly all physiological functions in the body, including heart rate, body temperature, sleep-wake cycles, mood, stress response, and menstrual physiology, exhibit rhythms synchronized with this natural periodicity. This phenomenon of rhythm synchronization is mediated through the body's internal biological clock (Pradhan et al., 2024).

According to Pradhan et al. (2024), there are various types of biological rhythms classified by the duration of one cycle completion, such as circadian rhythms (approximately 24 hours), ultradian rhythms (less than 24 hours), and infradian rhythms (more than 24 hours). Among these various types of rhythms, the circadian rhythm is the most extensively studied and has a significant influence on human health and performance (Pradhan et al., 2024, citing Pati, 2001). Pradhan et al. (2024) also emphasize that although circadian rhythms are highly influenced by light and dark exposure, organisms in constant light or dark conditions still exhibit rhythms with altered phases and periods. This indicates that these rhythms are endogenously controlled in almost all organisms, including humans (Pradhan et al., 2024, citing Kunorozva et al., 2012; Pati, 2001).

Pradhan et al. (2024) further assert that components of physical performance, such as aerobic-anaerobic strength, muscular endurance, and flexibility, as well as hormone secretion, also exhibit circadian rhythms. Therefore, it is important for managers and policymakers involved in competitive

sports and athletic events to consider the effects of circadian rhythm on athletes and their performance (Pradhan et al., 2024, citing Sabzevari Rad et al., 2021). Thus, *begadang* in the context of this study can be defined as a sleep pattern that deviates from the recommended sleep duration and the body's natural circadian rhythm. This condition is generally characterized by short or irregular sleep times (consistently less than 7 hours).

## 2.2. *Decreased Focus Due to Begadang*

Sleep deprivation, whether in the form of partial sleep loss (such as fragmented or short-duration sleep) or total sleep loss (staying awake all night), is proven to have systemic impacts on various human cognitive functions. Research cited by Khan and Al-Jahdali (2023) states that continuous sleep restriction is more damaging than total sleep loss for one night, as explained by Lo et al. (2012). This is closely related to the normal sleep process, which consists of three non-rapid eye movement (NREM) phases and one rapid eye movement (REM) phase, each playing a crucial role in neuron function recovery, emotional regulation, and neurotransmitter receptor restoration. REM phase deprivation leads to impaired threat assessment, while NREM deficiency inhibits the release of certain neurotransmitters, thereby reducing the brain's ability to restore its sensitivity and efficiency (Eugene & Masiak, in Khan & Al-Jahdali, 2023).

One of the primary impacts of sleep deficiency is an imbalance in the brain's attention system. Under conditions of adequate sleep, there is coordination between the default mode network (DMN), involved in reflective activities and internal tasks, and the fronto-parietal network (FPN), responsible for external attention. This balance is supported by stimulation from the thalamus, resulting in stable and sustained focus. However, when sleep deficiency occurs, an unbalanced inhibition between DMN and FPN activity leads to disruptions in brain activity, where the DMN becomes overactive and the FPN weakens (Khan & Al-Jahdali, 2023, citing Wang et al., 2015; Kajimura et al., 2020; Fox & Raichle, 2007). Consequently, individuals fail to focus on external tasks because the brain is unable to suppress internal distractions. This explains why students who *begadang* often experience difficulty maintaining focus in lectures or during important exams.

This decrease in focus is also reflected in visual function and short-term memory. Brain imaging studies show that individuals experiencing sleep deprivation exhibit a significant reduction in the activation of the parahippocampal area (PPA) and fronto-parietal cortex when performing visual tasks, and also experience impaired integration between their parts (Chee et al., 2010). This decline leads to an inability to complete visual tasks requiring precision and high concentration. Similar findings are demonstrated through PET scans, which indicate decreased activity in the thalamus and prefrontal cortex—two brain regions highly associated with attention and alertness (Thomas et al., 2000; Tomasi et al., 2009). Furthermore, lack of sleep also impacts working memory, which is the system that temporarily stores information for active processing in the mind. Pezzulo (2007) explains that this concept, as developed by Baddeley and Hitch (1974), refers to the brain's capacity to temporarily maintain and manipulate information to complete complex cognitive tasks such as thinking, planning, and language comprehension. Sleep deprivation disrupts memory consolidation processes in the hippocampus, primarily through interference with long-term potentiation (LTP) mechanisms and NMDA receptors, which are essential for long-term memory formation (Hernandez & Abel, 2011; Gais et al., 2007). As a result, individuals may experience reduced recall, speech difficulties, and impaired verbal information processing (Binder et al., 2000).

The impact of sleep deprivation does not stop at attention and memory but also extends to decision-making and emotional control. Yoo et al. (2007) showed that sleep deprivation leads to a disconnect in functional connectivity between the amygdala, which regulates emotions, and the medial prefrontal cortex (mPFC), which functions to inhibit excessive emotional impulses. When this connection is disrupted, individuals become more emotionally reactive to negative stimuli and lose the ability to rationally assess situations. Another study by Killgore et al. (2007) showed that sleep deprivation prolonged latency in moral decision-making, indicating impaired integration between logic and emotion. This phenomenon was also observed in tragic events such as the Challenger Space

Shuttle accident (1986), where errors in judgment due to fatigue and working early mornings were identified as major contributing factors (Khan & Al-Jahdali, 2023).

Another affected cognitive aspect is the mesolimbic reward system, a brain network involved in motivation and reward-based decision-making. Krause et al. (2017) revealed that sleep deprivation causes disturbances in this system, leading individuals to exhibit impulsive behavior, increased sensation-seeking, and decreased ability to assess the consequences of actions (Anderson et al., 2018). These behavioral changes directly affect the performance of students and professionals in completing tasks that demand constant evaluation. For instance, a study by Nurlela, Sulvinajayanti, & Afiah (2023) on Indonesian university students showed that the habit of begadang triggers negative moods such as irritability, fatigue, sadness, and lack of motivation. Consequently, students experience decreased concentration, a tendency to procrastinate on assignments, and a decline in their Grade Point Average (GPA). This effect is reinforced by research from Isnaningsih and Sari (2022) which asserts that mental fatigue due to begadang can directly impact academic performance quality.

Overall, scientific evidence indicates that begadang has a complex and damaging impact on the neurological balance required for optimal cognitive function. Disruptions in attention, memory, decision-making, and emotional control become increasingly apparent when sleep patterns are disturbed over prolonged periods. For students and young professionals, these consequences not only reduce productivity but also increase the risk of fatal errors and failure to achieve academic and career goals. Therefore, a deep understanding of the impact of begadang on brain function needs to be instilled as part of mental health education and the formation of a sustainable learning culture.

### *2.3. Risk of Health Disorders Due to Irregular Sleep Patterns*

Irregular sleep patterns, whether insufficient sleep or poor sleep quality, not only affect cognitive function but are also closely linked to an increased risk of various serious physical and mental health disorders, including chronic diseases. Sleep is a fundamental need for the body to rest and recover (Handayani, 2021). However, many individuals, especially adolescents and the elderly, often neglect healthy sleep patterns, leading to inadequate sleep duration and disturbed sleep quality (Handayani, 2021; Rachmadina et al., 2025).

Sleep disturbances have long been associated with an increased risk of cardiovascular and metabolic diseases. For example, in the elderly, irregular sleep patterns such as insomnia and sleep apnea significantly increase the risk of chronic diseases like hypertension and heart disease because poor sleep quality can disrupt blood pressure regulation and increase cardiac workload (Rachmadina et al., 2025, citing Ariyanto, 2023). Sleep apnea, with repeated breathing pauses, causes a drop in blood oxygen levels which triggers oxidative stress, damaging blood vessels and the heart, and increasing the risk of cardiovascular diseases such as heart attack and stroke. This disorder also contributes to insulin resistance and the development of type 2 diabetes (Rachmadina et al., 2025, citing Siregar, 2022). Meanwhile, insomnia can increase cortisol levels, a stress hormone associated with increased appetite and decreased metabolism, leading to unhealthy weight gain, obesity, and lipid disorders (Rachmadina et al., 2025, citing Setiawan & Wulandari, 2023). Poor sleep quality is also linked to blood glucose levels in patients with type 2 diabetes mellitus (Tajiwalar et al., 2023; Amelia et al., 2020, cited in Rachmadina et al., 2025 bibliography). Furthermore, poor sleep patterns also affect liver function, where begadang can increase SGPT or ALT enzyme levels, indicators of liver damage, because it disrupts the organ's biological clock (Handayani, 2021, citing Suryani, 2019; Choi et al., 2019).

In addition, sleep patterns have a crucial relationship with the balance of the autonomic nervous system (ANS) and cardiovascular health; sleep is a physiological process that regulates the ANS (Rozy & Risdiana, 2019, citing Tobaldini et al., 2013). Sleep disturbances increase the risk of sudden cardiac death due to ANS imbalance and sympathetic nervous system release that alters the Heart Rate Variability (HRV) index, particularly Standard Deviation of all N-N intervals (SDNN). Low SDNN reflects this imbalance (Rozy & Risdiana, 2019, citing Jackowska et al., 2012). Although the research by Rozy & Risdiana (2019) on young adults in Yogyakarta found no significant relationship

between sleep pattern disturbances and SDNN, this was due to the majority of respondents having “good” sleep patterns and “very high” SDNN, indicating a balanced ANS (Rozy & Risdiana, 2019). However, they noted that these findings contradict other studies showing that increased sleep pattern disturbances are related to low HRV, emphasizing that varied or disturbed sleep patterns can be predictors of ANS imbalance and cardiovascular disease risk (Rozy & Risdiana, 2019, citing Rodriguez-Colon et al., 2015; Jackowska et al., 2012). From an immunological perspective, sleep deprivation is known to suppress the immune system, making the body vulnerable to infections by reducing cytokine production and disrupting T-cell activity (Irwin et al., 2019; Cohen et al., 2009). Meanwhile, from an endocrinological perspective, chronic sleep deprivation can disrupt the secretion of vital hormones, such as increasing cortisol and affecting the appetite hormones ghrelin and leptin, which explains the increased risk of obesity (Spiegel et al., 2004). Insulin sensitivity can also decrease, increasing the risk of type 2 diabetes, as sleep plays a role in glucose metabolism regulation (Tasali et al., 2008), and disturbances in growth hormone and testosterone production can also occur, affecting overall body recovery and function (Van Cauter & Plat, 2010).

In addition to physical impacts, irregular sleep patterns also trigger psychological problems, which often become the main cause of insomnia in adolescents (Nurmawati et al., 2025, citing Putri, 2017). Anxiety is one of the primary causes of insomnia in adolescents (Nurmawati et al., 2025), where feelings of worry and tension inhibit body relaxation and cause difficulty falling asleep (Novianti & Suadnyana, 2022, cited in Nurmawati et al., 2025). Research shows that anxiety is significantly related to insomnia, even moderate stress levels can lead to severe insomnia (Eliza et al., 2022 in Dwiyantri et al., 2023, cited in Nurmawati et al., 2025), and students experiencing anxiety tend to have poor sleep quality (Tanan et al., 2024, cited in Nurmawati et al., 2025). Academic stress is also a major cause of sleep disturbances in adolescents, where high achievement demands create a heavy mental burden, making adolescents sacrifice sleep time for studying, which actually decreases cognitive function and worsens stress (Nurmawati et al., 2025, citing Ranti, 2022 in Hakim et al., 2024). Riskesdas 2018 data shows that about 9.8% of adolescents experience symptoms of emotional disorders related to stress (Andini et al., 2023, cited in Nurmawati et al., 2025).

Excessive gadget use before bedtime also significantly contributes to insomnia in adolescents (Nurmawati et al., 2025). Exposure to blue light from gadgets inhibits the production of the hormone melatonin, which regulates the sleep-wake cycle (circadian rhythm), making it difficult for the body to feel sleepy (Nurmawati et al., 2025, citing Saputra et al., 2022; Fernando, 2020). Social media use for more than five hours per day is also significantly related to severe insomnia in university students (Fernando & Hidayat, 2020, cited in Nurmawati et al., 2025), and the longer social media is used, the higher the risk of insomnia in adolescents (Cahyani et al., 2023, cited in Nurmawati et al., 2025). Finally, unhealthy lifestyle patterns such as irregular eating habits, excessive caffeine or sugar consumption, and lack of physical activity also trigger sleep disturbances (Nurmawati et al., 2025). Caffeine, especially at night, increases brain activity and inhibits melatonin production, reducing sleep duration and quality (Cahyani et al., 2023, cited in Nurmawati et al., 2025). Overall, irregular sleep patterns are a major trigger for various health risks, from cardiovascular and metabolic disorders to immune and hormonal dysregulation, as well as significant psychological impacts, emphasizing the importance of improving sleep patterns as a key intervention to maintain health and quality of life (Rachmadina et al., 2025, citing Ariyanto, 2023; Siregar, 2022).

#### *2.4. Decreased Emotional Stability and Mental Health*

Disturbed sleep patterns do not only affect physical health but also significantly impact an individual's emotional stability and mental well-being. Stress, defined as a physical and psychological response to pressure (Rivaldi, 2024, citing Speilberger; Donsu, 2017), is a common phenomenon, especially among university students. High academic pressure, adaptation to new environments, financial issues, and personal and social expectations often become triggers for prolonged stress in students (Rivaldi, 2024). If this stress is not managed well, it can disrupt mental health, leading to anxiety, depression, phobias, and obsessive-compulsive disorder, which ultimately

hinder their activities and academic performance (Rivaldi, 2024). In this context, impaired physical health, such as sleep deprivation and irregular eating patterns, exacerbates mental conditions; students who frequently stay up late for assignments are at risk of experiencing more serious health problems (Rivaldi, 2024). Internal pressures like high expectations or perfectionist attitudes can also cause anxiety and dissatisfaction, adding to the psychological burden (Rivaldi, 2024). Interestingly, research by Wibisono et al. (2025) specifically demonstrates a significant positive influence between sleep duration and students' Grade Point Average (GPA), where every additional hour of sleep has the potential to increase GPA by 0.032 points, indicating that sleep duration explains 21.1% of GPA variation (Wibisono et al., 2025). This highlights that sleep deprivation affects not only emotions but also cognitive and academic performance. Therefore, it is crucial for students to recognize stress symptoms, utilize counseling services, learn time management, and build social support to maintain mental balance (Rivaldi, 2024).

The Ministry of Health of the Republic of Indonesia (2024) asserts that mental health is an integral part of the comprehensive health concept, not merely the absence of mental disorders, but also an individual's ability to be productive, cope with problems, and establish adequate social relationships (Kemenkes RI, 2024). Mental health is influenced by biological, psychological, social, and spiritual (biopsychosociospiritual) factors, where emotional stability, personal resilience, good stress management, and harmonious relationships with adequate social support play crucial roles (Kemenkes RI, 2024). Mental health problems (mental disorders), if not addressed promptly, can lead to permanent psychological disability (psychosocial disability), with WHO data indicating that 1 in 8 people worldwide suffer from mental problems or disorders (Kemenkes RI, 2024). In Indonesia, the prevalence of mental health problems, including depression and suicidal ideation, is also high, especially in the 15-24 age group and among women (Kemenkes RI, 2024). This implies that mental health issues affect people across various genders, ages, and socioeconomic backgrounds, affirming that these disorders occur throughout the human lifespan (Kemenkes RI, 2024). Furthermore, the condition of mothers experiencing depression or anxiety during pregnancy and postpartum negatively impacts the emotional development and adaptation of children into adolescence (Kemenkes RI, 2024). The adolescent phase itself, with significant physical and hormonal changes, can be a source of restlessness and concerns about body image, identity, and emotional regulation, all of which can affect mental well-being (Kemenkes RI, 2024). Data from the Indonesian National Adolescent Mental Health Survey (INAMHS) reports that 1 in 3 Indonesian adolescents aged 10-17 years have at least one mental problem or disorder, yet few seek professional help due to stigma and shame (Kemenkes RI, 2024).

In the context of emotions, Goleman (2016, in Amalia et al., 2024) classifies various types of emotional disturbances that affect mental stability, including pleasant emotions such as euphoria, elation, exaltation, and ecstasy which, despite being positive, can become unstable if excessive. Conversely, negative emotional disturbances include anhedonia (inability to feel pleasure), loneliness, shallowness of affect (flat or blunted emotions), affect and emotions inconsistent with the situation, labile emotions (rapid changes without control), affect variation (emotions changing throughout the day), rigid affect, ambivalence (inappropriateness of feelings), apathy (reduced affect and emotion accompanied by indifference), anger (fury expressed aggressively), depression (feelings of sadness and dejection), and anxiety (anticipatory emotional responses such as restlessness, worry, or nervousness) (Amalia et al., 2024). To manage emotions, particularly anger, Goleman (2016, in Amalia et al., 2024) emphasizes the importance of recognizing angry emotions, controlling them to prevent excess and aggressive behavior, and alleviating anger through activities such as solitude, exercise, or relaxation techniques (Amalia et al., 2024). Furthermore, expressing angry emotions assertively is also crucial, allowing an individual to convey honest feelings without hurting others (Amalia et al., 2024). Factors triggering anger can stem from external and internal sources, including physical factors like excessive fatigue, as well as psychological factors such as low self-esteem, arrogance, or egoism (Amalia et al., 2024). Various anger management techniques and programs have been developed to train individuals in identifying triggers, controlling responses, and building

effective communication (Amalia et al., 2024, citing Yunere et al., 2019; Marcus & Mattiko, 2007). Thus, the decline in emotional stability and mental health issues are closely linked to poor sleep quality and represent serious challenges requiring comprehensive intervention, both from individuals and institutional support.

### 2.5. Case Studies and Actual Phenomena

Sleep pattern disturbances, particularly staying up late (*begadang*), are a widespread phenomenon among adolescents and young adults, with significant implications for emotional stability and mental health. This phenomenon is highlighted not only from medical and psychological perspectives but is also relevant in religious studies and social behavior.

From a religious perspective, Nurip Almunawir (2021) in “The Prohibition of Staying Up Late as an Islamic Immunity Maintenance Perspective” examines hadith about the prohibition of staying up late, emphasizing the importance of this teaching as an effort to maintain bodily immunity (Almunawir, 2021). This qualitative research, which uses *takhrij* and *syarah* hadith methods with contemporary analysis, shows that the hadith narrated by Imam Ahmad No. 18945, which states “The Messenger of Allah ﷺ disliked sleeping before the Isha prayer and disliked talking (chatting, gossiping) after it (after Isha),” is authentic (*sahih*) and can be accepted as an Islamic argument (Almunawir, 2021). Almunawir (2021) explains that the Messenger’s dislike of staying up late, especially for permissible or unimportant matters, is based on its potential impacts such as missing night prayers or Fajr (Subuh) prayers (Almunawir, 2021, citing Al-’Asqalani, 2005). Although the original ruling is *makruh* (disliked), staying up late can become permissible (*mubah*) if it is for common good, or even forbidden (*haram*) if it is for disobedience (Almunawir, 2021, citing Fuad, 2020). The habit of staying up late, according to Almunawir (2021), negatively affects the body, causing fatigue, dizziness, dark under-eye circles, muscle pain, increased appetite (contributing to obesity), increased blood sugar levels, and decreased working memory capacity (Almunawir, 2021, citing Arieselia et al., 2014; Herwanto & Umboh, 2017; Purnama, 2021; Reza et al., 2019). A noisy environment in the morning can also disrupt the sleep quality of those who stay up late, even though quality sleep requires a quiet atmosphere at night (Almunawir, 2021, citing Rahmawati et al., 2021). Therefore, avoiding staying up late is essential to maintaining a healthy lifestyle and boosting body immunity (Almunawir, 2021). To overcome this habit, it is recommended to avoid excessive caffeine, not take overly long naps, calm the mind before sleep, keep gadgets away, maintain room temperature, turn off lights, complete tasks during the day, and avoid unimportant conversations near bedtime (Almunawir, 2021, citing Adzani, 2021; Sulistiyani, 2012).

A quantitative study by Ramadita, Harsanti, and Harmoni (2023) specifically investigated the effect of academic stress on sleep quality in final-year university students. With a sample of 130 students from at least semester 7 who were working on their thesis, the study found that academic stress significantly affected sleep quality (Ramadita et al., 2023). Simple linear regression test results showed a significance value of 0.000 ( $p < 0.01$ ) and an R Square value of 0.294, meaning academic stress contributed 29.4% to sleep quality, while the remaining 70.6% was influenced by other factors outside the study (Ramadita et al., 2023). Ramadita et al. (2023) explained that pressure to complete studies and thesis, both from campus and parents, can trigger stress that disrupts focus, appetite, and especially sleep quality, even causing nightmares (Ramadita et al., 2023, citing Mayoral, 2016; Shenoy, 2000; Ambarwati, Pinilih, & Astuti, 2017). This phenomenon occurs because stress triggers the release of hormones such as adrenaline, norepinephrine, and cortisol, which disrupt the central nervous system, keeping individuals awake or making it difficult to maintain sleep (Ramadita et al., 2023, citing Yusa & Triadi, 2022). Specific sources of academic stress for final-year students include difficulties in writing a thesis, finding references, time constraints, and repeated revision processes (Ramadita et al., 2023, citing Wulandari, 2012). These findings are consistent with previous research showing a significant relationship between academic stress and sleep quality in university students (Ramadita et al., 2023, citing Shofia & Trihandayani, 2023; Noveni et al., 2022; Giese et al., 2013; Becker et al., 2015). In addition to academic stress, Ramadita et al. (2023) also identified other factors affecting

sleep quality, such as lifestyle, environment, caffeine and alcohol consumption, diet, and smoking (Ramadita et al., 2023, citing Berman, Snyder, & Frandsen, 2022).

Another study by Purwanto, Anganti, Yahman, and Hirdhania (2019) identified the characteristics of sleep disturbances in productive age (15-44 years) and middle age (44-64 years) in Surakarta City. This observational study with a cross-sectional design involved 459 respondents and used the Insomnia Severity Index (ISI) questionnaire (Purwanto et al., 2019). The results showed that the majority of respondents experienced mild insomnia (45.5%) and moderate insomnia (41.0%), with only 8.1% not experiencing insomnia (Purwanto et al., 2019). The main problem most commonly experienced was difficulty initiating sleep (80.2%), followed by difficulty maintaining sleep (54.7%) and waking up too early (44.0%) (Purwanto et al., 2019). As many as 62.1% of respondents were dissatisfied with their sleep, and 66.9% felt that their sleep problems affected their quality of life (Purwanto et al., 2019). The majority (46.3%) of respondents experiencing insomnia were at 20 years old (Purwanto et al., 2019). Purwanto et al. (2019) explained that in their 20s, sleep difficulties are often caused by overthinking, working on college assignments, and the habit of playing gadgets before sleep, which collectively disrupt sleep schedules and health (Purwanto et al., 2019). Written interview results also indicated that using gadgets before sleep, even with the intention of helping to fall asleep, often paradoxically causes sleep difficulties because respondents get engrossed in watching movies or videos (Purwanto et al., 2019). Other factors causing difficulty maintaining sleep include the habit of drinking before sleep which triggers waking up to use the bathroom, or thinking about unfinished tasks (Purwanto et al., 2019). Solutions attempted by respondents to overcome insomnia included turning off lights, reciting dhikr, listening to murottal (Quran recitation), washing face/performing ablution (wudhu), playing gadgets, forcing themselves to sleep, and reading books (Purwanto et al., 2019). Purwanto et al. (2019) affirmed that sleep disturbances remain a significant problem in productive and middle-aged individuals in Surakarta, and therapy for sleep initiation difficulties is crucial to improving daily activities and the quality of life for sufferers (Purwanto et al., 2019).

The phenomenon of sleep disturbance is also evident in the case study by Karlina and Fitriani (2022) which examined the healthy behaviors of students at the Faculty of Social Sciences (FIS) Universitas Negeri Padang (UNP). This qualitative research was motivated by data showing that 818 FIS UNP students sought treatment at the university clinic between 2020-2022, making it the faculty with the highest number of students seeking treatment (Karlina & Fitriani, 2022). Based on observations, interviews with 16 informants (active FIS UNP students attending in-person lectures and involved in student organizations), and document studies, this research identified several healthy behaviors applied by students (Karlina & Fitriani, 2022). These behaviors included maintaining eating patterns at least twice a day, consuming vegetables, fruits, and supplements/vitamins to maintain body immunity (Karlina & Fitriani, 2022). Despite economic limitations, students were able to prioritize basic needs and manage their allowance to buy fruits or receive staple food deliveries from parents (Karlina & Fitriani, 2022). In addition, students also engaged in physical activities such as light exercise for at least 10 minutes a day, increasing walking, or activities like cleaning their homes/dorm rooms (Karlina & Fitriani, 2022). They also accustomed themselves to sleeping at 10:00 PM and avoiding staying up late (begadang), as well as managing assignment completion time so as not to disrupt sleep patterns (Karlina & Fitriani, 2022). Students also demonstrated personal hygiene behaviors by bathing 2-3 times a day, habitually washing hands, and washing clothes after a single use (Karlina & Fitriani, 2022). Finally, maintaining a clean dorm environment by sweeping, disposing of trash, and regularly participating in mutual cooperation (gotong royong) were also part of their healthy behavior practices (Karlina & Fitriani, 2022). These healthy behaviors were adopted in response to the threat of various diseases, including COVID-19 and monkeypox (Karlina & Fitriani, 2022).

In a further literature review on the impact of staying up late (begadang), Aulia, Sianturi, Ginting, Siregar, Sigalingging, Tarihoran, Siregar, Manalu, Ihsan, and Harahap (2025) elaborated on the effects of staying up late on physical and mental health. They defined staying up late as the habit

of staying awake at night and sleeping in the morning or daytime, caused by various factors such as work demands, studies, and entertainment (Aulia et al., 2025). Their research highlighted that sleep deprivation due to staying up late can cause fatigue, metabolic disorders, and an increased risk of chronic diseases such as diabetes, obesity, and heart disease (Aulia et al., 2025, citing Cappuccio et al., 2010; Taheri et al., 2004). Furthermore, cell regeneration and organ recovery are also disrupted if the body does not get enough rest (Aulia et al., 2025). From a mental health perspective, sleep deprivation is strongly associated with increased stress levels, anxiety, and decreased cognitive performance (Aulia et al., 2025). To reduce the negative impacts of staying up late, it is recommended to implement a consistent sleep schedule, avoid caffeine before bedtime, and create a comfortable sleeping environment. Thus, individuals are expected to be wiser in managing their sleep time to improve overall physical and mental health (Aulia et al., 2025).

Overall, from a visual communication design perspective, R. P. Wijaya (2023) in his research on “Designing a Digital Illustration Book as a Social Campaign Medium about the Dangers of Staying Up Late (Begadeang) for Productive Age Adolescents” identified that a lack of awareness among adolescents regarding the impact of staying up late and low reading interest are problems (Wijaya, 2023). Based on interviews with dr. Muhammad Jalul M, he explained that sleep difficulties in adolescents are often caused by changes in sleep patterns, caffeine consumption, stress, noisy environments, and certain medical conditions. The impacts of staying up late include headaches, excessive drowsiness, easy fatigue, hypertension, heart disease, diabetes, and poor concentration (Wijaya, 2023). Recommended solutions include regular sleep schedules, breathing exercises, physical exercise, limiting caffeine, increasing daytime activity, adequate naps, avoiding smoking, and maintaining a comfortable bedroom (Wijaya, 2023). Actual phenomena found through observation show that 24-hour coffee shops in Surabaya become gathering places for adolescents to stay up late, often to do assignments, play games, or socialize (Wijaya, 2023). The coffee shop environment, which supports excessive tobacco and coffee consumption, exacerbates the physical and psychological health risks due to staying up late (Wijaya, 2023). This reinforces that lack of rest can affect memory and concentration, negatively impacting adolescents’ academic achievement (Wijaya, 2023). Wijaya’s (2023) literature study also reviewed illustration books such as “The Importance of Sufficient Sleep for Teenagers” by Karillah Noriza Jasmin and “Wake Up Sloth!” by Aulia Hanifa, which use engaging language and visuals to raise adolescents’ awareness about the importance of sleep (Wijaya, 2023). Based on interview results, observations, and literature study, Wijaya (2023) concluded that productive age adolescents (9-24 years old) require engaging visual learning media, such as digital illustration books, to increase awareness about the dangers of staying up late (Wijaya, 2023). The design of this book, with a comic illustration and flat design style, the use of soft and calming colors, and a single main character depicting an adolescent affected by staying up late, aims for the message to be easily digestible and to focus on the dangers of staying up late (Wijaya, 2023). The campaign techniques used are reward (explaining good and bad impacts) and visual arrangement (visually pleasing depiction), which are expected to foster adolescents’ awareness of the importance of healthy sleep patterns (Wijaya, 2023). This indicates an urgent need for innovative interventions relevant to the current lifestyle of adolescents.

## 2.6. *Synthesis and Research Conceptual Direction*

The various literature reviews and case studies above comprehensively describe the multifaceted impacts of staying up late (begadang) and irregular sleep patterns on individuals, particularly adolescents and young adults. The definition of sleep, encompassing duration and essential circadian rhythms (Sakhawah, 2023; Pradhan et al., 2024), serves as a foundation for understanding sleep pattern deviations as triggers for health problems. Sleep deprivation has been neurologically proven to impair focus, affect the balance of brain networks such as the DMN and FPN, and decrease working memory capacity and memory consolidation (Khan & Al-Jahdali, 2023). Furthermore, its impact extends to decision-making, emotional control, and the mesolimbic reward

system, significantly affecting academic performance and impulsive behavior (Yoo et al., 2007; Krause et al., 2017; Nurlela et al., 2023; Isnainingsih & Sari, 2022).

Moreover, poor sleep quality is strongly correlated with an increased risk of serious physical health disorders, including cardiovascular diseases, metabolic conditions such as hypertension, obesity, and type 2 diabetes, as well as liver dysfunction (Rachmadina et al., 2025; Handayani, 2021). This condition also disrupts the balance of the autonomic nervous system, suppresses the immune system, and impairs the regulation of vital hormones, all of which contribute to a decline in overall health and quality of life (Rozy & Risdiana, 2019; Irwin et al., 2019; Spiegel et al., 2004). Psychologically, irregular sleep patterns are often at the root of declining emotional stability and mental health problems, triggering stress, anxiety, and depression, as data on the prevalence of mental disorders in Indonesia also show high rates in the productive age group (Nurmawati et al., 2025; Rivaldi, 2024; Kemenkes RI, 2024). External factors such as academic demands, excessive gadget use (Wijaya, 2023), and unhealthy lifestyles further exacerbate this phenomenon.

Although literature has widely identified the impacts and risks of staying up late, and some case studies have shown healthy behavior adaptation efforts (Karlina & Fitriani, 2022), there remains a gap in the literature regarding innovative and engaging interventions that can both raise awareness and encourage real behavioral change in the productive age group. Wijaya (2023) highlighted adolescents' low awareness of the dangers of staying up late and minimal reading interest as obstacles. Therefore, this research departs from the need to bridge this gap by exploring innovative conceptual and action strategies that not only educate but also motivate individuals to adopt healthy sleep patterns. The conceptual direction of this research will focus on developing critical and creative ideas to create solutions that encourage real action in maintaining sleep patterns, considering psychological, social, and effective communication design aspects to target the younger generation. This is expected to contribute to a deeper understanding of how stimulated awareness can be converted into long-term behavioral change for overall improvement in quality of life and mental health.

### 3. Research Methodology

#### 3.1. Type and Approach of Research

This research adopts a qualitative approach to deeply explore the phenomenon of staying up late (*begadang*) and its implications, as well as to formulate innovative ideas as solutions. The qualitative approach was chosen because it allows researchers to holistically and comprehensively understand how a social phenomenon develops, including how individuals or groups form their perspectives on a reality (Denzin & Lincoln, 2011). This approach is relevant for answering fundamental questions such as why people behave in certain ways, how attitudes are formed, and how they are influenced by the social environment, without being fixated on data quantification. This study is classified as a qualitative literature study or a systematic-interpretive literature review. This classification is suitable because the research does not involve primary field data collection, such as through respondents, questionnaires, or experiments, but instead focuses on comprehensive and credible secondary data analysis. The main characteristics of this approach and type of research include:

- **Description and Interpretation:** This research will focus on describing and interpreting the phenomenon of staying up late and its impacts. This will be based on existing literature reviews and observations of actual phenomena that have been identified.
- **Flexible yet Systematic Process:** Although qualitative research is known for its flexibility in information collection and analysis, the process in this study will still be carried out systematically. This aims to ensure conceptual validity and build strong arguments.
- **Emphasis on Natural Context:** The analysis will always be linked to the natural context of the phenomenon of staying up late occurring in society. This is reinforced by referring to case

studies and actual phenomena that have been identified and discussed in Chapter II (Literature Review).

- Focus on Experience, Logic, and Phenomena: This research will not be oriented towards numerical data or statistics. Instead, its focus is on subjective experience (extracted from literature data and observation of phenomena), logical thinking, and the correlation between various phenomena linked to relevant literature. This approach opens opportunities for the emergence of new concepts or theoretical frameworks related to innovative solutions.

### 3.2. Data Collection Methods and Techniques

In this qualitative literature study research, the primary data collection method used is a systematic literature review. This method involves the systematic and objective identification, evaluation, and synthesis of relevant literature. A systematic literature review ensures that all information used originates from credible sources and has undergone a scientific validation process. The data collection techniques applied include:

- Academic Database Searching: Conducting comprehensive searches in various leading scientific databases.
- Document Study: Collecting and analyzing relevant documents, including journal articles, book chapters, research reports, official institutional publications, and case studies.
- Cross-Source Verification: Comparing information from various sources to ensure data consistency and reliability, and to avoid biased or inaccurate information.
- The primary data sources in this research entirely originate from comprehensive and credible secondary data. This data includes:
  - Scientific Journals: Articles from indexed journals discussing sleep patterns, staying up late (begadang), sleep deprivation, its impacts on physical and mental health, cognitive function, and related interventions (e.g., Sakhawah, Pradhan et al., Khan & Al-Jahdali, Rachmadina et al., Nurmawati et al., Rivaldi, Wibisono et al., Aulia et al.).
  - Reference Books: Book publications relevant to the disciplines of sleep psychology, mental health, neurocognition, and behavioral change (e.g., Goleman, 2016).
  - Official Institutional Reports: Official documents and publications from government institutions such as the Ministry of Health of the Republic of Indonesia (Kemenkes RI, 2018a, 2024), or data from global health organizations like the World Health Organization (WHO), providing statistical information or policies.
  - Case Studies and Previous Research: Various case studies and empirical research conducted by other researchers (e.g., Nurip Almunawir, Ramadita et al., Purwanto et al., Karlina & Fitriani, Wijaya) relevant for describing actual phenomena and identifying research gaps.

All data sources are carefully selected to ensure their relevance, credibility, and timeliness, in order to build a strong argument and generate innovative solutions.

### 3.3. Data Collection Procedures

The data collection procedures in this research are conducted iteratively and systematically, reflecting a deep qualitative literature study approach:

#### 3.3.1. First Data Collection Procedure: Identification of Keywords and Research Questions

The initial stage involves determining a series of relevant and specific keywords for the research topic. These keywords are formulated based on the main issues of staying up late, its impacts, and the focus on innovative solutions. Examples of keywords include "begadang," "sleep deprivation," "sleep quality," "impact of staying up late," "mental health," "cognitive function," "circadian rhythm," "emotional disturbance," "sleep interventions," "health education," and "innovative sleep solutions." Concurrently, initial research questions are also formulated to guide the direction of literature search and ensure the relevance of the collected information.

### 3.3.2. Second Data Collection Procedure: Systematic Literature Search

Using the established keywords, the researcher conducts a systematic literature search across various prominent scientific databases (such as Google Scholar, ScienceDirect, PubMed, Scopus, and Web of Science). This search process is performed by combining Boolean operators (AND, OR, NOT) to effectively narrow down and broaden search results. In this stage, initial literature selection is carried out based on the relevance of titles and abstracts to ensure that the articles or publications found truly align with the research focus and objectives.

### 3.3.3. Third Data Collection Procedure: Source Selection and Verification

After the initial search, the selected documents (journal articles, books, reports, case studies) will undergo a stricter selection phase. The researcher reads the abstract and introductory or conclusion sections to ensure the depth of relevance and validity of the sources. Each source will also be verified for authenticity and credibility to uphold scientific integrity and objectivity. The researcher ensures that information originates from reputable publications or recognized institutions.

### 3.3.4. Fourth Data Collection Procedure: Full Reading and Extraction of Critical Information

Documents that pass the selection will be read fully and thoroughly. At this stage, key information is extracted and carefully recorded. The recorded information includes: concept definitions, relevant theories, previous research findings, statistical data, concrete case studies, impacts of staying up late (physiological, cognitive, psychological), previously offered solutions, and identified research gaps from each source. Extraction is performed by focusing on relevant and essential details.

### 3.3.5. Fifth Data Collection Procedure: Accurate Recording and Citation

All extracted information will be recorded systematically. It is crucial to ensure that all information quoted, paraphrased, or summarized from external sources is cited correctly (author's name, year of publication) at the beginning or end of the sentence, in accordance with scientific writing guidelines. If direct words from other authors are used, quotation marks ("...") will be employed to indicate them. For very long quotations, the text format will be indented to differentiate it from the main text and to comply with writing ethics. This is strictly done to ensure no false information regarding citation sources, avoid plagiarism, and ensure transparency of data sources.

## 3.4. Analysis Techniques and Conclusion Drawing

Data analysis in this research is conducted qualitatively-descriptive and interpretively through a series of structured stages, designed to generate deep understanding and innovative ideas:

### 3.4.1. Data Reduction: Core Information Filtering

The initial stage of analysis is data reduction. In this stage, information extracted from various literature sources is carefully filtered and sorted. The primary focus is to identify and retain core data most relevant to the research objectives, while eliminating less important or redundant information. This reduction allows the researcher to focus on the essence of findings and arguments from the literature.

### 3.4.2. Data Presentation: Thematic Categorization and Structuring

The reduced data is then presented through thematic categorization. Information is grouped into logical categories relevant to the structure and flow of the article's discussion. This categorization includes the physiological impacts of staying up late, cognitive impacts, psychological impacts, actual phenomena occurring in society, and solutions previously offered or proposed in the literature. This structured data presentation facilitates the process of comparative analysis and synthesis.

### 3.4.3. Thematic and Comparative Analysis: Identifying Patterns and Gaps

At this stage, an in-depth analysis of the emerging themes from the presented data is conducted. The researcher compares findings from various sources to identify consistent patterns, similarities in impacts and causes, differences in perspectives, and most importantly, to identify gaps or unaddressed voids in the existing literature. This analysis also includes:

- Identification of Central Problems: Detailing the main problems related to staying up late that consistently emerge from various literature data.
- Conceptual Synthesis: Integrating various concepts, theories, and findings from the literature to build a complete and cohesive understanding of the phenomenon of staying up late and its implications, as formulated in the Synthesis and Conceptual Direction of Research section (Chapter II).

### 3.4.4. Development of Innovative Ideas: Formulation of Innovative Solutions

Based on the identified literature gaps and conceptual synthesis, this research proceeds to the development of critical and creative ideas. These ideas are formulated as potential solutions to the problem of staying up late, with a special emphasis on “innovative, appealing, and action-driving measures.” This is not just about education, but also how information can be packaged and disseminated to trigger positive and sustainable behavioral changes in individuals, especially the younger generation.

### 3.4.5. Conceptual Validation and Scientific Argumentation

Every developed idea will be conceptually validated. This means that the idea must be supported by strong scientific arguments, built from theoretical foundations and empirical findings that have been reviewed. This scientific argumentation ensures that the proposed solutions are not mere speculation but have a rational basis and potential for application. The quality of the argumentation will determine the strength of this article.

### 3.4.6. Conclusion Drawing and Recommendations: Contribution to Knowledge

The final stage is drawing conclusions and formulating recommendations. Conclusions will be drawn logically and consistently with the research questions and objectives, summarizing the main findings from the analysis. From these conclusions, practical suggestions and recommendations will be formulated, offering implications for further theory development, or leading to opportunities for further research. This process aims to ensure that this research not only provides new understanding but also contributes to the development of knowledge and encourages concrete steps in addressing the problem of staying up late.

## 4. Results and Discussion

This section presents the synthesized results from the systematic literature review regarding the phenomenon of staying up late (*begadang*) and its implications, along with an in-depth discussion connecting findings with theory and practice. The analysis is conducted based on secondary data collected from various credible sources, as outlined in Chapter III (Research Methodology), to answer the research questions and achieve the research objectives focused on formulating innovative ideas as solutions.

### 4.1. Research Findings

#### 4.1.1. Sleep Deficiency and Circadian Rhythm Dysregulation

Sleep is an essential physiological process whose duration and rhythm are crucial for optimal health. Literature asserts that staying up late (*begadang*) is defined as a sleep pattern that deviates

from the recommended sleep duration and the body's natural circadian rhythm, often characterized by consistently less than seven hours of sleep or irregular sleep times (Sakhawah, 2023; Pradhan et al., 2024). Each age group has different sleep duration needs; for instance, young adults (18-40 years) ideally require 7-8 hours of sleep per day. Deviation from this norm, as often occurs in individuals who stay up late, directly disrupts homeostatic mechanisms and the role of neurotransmitters that control the sleep-wake cycle (Sakhawah, 2023, citing Reza et al., 2019). Furthermore, the circadian rhythm, as an internal biological clock that aligns physiological functions with the day-night cycle, is highly vulnerable to disruption due to staying up late. Circadian rhythm disruption can affect heart rate, body temperature, mood, and even physical performance (Pradhan et al., 2024). This phenomenon forms the initial foundation for understanding why staying up late has such broad impacts on the body.

#### 4.1.2. Decline in Cognitive Function and Academic Performance

Staying up late significantly reduces cognitive capacity, especially the ability to focus and memory. Sleep deprivation causes an imbalance between the default mode network (DMN) and the fronto-parietal network (FPN) in the brain, resulting in a weakening of the ability to concentrate on external tasks and an increase in internal distractions (Khan & Al-Jahdali, 2023, citing Wang et al., 2015; Kajimura et al., 2020). This decline is evident in brain imaging studies showing impaired activation of brain areas related to visual and memory (Chee et al., 2010; Thomas et al., 2000; Tomasi et al., 2009). Moreover, sleep deprivation interferes with working memory—the brain's ability to process short-term information—and inhibits long-term memory consolidation in the hippocampus, leading to decreased recall and difficulty in verbal processing (Pezzulo, 2007; Hernandez & Abel, 2011). In university students, this impact manifests as difficulty concentrating, a tendency to procrastinate on assignments, and a decrease in Grade Point Average (GPA), as shown by Nurlela, Sulvinajayanti, & Afiah (2023) and Isnaningsih and Sari (2022).

#### 4.1.3. Disruption of Emotional Stability and Mental Health

Poor sleep quality is a primary trigger for reduced emotional stability and mental health problems. Stress, anxiety, and depression are common consequences of staying up late (Rivaldi, 2024; Nurmawati et al., 2025). This condition is exacerbated by high academic pressure and unhealthy lifestyles, particularly among university students (Rivaldi, 2024). The Ministry of Health of the Republic of Indonesia (Kemenkes RI, 2024) asserts that mental health is an integral part of comprehensive health, and data show a high prevalence of mental disorders, especially in the 15-24 age group in Indonesia. Staying up late also affects the connectivity between the amygdala (emotional center) and the medial prefrontal cortex (emotional impulse control), causing individuals to become more emotionally reactive and lose the ability to rationally assess situations (Yoo et al., 2007). Goleman (2016, in Amalia et al., 2024) outlines various emotional disturbances that can arise, ranging from anhedonia to anger and anxiety, all of which are complicated by irregular sleep patterns.

#### 4.1.4. Increased Risk of Chronic Physical Diseases

Beyond cognitive and mental impacts, staying up late significantly increases the risk of various chronic physical health disorders. Sleep deprivation is closely correlated with an increased risk of cardiovascular diseases such as hypertension and heart disease, where sleep disturbances can disrupt blood pressure regulation and increase cardiac workload (Rachmadina et al., 2025). Sleep apnea and insomnia also trigger oxidative stress and an imbalance of the autonomic nervous system (ANS), increasing the risk of sudden cardiac problems (Rozy & Risdiana, 2019). From a metabolic perspective, sleep deprivation is linked to insulin resistance, an increased risk of type 2 diabetes, obesity, and liver dysfunction (Rachmadina et al., 2025; Handayani, 2021; Spiegel et al., 2004). Additionally, the immune system is suppressed, making the body vulnerable to infections due to reduced cytokine production (Irwin et al., 2019).

#### 4.1.5. Triggering Factors and Actual Case Studies

Several key factors contribute to the habit of staying up late (*begadang*), especially among adolescents and young adults. Academic stress is a major trigger, significantly affecting the sleep quality of final-year university students (Ramadita et al., 2023). Excessive gadget use before sleep is also a cause of insomnia, as blue light exposure inhibits melatonin production (Nurmawati et al., 2025; Wijaya, 2023). Social phenomena such as 24-hour coffee shops also provide an environment that supports the habit of staying up late, exacerbated by excessive caffeine and tobacco consumption (Wijaya, 2023). Case studies show that adolescents' lack of awareness regarding the dangers of staying up late and low reading interest are obstacles in educational efforts (Wijaya, 2023). Although there are individual efforts to implement healthy behaviors, as found in FIS UNP students (Karlina & Fitriani, 2022), the challenge to change the habit of staying up late remains significant.

#### 4.2. Discussion

This discussion analyzes the research findings in more depth, connecting them with theoretical frameworks and identifying existing gaps in the literature. This section also presents innovative ideas proposed as concrete solutions to address the problems of staying up late and its impacts.

##### 4.2.1. Knowledge Gaps and the Urgency of Innovative Interventions

Although the literature review has comprehensively outlined the detrimental impacts of staying up late, ranging from cognitive dysfunction (Khan & Al-Jahdali, 2023), emotional and mental disturbances (Rivaldi, 2024; Kemenkes RI, 2024), to the risk of chronic physical diseases (Rachmadina et al., 2025), there remains a significant gap in the literature regarding interventions that are innovative, engaging, and effectively encourage real behavioral change, especially in the productive age group. Wijaya's (2023) study explicitly highlights low awareness and minimal reading interest among adolescents as major obstacles in disseminating information about the dangers of staying up late. This indicates that conventional educational approaches are often insufficient to trigger real action.

This gap serves as the starting point for this research, which aims not only to define the problem but also to formulate solutions that are adaptive to the lifestyle and preferences of the current younger generation. The importance of packaging information in an appealing and interactive format—is suggested by Wijaya (2023) through digital illustration books—is key to bridging the gap between knowledge (what should be done) and practice (what is actually done). This article argues that an approach that is not only informative but also inspiring and encourages active participation is essential to addressing the widespread habit of staying up late.

##### 4.2.2. Interconnections Among Concepts in the Phenomenon of Staying Up Late

To clarify the interconnections among the causes, impacts, and intervention areas related to the phenomenon of staying up late, a conceptual framework can be illustrated as follows: Triggers for staying up late, such as academic stress, excessive gadget use, and supportive social environments (e.g., 24-hour coffee shops), lead to Irregular Sleep Patterns. These patterns fundamentally trigger two central conditions: Circadian Rhythm Dysregulation and Sleep Deprivation. Both conditions then become the root of various negative impacts.

Sleep deprivation directly causes a Decline in Cognitive Function, manifesting as reduced focus and memory. Additionally, sleep deprivation also triggers Emotional Stability Disturbances, including stress, anxiety, and depression. No less important, there is an Increased Risk of Physical Diseases such as cardiovascular problems, metabolic issues, and immune system disorders. Circadian rhythm dysregulation significantly exacerbates these three direct impacts, creating a domino effect that further worsens the individual's condition. The combination of declining cognitive function, emotional disturbances, and the risk of physical diseases ultimately and collectively leads to an Overall Decline in Quality of Life.

In an effort to address this problem, a Gap is found in the form of a lack of awareness and reading interest among the public regarding the dangers of staying up late. This gap creates Barriers to Behavioral Change and makes Conventional Interventions less effective. Therefore, there arises a Need for Innovative Solutions capable of bridging this gap. These innovative solutions are expected to generate effective Concrete Action Ideas, leading to Increased Awareness, and ultimately triggering Positive Behavioral Change towards healthier sleep patterns. This framework indicates that staying up late is a multi-dimensional problem that requires a holistic approach, not only addressing symptoms but also root causes and barriers to behavioral change through innovative solutions.

#### 4.2.3. Theoretical Relevance and Contribution to New Knowledge

The findings of this research are consistent with the theoretical frameworks discussed in Chapter II, particularly theories about sleep regulation, cognitive function, and mental health. For instance, the theory of sleep homeostasis and circadian rhythm (Sakhawah, 2023; Pradhan et al., 2024) provides a basis for understanding why staying up late disrupts bodily balance. The concepts of DMN and FPN brain networks (Khan & Al-Jahdali, 2023) and the mesolimbic reward system (Krause et al., 2017) neurologically explain how staying up late affects focus, decision-making, and impulse control. The relationship between stress, emotion, and sleep is also reinforced by comprehensive mental health theories (Kemenkes RI, 2024) and the classification of emotional disturbances (Goleman, 2016, in Amalia et al., 2024).

The contribution of new knowledge from this research lies in the comprehensive synthesis of various impacts of staying up late that might have previously been scattered across different disciplines, as well as the emphasis on the gap in effective interventions. This research does not merely reiterate existing findings but integrates perspectives from psychology, health science, even religious studies (Almunawir, 2021) and visual communication design (Wijaya, 2023) to form a holistic understanding of the problem of staying up late. More importantly, this research fills a gap by guiding the formulation of critical and creative ideas for concrete action. Thus, this article is not just a literature review but a platform for modifying existing approaches and even creating new frameworks for more effective awareness campaigns and behavioral change interventions, especially for the younger generation vulnerable to the phenomenon of staying up late.

#### 4.2.4. Innovative Actions: Fostering a Healthy Sleep Culture Based on Digital and Community Platforms

Referring to the identified gaps—namely, low awareness and reading interest regarding the dangers of staying up late, and the need for interventions that drive real action—this research proposes innovative actions in fostering a healthy sleep culture. The core idea is to leverage digital platforms and communities to disseminate information in an engaging and interactive manner, targeting the younger generation. Examples of Concrete Action Ideas:

- “SleepSync Buddy” Application: Developing a mobile application that is not just a sleep tracker but also a “friend” providing interactive education about circadian rhythm, the neurological impacts of staying up late with visualizations (as discussed in 4.1.2), community-based sleep challenges (gamification), “nature sounds” and short meditation features, and personalized notifications encouraging timely sleep. This application could collaborate with mental health experts (as suggested by Rivaldi, 2024) and visual communication designers (Wijaya, 2023) for engaging content.
- Interactive Social Media Campaign #IstirahatKeren (RestIsCool): Launching a campaign on popular platforms (TikTok, Instagram) with short video content, animated infographics, and healthy sleep challenges. This content would be not only educational but also relatable and engaging, featuring micro-influencers or university students sharing positive experiences after adopting healthy sleep patterns. The theme “Rest Is Cool” or “Enough Sleep, Better

Performance” could be the main narrative, highlighting direct benefits on productivity and appearance.

- “Sleep Health Hub” Based on Campus Communities: Establishing units or study groups within university campuses focused on educating and supporting healthy sleep patterns. These groups can organize webinars with experts, stress management and relaxation workshops (consistent with Purwanto et al., 2019’s findings), and peer-counseling or sharing sessions for students struggling with sleep. This leverages the power of social support (Rivaldi, 2024) and community for behavioral change.
- Integration of “Sleep Literacy” Curriculum: Proposing the integration of “Sleep Literacy” material into general education courses at universities. This material would not only cover sleep physiology but also the impacts of staying up late on cognition and mental health, as well as practical sleep management strategies. This approach would systematically increase awareness and provide a strong knowledge base for students from an early age.

These ideas emphasize the importance of a proactive, preventive, and community-based approach, going beyond mere passive information dissemination. The goal is to create an ecosystem that supports healthy sleep patterns, aligning with the article’s objective to inspire concrete action.

#### 4.2.5. Implications and Prospects for Further Research

The implications of this research are extensive, particularly for university students, educational institutions, and health policymakers. For students, a deep understanding of the impacts of staying up late and the availability of innovative solutions are expected to encourage positive behavioral changes, improve academic performance, and maintain mental health. For educational institutions, these findings serve as a basis for developing more targeted and relevant campus health programs, such as strengthened counseling services or more engaging educational campaigns. For health policymakers, this article can serve as a foundation for formulating guidelines or initiatives that support sleep health at the national level, given the high prevalence of sleep and mental health problems (Kemenkes RI, 2024).

The prospects for further research are wide open. This study, being a qualitative literature review, can be followed by empirical research that tests the effectiveness of the proposed interventions. For example, experimental studies could be conducted to measure the impact of the “SleepSync Buddy” application or the #IstirahatKeren campaign on sleep quality and awareness among university students. Further qualitative research could also explore the specific perceptions and barriers faced by other age groups in adopting healthy sleep patterns. This research has limitations as it did not involve quantitative data or longitudinal measurements. Further studies are suggested to explore actual behavioral impacts using mixed methods or field experiments.

## 5. Conclusions

### 5.1. Conclusions

This research has comprehensively outlined the multifaceted impacts of staying up late (begadang) and irregular sleep patterns on the physical and mental health of individuals, particularly among the younger generation and those in their productive years. Through a systematic literature review, it was found that sleep deficiency significantly impairs cognitive functions, such as focus, working memory, and decision-making abilities, which stem from neurological imbalances in the brain. Moreover, poor sleep patterns are directly correlated with an increased risk of chronic physical health disorders, including cardiovascular and metabolic diseases (such as hypertension and diabetes), as well as hormonal dysregulation and immune system suppression. Psychological aspects are also profoundly affected, with staying up late being a primary trigger for stress, anxiety, and depression, evident in the high prevalence of mental health problems within Indonesia’s productive age group. Actual phenomena, such as excessive gadget use and the habit of staying up late in public

spaces, further exacerbate this condition, indicating that a lack of awareness and reading interest in health information are major obstacles to behavioral change.

Thus, the core problem identified is an urgent need for interventions that not only educate but are also capable of triggering real and sustainable behavioral change. This research successfully bridges a literature gap by formulating critical and creative ideas for innovative solutions relevant to the lifestyle of the younger generation, focusing on engaging actions that encourage tangible results. This underscores that addressing the problem of staying up late requires a holistic approach, not only from medical and psychological standpoints but also through effective and adaptive communication design.

### 5.2. *Suggestions and Recommendations*

Based on the conclusions and limitations of this research, several suggestions and recommendations can be put forth:

#### 5.2.1. For Theoretical Development and Further Research

- Further studies are recommended to explore the actual impact on behavior using mixed methods or field experiments. This could involve surveys, in-depth interviews, or direct interventions to test the effectiveness of proposed innovative programs or media in triggering changes in sleep behavior.
- Future research can focus on developing a theoretical model that integrates psychological, social, and communication design factors to explain how awareness can be converted into tangible action within the context of sleep health.
- Comparative research should be conducted to evaluate the effectiveness of various types of interventions (e.g., digital-based, community-based, or counseling) in improving sleep quality and emotional stability across different age groups.

#### 5.2.2. For Practical Action and Policy Development

- Government and health institutions are advised to develop more creative and lifestyle-relevant health campaigns for the younger generation, leveraging digital platforms and engaging visual media, such as digital illustration books or interactive social media content, to raise awareness about the dangers of staying up late and promote healthy sleep patterns.
- Educational institutions, especially universities, need to integrate education on the importance of sleep health and stress management into their curriculum or student mentoring programs, as well as provide facilities or environments that support healthy sleep patterns (e.g., comfortable rest areas, reducing non-essential nighttime activities).
- Individuals, particularly adolescents and young adults, are encouraged to proactively seek information and implement healthy sleep strategies, such as maintaining a consistent sleep schedule, limiting gadget exposure before bedtime, and managing stress through relaxation techniques or social support.
- Visual communication design experts can collaborate with health and psychology professionals to design innovative and effective educational media, considering aesthetics, narrative, and interactivity that can resonate with the target audience and encourage positive behavioral change.

Overall, this article asserts that a limitation of this research is its conceptual nature and its lack of direct field impact testing. Therefore, it should be followed by more in-depth empirical studies to validate and implement the innovative ideas that have been formulated.

### 5.3. *Limitations of the Research*

This research has limitations as it did not involve quantitative data or longitudinal measurements. The study relied entirely on a systematic-interpretive literature review and secondary

data analysis. Thus, the findings generated are conceptual and interpretive, rather than results from direct observation or experiments on behavioral change. The absence of primary data does not allow for the empirical identification of causal relationships or the measurement of the impact of the proposed interventions.

## References

1. Amalia, R. F., Taufik, Nuryanti, T., Juliyanti, Agustina, H. S., Sinulingga, E., Mujito, Sianturi, R., Kurniawati, Sulistyowati, R., Herawati, N., & Farida, I. (Eds.). (2024). *Bunga rampai manajemen stres*. PT Nuansa Fajar Cemerlang.
2. Aulia, A., Sianturi, S. K., Ginting, F. A. B., Siregar, I. P., Sigalingging, I., Tarihoran, J., Siregar, R. D., Manalu, N., Ihsan, M., & Harahap, A. M. (2025). Pengaruh begadang terhadap kesehatan tubuh dan mental. *Journal Sains Farmasi Dan Kesehatan*, 2(3), 303–306. <https://jurnal.ittc.web.id/index.php/jfkes/index>
3. Handayani, M. (2021). *Gambaran kadar SGPT pada siswa begadang di SMK Kesehatan Bakti Indonesia Medika Ponorogo* [Diploma thesis, Sekolah Tinggi Ilmu Kesehatan Nasional].
4. Kementerian Kesehatan Republik Indonesia. (2024). *Keputusan Menteri Kesehatan Nomor HK.01.07/MENKES/1336/2024 tentang Standar Kompetensi Psikolog Klinis*.
5. Khan, M. A., & Al-Jahdali, H. (2023). The consequences of sleep deprivation on cognitive performance. *Neurosciences*, 28(2), 91–99. <https://doi.org/10.17712/nsj.2023.2.20220108>
6. Krause, A. J., Ben Simon, E., Mander, B. A., Greer, S. M., Saletin, J. M., Goldstein-Piekarski, A. N., & Walker, M. P. (2017). The sleep-deprived human brain. *Nature Reviews Neuroscience*, 18(7), 404–418. <https://doi.org/10.1038/nrn.2017.55>
7. Nurlela, Sulvinajayanti, & Afiah, N. (2023). Studi suasana hati di pagi hari pada mahasiswa yang memiliki kebiasaan begadang dengan yang tidak begadang di Fakultas Ushuluddin, Adab dan Dakwah. *Indonesian Journal of Islamic Counseling*, 5(2), 138–xxx. <https://ejurnal.iainpare.ac.id/index.php/ijic>
8. Nurmawati, Fil'ardi, B., Alsyaina, Y. R., Nuralifah, A., & Rahmah, D. A. (2025). Faktor penyebab insomnia di kalangan remaja. *Indonesian Research Journal on Education*, 5(1), 173–179. <https://irje.org/index.php/irje>
9. Pezzulo, G. (2007). *Working memory*. Unpublished manuscript, Institute of Cognitive Science and Technology – CNR. <https://www.researchgate.net/publication/228394612>
10. Pradhan, S., Parganiha, A., Agashe, C. D., & Pati, A. K. (2024). Circadian rhythm in sportspersons and athletic performance: A mini review. *Chronobiology International*. Advance online publication. <https://doi.org/10.1080/07420528.2024.2305663>
11. Purwanto, S., Anganti, N. N. R., Yahman, S. A., & Hirdhania, C. T. (2019). Karakteristik gangguan tidur pada usia produktif dan usia pertengahan di Kota Surakarta. *The 10th University Research Colloquium 2019*, 109–110. Sekolah Tinggi Ilmu Kesehatan Muhammadiyah Gombong.
12. Rachmadina, A., Zahra, I. S., Ritonga, R., Pratama, N. A., & Nayla, Y. (2025). Hubungan antara pola tidur dan resiko penyakit kronis pada lansia. *Inovasi Kesehatan Global*, 2(1), 87–94. <https://doi.org/10.62383/ikg.v2i1.1270>
13. Ramadita, A. M., Harsanti, I., & Harmoni, A. (2023). Pengaruh stres akademik terhadap kualitas tidur pada mahasiswa tingkat akhir. *Arjwa: Jurnal Psikologi*, 2(4), 212–222. <https://doi.org/10.35760/arjwa.2023.v2i4.9620>
14. Rivaldi, A. A. (2024). Analisis faktor penyebab stres pada mahasiswa dan dampaknya terhadap kesehatan mental. *Detector: Jurnal Inovasi Riset Ilmu Kesehatan*, 2(4), 11–18. <https://doi.org/10.55606/detector.v2i3.4378>
15. Rozy, R. M. F., & Risdiana, N. (2019). Hubungan antara gangguan pola tidur dengan keseimbangan sistem saraf otonom pada usia dewasa muda. *Mutiara Medika: Jurnal Kedokteran dan Kesehatan*, 19(1), 1–6. <https://doi.org/10.18196/mm.190120>
16. Sakhawah, S. (2023). *Hubungan durasi tidur dan kualitas tidur dengan kejadian hipertensi pada usia dewasa di wilayah kerja Puskesmas Tambakaji Kota Semarang* [Skripsi, Universitas Islam Negeri Walisongo Semarang].
17. Wijaya, R. P. (2023). *Perancangan buku ilustrasi digital sebagai media kampanye sosial tentang bahaya begadang bagi remaja usia produktif* [Undergraduate thesis, Universitas Dinamika].

18. Wulansih, N. C., Zharfan, F. R., Biyang, A. W. A., Anggraini, M. R., & Herbawani, C. K. (2024). Tinjauan literatur: Dampak durasi dan kualitas tidur yang buruk pada kesehatan tubuh usia produktif. *Jurnal Kesehatan Poltekkes Kemenkes RI Pangkalpinang*, 12(1), 71–72.

**Disclaimer/Publisher's Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.