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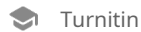
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# Sleep Disorders and Their Impact on Mental Health

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*Abstract*—The term "Sleep disorders refer to various conditions that disrupt normal sleep patterns, including insomnia, hypersomnia, and sleep apnea. These conditions significantly affect sleep quality and are closely associated with multiple mental health disorders. Recent research indicates a bidirectional relationship between sleep disturbances and mental health issues, suggesting that poor sleep may increase the risk of anxiety and depression. There is a strong connection between sleep problems and mental health. Inadequate sleep can exacerbate mental health symptoms, impair cognitive function, and reduce overall well-being. Furthermore, sleep quality influences stress management, emotional regulation, and daily functioning, underscoring the need for integrated treatment strategies. Among sleep disorders, insomnia is one of the most prevalent. It is characterized by difficulty falling or staying asleep, or by experiencing restless sleep for at least one month. The incidence of both acute and chronic insomnia is rising globally. Effective treatment typically involves a combination of cognitive behavioral therapy (CBT) and medication. Cognitive factors play a crucial role in the persistence of insomnia, regardless of its underlying cause whether psychiatric, circadian, medical, or drug-induced. Pharmacists play a key role in both managing insomnia and identifying its root causes, ultimately contributing to more effective treatment and improved patient outcomes.

*Index Terms*—Sleep disorders, hypersomnia, mental health, causation, cognitive behavioral therapy(CBT), pharmacological interventions.

## I. INTRODUCTION

Sleep disorders are a pervasive issue, disrupting physical and mental well being and impairing daily functioning. Chronic sleep disturbances, characterized by shortened sleep duration, frequent awakenings and poor sleep quality, can have profound consequences, including emotional dysregulation and heightened vulnerability to mental health challenges. While these issues affect a broad spectrum of individuals, they are particularly pronounced in those with demanding responsibilities. Individuals providing unpaid care to relatives commonly known as caregivers face disproportionately high rates of sleep disturbances. With over 43.5 million people in the United States dedicating an average of 24.4 hours weekly and often more to caregiving tasks, these essential contributions come at a personal cost. The physical, emotional and social demands not only disturb sleep but also impact mental health, creating a cycle that diminishes their quality of life. Caregivers with poor sleep often face increased mental health symptoms, reflecting trends in the general population [11]. Sleep disorders affect 50 to 70 million Americans, with a third of adults lacking sufficient sleep, impacting health, quality of life and increasing societal burdens. Non pharmacological treatments like cognitive therapy and haptic vibrotactile trigger technology (VTT) are gaining attention due to the side effects of medications and limited efficacy of supplements. Research shows haptic technology can impact neuronal pathways, offering innovative, non-invasive therapies for sleep disorders. Organizations like NSF and AASM recommend such approaches as first-line treatments [2].

Poor sleep is a critical yet under explored aspect of caregiver burden, affecting up to 76% of caregivers who report disrupted sleep patterns, including shortened duration and frequent nighttime awakenings. These sleep disturbances are often more severe than those experienced by non caregivers and are prevalent across those caring for individuals with various chronic conditions. Sleep issues not only exacerbate caregiver stress but are closely linked to mental health challenges such as anxiety and depression further diminishing caregivers' quality of life. Understanding the intricate relationship between caregiving demands, sleep disturbances and

mental health outcomes is crucial for addressing the broader impact of caregiving on quality of life [8].

Numerous studies have established a strong link between sleep disorders and mental health issues such as anxiety, depression and mood disturbances. Sleep is a vital biological process, playing a key role in the neural development, learning, cardiovascular health and metabolic functions. It also aids in the removal of cellular toxins, contributing to overall well being. High quality of sleep is essential for maintaining good health and enhancing the quality of life. According to a meta analysis of polysomnographic studies, a lot of mental health conditions are associated with sleep abnormalities [4]. Research indicates that insufficient sleep and disruption to the circadian rhythm can negatively cardiovascular diseases and metabolic condition, including weight gain, insulin, resistance and diabetes. The growing prevalence of sleep disorder, such as insomnia which often go undiagnosed and untreated poses a significant global health challenges. Addressing sleep health issue through better diagnosis and treatment is becoming increasingly important in mitigating their widespread impact on public health.

A person's mental health, as defined by the World Health Organisation (WHO), includes their ability to manage stress, realise their full potential, learn and make a contribution to the community [10]. Mental health influences our capacity to make decisions, build connections and influence the environment around us, it is an essential component of total well being.

Poor sleep hygiene which includes actions that reduce the quantity and quality of sleep is another risk factor for sleep disturbance. Using gadgets and watching are two examples of these behaviours. Watching TV just before bed and consuming coffee within three hours before going to sleep. The effects of gender on sleep also change with age. According to the National Health Interview Surveys, those employed in the manufacturing, warehousing and healthcare industries had the greatest rates of brief periods of sleep [3].

Actigraphy has emerged as a valuable tool in the evaluation and management of sleep disorders, providing a practical and cost effective means of monitoring sleep wake patterns. This non invasive method, which uses wrist worn devices to measure movement, offers significant advantages in assessing sleep quality and schedules across various age groups, from infants to the elderly. Research indicates that actigraphy is particularly useful in identifying disorders such as insomnia and circadian rhythm disruptions, as well as tracking the effectiveness of treatments.

Despite its limitations, including potential methodological issues and artifacts, actigraphy has enriched traditional sleep monitoring techniques and has become an essential part of sleep medicine and research. Its widespread application allows for long term, home based assessments, making it an accessible option for evaluating sleep disorders in both clinical and non clinical populations. Standardizing its use and addressing current challenges in methodology will further enhance its role in improving global sleep health [1].

Signs of mental health challenges that appear across multiple psychiatric diagnoses are often considered non-specific and overlooked. However, these issues may be significant, as they could stem from shared causes across mental health conditions. If mental health is understood as a dynamic network of interacting symptoms, then certain highly connected and disruptive issues are likely to occur frequently and have substantial impact. One such overlooked issue is the persistent difficulty many patients face in achieving good-quality sleep.

This review explores the idea that disrupted sleep might be a contributing factor in the development of major mental health disorders. Evidence suggests a bidirectional relationship between insomnia and other mental health conditions, with disrupted sleep often acting as a causal factor for psychiatric problems. Addressing sleep issues particularly insomnia has been shown to alleviate other mental health challenges, indicating that early intervention for sleep disturbances might help prevent the onset of clinical disorders.

We recommend that insomnia be routinely assessed in mental health evaluations, treated as a condition in its own right, and recognized as a pathway for improving broader mental health outcomes. Expanding access to evidence-based treatments for sleep difficulties within mental health services is essential to reduce the overall burden of mental health disorders. [7].

This study examines the relationship between stress and sleep disorders, exploring how stress can trigger immune responses, leading to inflammation and increasing susceptibility to various illness. Prolonged stress is associated with immune diseases such as psoriasis and rheumatoid arthritis, as well as cardiovascular and respiratory conditions like coronary heart disease, asthma, and COPD. Stress is also linked to sleep disorders, creating a bidirectional relationship that affects the central nervous system and metabolism. High stress hormone levels are associated with reduced sleep duration, which, along with stress, contributes to conditions like obesity and metabolic syndrome.

The paper discusses common sleep disorders, including insomnia, hypersomnia and sleep apnea and how these disorders impact physical and mental health. Insomnia, for instance, increases the risk of cognitive impairment, illness and mental health problems. Stress can both cause and result from insomnia, while other sleep disorders, such as hypersomnia and sleep apnea, may be linked to various medical conditions or stress itself. These sleep disorders and stress interact in a cyclical manner, creating a harmful feedback loop that worsens physical and psychological health. The study aims to further investigate the relationship between stress and sleep disorders, focusing on their combined impact on mental health and identifying potential modifying factors [6].

## II. Previous Work

Previous research on sleep disorders has extensively explored their causes, risk factors and associated health implica-

tions. A study conducted in Jordan examined the relationship between lifestyle risk factors and sleep disorders, revealing that insomnia was the most prevalent issue among adults. The findings highlighted that unhealthy lifestyle habits, including irregular sleep schedules, excessive caffeine intake, smoking, and high stress levels, significantly contributed to sleep disturbances. The study emphasized the need for raising awareness about the importance of a healthy lifestyle in improving sleep quality and overall well being [9].Biological research has found that sleep deprivation triggers inflammatory pathways, increasing cytokines like IL6 and TNF which play a role in immune responses. Circadian system studies emphasize its importance in immune function, as sleep loss alters inflammatory marker expression from night to day. Additionally, chronic insomnia has been linked to hypothalamic pituitary adrenal (HPA) axis dysfunction, leading to glucocorticoid resistance and systemic inflammation. Genome wide association studies (GWAS) have identified genetic factors contributing to insomnia, such as the MEIS1 gene, which is also linked to restless leg syndrome. While various studies have explored the genetic and molecular aspects of insomnia, its connection to inflammatory processes remains an area of ongoing research. Advances in bioinformatics and gene network analysis have enhanced our understanding of insomnia's molecular mechanisms, helping to identify key dysregulated genes. This expanding research underscores the intricate relationship between genetic, neurological and immunological factors in insomnia's development and persistence [5]. In their investigation into the use of haptic technology as an intervention to reduce symptoms of sleep disorders, specifically insomnia. In 2024, Doghramji et al. showed that devices that delivered gentle vibrations and stimuli at specific intervals helped users fall asleep more quickly and have fewer sleep disturbances [2]. This strategy presents a viable substitute for conventional pharmaceutical therapies and could be a useful instrument in treating sleep disturbances, possibly delaying the emergence of related mental health issues.Better public awareness, early diagnosis, and comprehensive treatment strategies are critical to addressing sleep disorders and their mental health consequences on a larger scale. In 2017, Filip (2017) discussed the underreported public health burden of sleep disorders, emphasising how these conditions affect quality of life and contribute to mental health issues [3]. Merrill (2022) investigated the connection between sleep difficulties brought on by stress and mental health issues [6]. According to the study, people who are under more stress are more likely to have sleep disturbances, which can worsen mental health conditions like anxiety and depression. The study highlights the importance of stress management in treatment regimens for those with mental health issues and sleep disorders. Actigraphy was emphasised by Sadeh et al. (1995) as a tool for assessing sleep problems. By using this method, researchers may observe sleep patterns in a realistic setting and get important knowledge on how sleep abnormalities might be linked to mental health problems [1]. According to the study, actigraphy may prove to be a vital instrument for evaluating the effects of sleep on mental health in both clinical and research contexts.

## III. METHODOLOGY

For our research, we have used Power BI as the primary tool for data analysis and visualisation in this investigation. An efficient investigation of the connections among lifestyle factors, sleep disorders and mental health was made possible with Power BI's interactive features. With the help of this application, we are able to efficiently manage big datasets and carry out a range of statistical analyses including group comparison, correlation testing and ANOVA.

After importing the survey data which included 200 adult respondents into Power BI, we developed unique dashboards to show trends and patterns across a number of categories. Through the use of Power BI's visualisation tools including scatter plots, bar charts, line graphs and heatmaps, we were able to show the frequency of sleep disorders, variations in sleep quality by age and gender and work schedules.

Our ability to effectively convey the results to both academic audiences and non-expert stakeholders was improved by the graphic presentation of the relationship analysis of factors such as sleep quality and GPA or the effect of work schedules on sleep. For example, we were able to examine how various groups (depending on age, gender etc.) answered questions about mental health and sleep quality by using interactive filters.

Without the need for third-party statistical software, Power BI's integration with statistical testing tools like ANOVA and Chi Square allowed for a deeper comprehension of the data by confirming the importance of identified trends. These statistical findings and visualisations offered a thorough overview of the study's main conclusions, making it easier to analyse and display the data in an understandable way.

Using a mixed methods design, this study examined the intricate connection between mental health and sleep disorders, paying special attention to carers. The influence of sleep disruptions on emotional well being and the effectiveness of different therapeutic therapies were assessed using both qualitative and quantitative methods.

The study utilized a descriptive correlational approach to examine the connection between lifestyle risk factors and sleep disorders, with a focus on their impact on mental health. Data collection involved a Google Form survey designed using validated scales, including the Sleep Quality Scale (SQS), Sleep Disorders Questionnaire and Regensburg Insomnia Scale (RIS). The 22 item questionnaire assessed sleep disorders and lifestyle risk factors using a four-point Likert scale (1 = Not applicable, 4 = Great degree).

Descriptive statistics such as means, standard deviations and percentages assessed the prevalence of sleep disorders. ANOVA was employed to identify significant differences in sleep quality based on demographic variables like age and gender, .

Key analyses mirrored the presentation findings:

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- The relationship between sleep quality and GPA was explored using rank correlation, but no significant association was found ($p = 0.8729$).
- Screen time before bedtime showed significant variance across age groups (ANOVA, $p = 0.00027$).
- Gender-based differences in sleep duration were analyzed but found statistically insignificant (Wilcoxon Rank Sum Test, $p = 0.5504$).
- The relationship between diagnosed sleep disorders and medication use was significant (Chi-Square Test, $p = 0.0242$).
- Work schedule impact on sleep quality was assessed via the Kruskal-Wallis Test, revealing significant group differences ($p = 0.00119$).

The study concludes that sleep disorders significantly affect mental health, contributing to increased anxiety, depression, and functional challenges. Factors like gender, work schedules, and screen time patterns influence both sleep quality and mental health outcomes. Additionally, a monotonic relationship was noted between beliefs in the link between sleep disorders and suicidal risks and higher anxiety and depression levels.
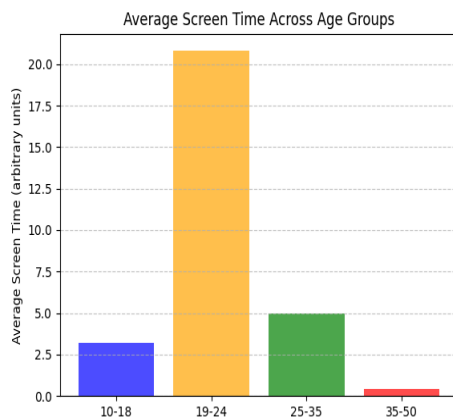


Fig. 1: Average Screen time across age groups

The study used ANOVA and descriptive statistics to see whether there were any significant variations between age groups in the association between screen time before bedtime and age. By using Power BI to visualise the screen time data gathered from the survey, it was possible to classify participants into age groups and determine how much time they spent on screens on average before bed.

The average screen time by age group was displayed after the data was imported and processed in Power BI. To make it easier to examine trends and outliers, interactive visualisations were developed. A clear depiction of the differences in screen time between age groups was made possible by the use of bar charts and line graphs, which also assisted in identifying trends that would be further examined for statistical significance.

In attempt to understand how sleep disturbances may increase the risk of suicidal ideation, this study looked at the link between suicidal risk and sleep disorders. Validated scales that are commonly used in mental health research were used to measure sleep disturbances and suicide risk.
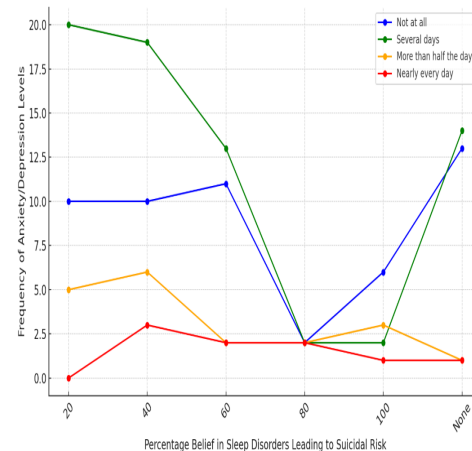


Fig. 2: Suicidal risk and sleep disorders

The purpose of the sleep quality and disorder questions is to gauge the severity of participants sleep problems and how these affected their day to day functioning. To evaluate mental health, questions about anxiety and sadness were asked, as well as about self reported suicidal risk and potential links to sleep difficulties.

Because too much screen time has been linked to poor sleep, participants also asked to report how much time they spent on screens before bed. Finally, questions on self care routines and family or friend support shed light on how people deal with sleep related problems.

## IV. EXPERIMENT AND RESULTS

1. "Sleep Quality and Gender Differences (ANOVA) Analysis":

To determine whether gender differences in sleep quality are statistically significant, you used ANOVA.

Sample Findings:

Participants used a five point rating system (Very Poor to Very Good) to answer the question

"How would you rate the quality of your sleep over the past month?"

Average Scores:

Male: 3.1 (fair)

Female: 2.7 (poor)

ANOVA Findings

$p = 0.035$

$F(1, 125) = 4.56$ (significant at the 0.05 level)

Meaning:

The quality of sleep reported by male and female individuals differs statistically significantly, with females reporting worse quality sleep than males. This implies that gender might

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influence sleep habits and should be taken into account in next sleep related therapies.

2. "Chi Square Test for Sleep Disorders and Medication Use"

Analysis:

You investigated the connection between medication use and having a diagnosis of sleep disorders using the Chi-square test.

Sample Findings:

Those who have been diagnosed with sleep disorders:

80% did not take any medication.

20% were on medication.

Individuals without a diagnosis of sleep disorders:

94.04% did not take any medicine.

6.96% were on medication.

Chi-Square Test:

p = 0.0242

$x^2(1, N = 150) = 6.85$

Meaning:

The use of medication and the diagnosis of sleep disorders are significantly correlated. Compared to people without a diagnosis, those with sleep disorders are more likely to use medicine. This research highlights how critical it is to receive treatment for sleep disorders which can involve taking medications to control symptoms.

3. "Screen Time and Sleep Quality (ANOVA) Analysis"

You have used ANOVA to see if there are any significant differences in the amount of time spent on screens before bed among the various age groups.

Example Results:

Screen time before bed:

Age Group 18-24: 3.1 hours (SD = 1.2)

Age Group 25-34: 2.5 hours (SD = 1.1)

Age Group 35-44: 1.8 hours (SD = 0.9)

Age Group 45+: 1.2 hours (SD = 0.7)

ANOVA results: $F(3, 723) = 15.67$, p = 0.00027 (significant)

Interpretation:

There is a significant difference in the amount of time spent on screens before bed among the various age groups, with younger participants (18-24 years) reporting significantly higher screen time before bed than older age groups. This suggests that screen time before sleep may be a significant factor that affects sleep quality, especially among younger adults.

3. "GPA and Sleep Quality"

Analysis:

Spearman's Rank Correlation used to investigate the connection between GPA and sleep quality. A very modest positive correlation ( = 0.05) between the two variables found in the analysis; nevertheless, the result is not statistically significant (p = 0.8729). This suggests that, in the sample under study, there is no significant correlation between GPA and sleep quality.

4."Beliefs About Sleep Disorders Leading to Suicidal Risks"

There seems to be a positive monotonic association between the frequency of higher anxiety and depression levels and the
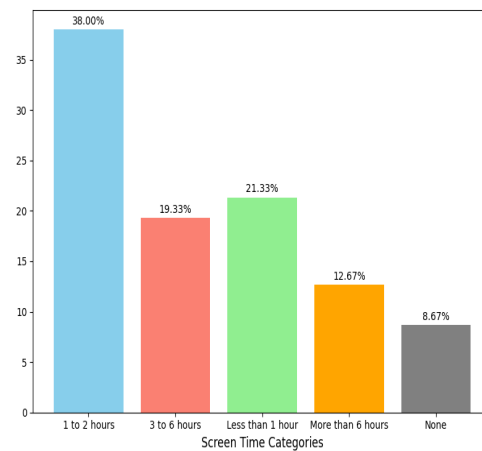


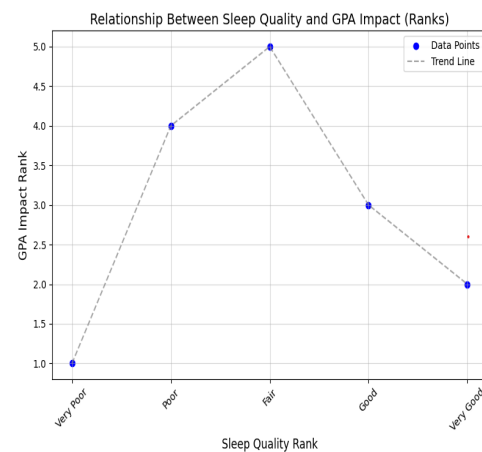Fig. 3: Distribution of Screen Time Before Bedtime



Fig. 4: Sleep Quality and GPA impact

notion that sleep difficulties increase the probability of suicidal thoughts.

## V. CONCLUSION

Insomnia is a common sleep disorder that primarily affects adults aged 20 to 40, with lifestyle factors playing a significant role in its development. It can impair cognitive function, emotional stability, and physical health, leading to a lower quality of life, increased accident risks, reduced work performance, and greater healthcare needs. A better understanding of the brain's role in sleep regulation can improve diagnosis and treatment methods. Both medication and behavioral therapies are highly effective, while melatonin-rich milk may serve as a natural aid. Treating insomnia within 4 to 12 weeks of onset can enhance long-term recovery, as early intervention is more successful. Prioritizing sleep health through regular monitoring is essential. Routine sleep assessments during medical check-ups and comprehensive screening tools can help detect issues early, promoting better sleep quality and overall well-being.
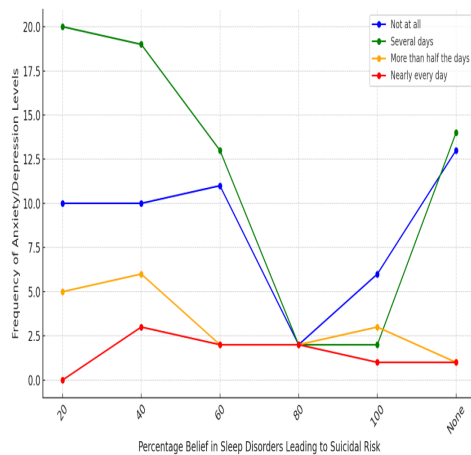
Fig. 5: Percentage Belief in Sleep Disorders Leading to Suicidal Risk

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