Correlation between Circadian Disruption and Academic Performance of Accounting Students

Arjel Joy G. Apostol., Regiena Melaine M. Artes., Mark Clifford A. Delos Reyes., Vanessa L. Hernandez., Kiel Andrei L. Solo., Joannamarie Uy Santos

Our Lady of Fatima University

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ABSTRACT

This study analyzed the relationship between circadian rhythm disruptions and the academic performance of students enrolled in accountancy and accounting information systems programs through the use of the Social Jet Lag Theory in discussing the discrepancy between students' natural sleep preferences and academic responsibilities. It emphasized the significance of circadian rhythms in managing physiological and behavioral processes, highlighting the effect that disruptions caused by factors such as academic stress, rigid class schedules, and lifestyle choices have on cognitive processes that are critical to learning. Using a correlational study design, the researchers gathered information from students enrolled in the BSA and BSAIS programs by distributing surveys. These questionnaires collected data on academic performance, sleeping patterns, and factors of circadian disruptions. The findings revealed that the disruption of circadian rhythm has a significant correlation with lower academic performance, particularly in classroom attendance and classroom engagement. Students adopting strategies including mental relaxation, consistent sleep schedule, and limitation of stimulant intake showed better management of their circadian disruption, emphasizing the importance of practical measures to enhance both academic success and overall well-being.

Key words: Circadian Rhythm, Academic Performance, Accountancy Students, Social Jet Lag

INTRODUCTION

The pursuit of an accountancy degree, similar to other programs, necessitates accounting students to develop rigorous study habits to navigate between demanding academic schedules and heavy course loads (Tamayo, 2023). Ultimately, this leads to a disruption in the sleeping patterns as adequate sleep is crucial for maintaining optimal physical and mental well-being, and for excelling in social and academic contexts. Inconsistent sleep patterns can disrupt the body's natural circadian rhythms, which can potentially hinder a student's academic performance (Studer et al., 2019). Circadian rhythms are inherent 24-hour cycles that regulate various physiological and behavioral processes, vital for aligning the body's internal functions with the external environment.

A study by Phillips et al. (2017) highlighted several factors that directly disrupt the body's internal clock, including irregular sleeping patterns, exposure to light from electronic devices at night, shifts in schedules, and traveling across time zones. Moreover, students' habit of staying up for 24 hours or longer to study heavily contributes to the disruption of their circadian rhythms (Hershner & Chervin, 2014). However, it is important to note that pulling all-nighters may only provide short-term benefits, as sleep duration and quality impact memory retention and cognitive performance (Dahat et al., 2023). Lack of sleep poses risks to students as it affects fundamental cognitive processes, namely attention and executive functions, which are necessary for ensuring long-term academic success (Garcia et al., 2021). Thus, in light of these detrimental effects, managing disruptions in the circadian rhythm is essential for students striving to achieve sustained academic performance and overall well-being.

Two predominant issues that transcended the topic were sleep deprivation and an overload of coursework (Chemagosi & Barongo, 2024). These challenges have broader implications for academic performance. Understanding the intricacies of these issues was crucial for devising effective interventions and support systems to address them within educational settings. These issues represented both blank spots and blind spots in the existing literature. Sleep deprivation, often underestimated in academic discourse, fell within the category of a blank spot. Despite its profound impact on students' academic performance, minimal literature comprehensively addressed this problem. On the other hand, the overload of coursework represented a blind spot. While there is available literature on this topic, the results and conclusions are often contradictory, leaving gaps in our understanding of its precise effects on students.

The focus of this research was to scrutinize the effects of disruption of circadian rhythm on academic performance through the collection and analysis of data from various student groups over the course of an academic year. The researchers quantified the manner in which different factors such as academic stress, rigid class schedules, and lifestyle choices contributed to disruptions in circadian rhythms and impacted academic outcomes. The research findings were expected to make substantial contributions to the current theories, practices, and future research. It supplemented current theories by integrating circadian rhythms into the examination of factors influencing academic performance. The findings informed educational institutions by providing practical strategies to lessen the negative impacts of circadian disruption on student performance. Also, this established a foundation for subsequent research and encouraged the exploration of additional variables that may influence the relationship between academic achievement and circadian rhythms.

Theoretical Framework

In a study scrutinizing the relationship between circadian disruption due to class schedule and students' academic performance, there were established theories that provided a thorough understanding of this phenomenon. Dr. Till Roenneberg, a German chronobiologist, proposed the Social Jet Lag Theory, which demonstrated the variance and misalignment between the individual's natural sleep preference (circadian rhythm) and the social clock (dictated by social obligations such as school or work). Similar to the disruption caused by jet lag during cross-border travel, following the social obligations that interfered with one's natural rhythms may have resulted in comparable disruption.

Caliandro et, al. (2021) stated that the circadian clock regulates numerous physiological processes such as the sleep-wake cycle, metabolism, and hormone production. Circadian misalignment may occur when the body's natural clock is mismatched with the external environment, which could negatively impact health over both immediate and prolonged periods. It may result in substandard sleep and shortened sleep duration. When the internal clock is not aligned with the requirements of academic schedules, students may find it challenging to maintain focus and attention consistently, leading to mistakes and an overall decline in academic performance gradually.

Disruption of Circadian Rhythm

The concept of disruption of the circadian rhythm occurring in students has attracted an immense amount of attention lately since it has enormous consequences for students' health, academic achievement, and general well-being. Over the course of a 24-hour cycle, circadian rhythms—also known as the body's internal clock—control a number of physiological functions and behaviors. The main causes of inconsistent sleep-wake cycles in individuals, especially in teenagers and young adults, include academic stress and social obligations. Almojali et al. (2017) found that higher levels of academic stress were strongly correlated with more sleep disruptions, such as trouble falling asleep and staying asleep during the night. This conclusion is further supported by the study of Fischer et al. (2019), showing that students' sleep length and quality are adversely affected by academic stress.

Academic institutions frequently impose rigid class schedules that could interfere with people's natural circadian rhythms, possibly delaying the sleep phases of students that could result in sleep deprivation and circadian misalignment (Crowley et al., 2019). In creating a class schedule, various components are considered. The timing of classes can affect the attendance and participation of students. The students attend

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and engage more actively when the class timing coincides during their peak cognitive hours and their natural sleep patterns (Dela Cruz, 2022) . The duration of classes impacts the students' learning result as research shows that longer classes encourage deeper learning and retention through more in-depth discussions and involvement. Increasing the allocated time to learning mathematics would likely result in a slight improvement in test scores of students (Odeyemi, 2023). Increased frequency of classes improved students' comprehension of complex material and their capacity to apply information in practical settings when coupled with well-structured topics (Lewohl, 2023). Moreover, a study indicated that circadian rhythms and sleep patterns have a major impact on alertness and cognitive function, which in turn affects performance (Colminar et al., 2020). Irregular or late class timings may disrupt sleep patterns, leading to sleep deprivation and fatigue, which are known to impair cognitive function and academic performance (Crowley et al., 2019). Block schedules, which feature longer but fewer classes, can improve retention and deep learning, but they also present difficulties with focus and long-term memory retention (Boctuan et al., 2019). Chronotype-based scheduling presents logistical challenges but provides significant benefits. Schools that implement flexible scheduling or later start hours experience improvements in the academic and health outcomes of their learners which lessen the effects of sleep deprivation, such as stress levels, memory, and concentration (Nariz & Roleda, 2019). Learning how class scheduling affects academic performance can help education institutions modify their scheduling guidelines in order to satisfy the needs of their students, which could increase their success and satisfaction (Cordis & Pierce, 2017).

Disruption of circadian rhythms, often resulting from environmental factors or lifestyle choices, can have profound implications for academic performance and cognitive functioning. According to Shimura et a. (2018), lifestyle habits such as irregular sleep schedule, caffeinated beverages intake at late hours, excessive screen time, and insufficient physical activities had a significant effect on the sleep quality and daytime sleepiness among students. Chellappa et al. (2018) examined how young individuals' cognitive function was affected by circadian misalignment. The results showed that people with irregular sleep-wake cycles had problems with working memory and attentional control, which had a detrimental impact on their academic performance. Additionally, Pilcher and Huffcutt (2019) showed a strong inverse relationship between academic performance and sleep disturbances, highlighting the need of encouraging restful sleep practices to improve educational attainment.

Academic Performance

A study conducted by Brigham and Women's Hospital (2017) on undergraduates of Harvard College revealed that academic performance is significantly impacted by irregular sleeping patterns. The research demonstrated that students who consistently maintain regular sleeping schedules outperform those with irregular sleeping patterns. This phenomenon is attributed to the time it takes for the circadian clock to adjust to changes in sleep schedules. Students who frequently alter their sleeping patterns experience a misalignment between their circadian system and sleep-wake cycle, negatively affecting cognitive functions and overall academic performance. Consequently, the study suggested that adhering to a consistent sleep schedule enables students to synchronize their internal clocks, which in turn enhances their capacity to learn, retain information, and achieve success in academic pursuits.

Sleep deprivation has also been associated with a decline in students' academic performance. When students do not get sufficient sleep, they often struggle to maintain focus and engagement during lessons, leading to missed information and reduced comprehension. Sleep deprivation further impacts students' ability to effectively store new information in their long-term memory, which is crucial for learning. As a result, students may have difficulty retaining what they have learned, leading to lower performance on tests and exams. Additionally, the lack of sleep can compromise decision-making skills, resulting in more errors and challenges in choosing effective study strategies or prioritizing academic tasks. These cognitive impairments can be reflected in lower grades and reduced academic achievement as students who do not get enough sleep are more likely to perform poorly on standardized tests, experience difficulties in class participation, and achieve lower overall academic performance. The substantial impact of adequate sleep on optimal academic performance suggests that improving students' sleep habits could significantly enhance their educational outcomes (Hershner & Chervin, 2014).

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Statement of the Problem

This empirical study intends to address the subsequent questions:

1. What is the demographic profile of the respondents in terms of program, year level, and gender?
2. What are the sleep patterns of the respondents?
3. How do the respondents assess the following factors affecting the disruption of circadian rhythm: academic stress, rigid class schedule, and lifestyle choices
4. How do the respondents perform in class in terms of attendance, and engagement
5. Is there a significant correlation between the disruption of circadian rhythm and the academic performance of students enrolled in the Accountancy and Accounting Information System programs?
6. What strategies do students of BSA and BSAIS programs employ to manage circadian rhythm disruption?

Hypothesis

There is no significant relationship between academic stress, rigid schedules, and lifestyle choices, and class attendance and classroom engagement of students.

Research Simulacrum

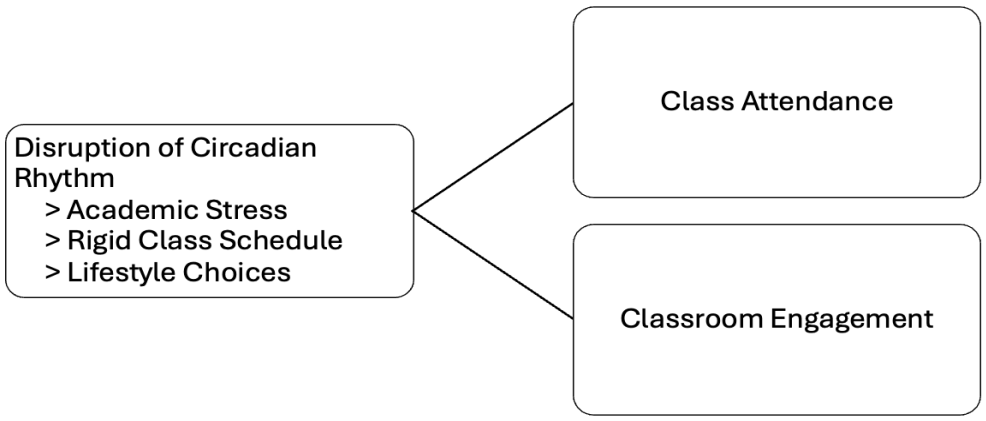

Figure 1. Research Simulacrum

Figure 1 presents the research framework of the study, detailing the interrelationships among various independent variables and two dependent variables, represented by single-headed arrows. Specifically, it illustrates the influence of academic stress, rigid class schedules, and lifestyle choices on attendance and engagement. This visual representation underscores the direct associations among these factors, emphasizing their significant interplay within the study.

METHODS

Research Design

This study adopted a quantitative, descriptive and correlational research approach. Without including any experimental modification, this approach was appropriate for determining the relationship between two naturally occurring variables. The researchers gathered information on accounting students' circadian rhythms, including sleep pattern and its disruption as well as their academic performance, particularly class attendance

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and classroom engagement. The objective of this study was to find any significant correlation between circadian disruptions and academic outcomes by statistically evaluating this data.

Research Locale

This study was conducted among students enrolled in the Accountancy and Accounting Information Systems programs at a private higher education institution in Quezon City. The institution offers structured academic programs designed to meet national standards and regulatory requirements, ensuring students follow a defined curriculum and schedule.

The inclusion criteria for respondents required that they be currently enrolled in the ongoing semester and had also been enrolled in the previous semester to ensure continuity in their academic experience. This approach aimed to assess how structured course schedules influence sleep patterns, attendance, and engagement among students who follow a standard academic load.

Students classified as irregular enrollees were excluded from the survey, as they may have fewer subjects, differing academic loads, and greater flexibility in choosing their schedules. Their varying course loads and enrollment patterns could introduce potential variability in results, which may not align with the study's primary focus on students experiencing standard academic progression.

Population and Sampling

This study focused on students enrolled in the Bachelor of Science in Accountancy (BSA) and Bachelor of Science in Accounting Information Systems (BSAIS) programs in a private higher education institution in Quezon City. The total population of regular students from these programs was 302, consisting of first-year to fourth-year students who met the inclusion criteria of being currently enrolled in the ongoing semester and the previous semester.

To ensure a representative sample, the researchers applied Slovin’s formula to determine the appropriate sample size:

n=N1+Ne^2

Where:

- n = Sample Size
- N = Population Size (302)
- e = Margin of Error (typically 0.05)

Due to time constraints and accessibility of participants, the researchers employed purposive sampling rather than probability-based randomization. This ensured that all year levels—first, second, third, and fourth year—were represented, while excluding irregular students whose enrollment patterns might introduce variability. Although the computed sample size was achieved, the use of purposive sampling limits the extent to which the findings can be generalized to the entire population. Nevertheless, this approach provided adequate coverage of the target programs and meaningful insights into the student population under study.

Research Ethics

The researchers, fourth-year BSA students from an established educational institution, conducted a study on the correlation between circadian rhythm disruption and academic performance. Participants were recruited voluntarily through online announcements and class invitations. Informed consent was obtained to ensure participants understood the study's purpose, procedures, and their right to withdraw at any time.

Participation in this study involved minimal risk. Potential risks included emotional discomfort when discussing sleep patterns and academic performance, minor inconvenience or disruption to daily routines due to surveys, and a slight risk to privacy despite efforts to anonymize data. If discomfort arose, participants were encouraged to contact the researchers or seek support from university counseling services.

Respondents did not personally benefit from the conclusions and recommendations of this research. However, the researchers anticipated that the findings of this study will help current theories, practices, and future research in determining the correlation between the disruption of circadian rhythms and academic performance of students. While there was no material or monetary compensation for those who took part in this study, their contribution was greatly valued and appreciated by the researchers.

The researchers tried to figure out if there was a connection between the disruption of students' circadian rhythm and how well they do in school. Specifically, they were interested in how interfering with the body's internal clock, which controls when you feel sleepy or awake, might affect one's grades. The researchers were curious if having classes at certain times might make it harder for students to focus and learn.

This research involved answering a survey questionnaire for the study. The involvement in this research was completely voluntary. Only participants capable of giving personal consent were recruited. They had the freedom to decide whether or not they wished to participate.

The research survey was conducted online and was designed to take approximately 5 to 10 minutes to complete. To ensure participant anonymity, no names were collected on the questionnaires and each respondent was provided with an anonymous identification code (e.g., Respondent 1, Respondent 2). The assigned codes did not reveal any information that could identify the participant among other respondents. All data remained anonymous from the point of collection. The anonymized data were securely stored in encrypted digital files, accessible only to the research team, until the research was completed. Upon completion, all participant data were securely disposed of through permanent deletion of digital files. These protocols were implemented to protect the confidentiality and privacy of all participants.

The researchers were committed to sharing the research findings with participants in a timely and accessible manner. They planned to keep the data only till the end of the course. Upon completion of the study, the researchers disseminated the results more broadly through publications in academic journals and presentations at relevant conferences.

Research Instruments

The researchers utilized a structured survey questionnaire as the primary research instrument to assess the alignment of students' class schedules with their circadian rhythm and examine its impact on academic performance. The questionnaire was carefully designed to cover five key sections, ensuring a comprehensive evaluation of factors influencing sleep patterns and academic engagement. The first section gathered demographic information, including the respondents' program, year level, and sex, to provide a foundation for comparative analysis. The second section focused on students' sleep patterns, identifying variations in wake-up times, ease of waking, and natural productivity periods to pinpoint those experiencing circadian disruptions. The third section explored the primary contributors to circadian rhythm disturbances, such as academic stress, rigid class schedules, and lifestyle choices, enabling the researchers to analyze the extent of their influence on sleep quality. The fourth section examined potential academic repercussions, assessing the effects of scheduling misalignment on class attendance and classroom engagement to determine whether students struggle with focus and participation due to sleep irregularities. Lastly, the fifth section addressed coping strategies, identifying the common self-guided methods students adopt—such as relaxation techniques, exercise, and sleep hygiene practices—to counteract disruptions to their biological rhythms.

Validity. The content validity of the questionnaire was established through expert review. A panel of three experts in accounting education assessed the clarity, relevance, and comprehensiveness of the items. Their feedback and recommendations were incorporated to ensure that the instrument adequately measured the intended constructs.

Reliability. A pilot test was conducted with 20 respondents who were not part of the main study sample. Cronbach's alpha coefficients were calculated for each section of the instrument, yielding the following results: Section 1 – Circadian Rhythm Disruption ($\alpha = 0.860$), Section 2 – Academic Performance ($\alpha = 0.823$), Section 3 – Coping Strategies ($\alpha = 0.844$). The overall Cronbach's alpha for the entire instrument was 0.899, which exceeds the acceptable threshold of 0.70, indicating strong internal consistency.

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Data Collection

The researchers utilized Google Forms as the primary platform for data collection, ensuring accessibility and convenience in reaching the target respondents. A structured survey questionnaire was developed, incorporating all essential questions necessary for obtaining relevant information on circadian rhythm disruptions and their impact on academic performance. To effectively distribute the survey, the researchers posted the survey link in university-related Facebook groups and pages, maximizing visibility among students. Additionally, representatives from each year level assisted in sharing the questionnaire, ensuring a timely and efficient response rate from the target population.

To uphold confidentiality and ethical standards, the researchers did not collect respondents' names and instead assigned anonymous identification codes in place of personal identifiers. This measure was taken to protect the anonymity of participants, fostering an environment where respondents felt comfortable providing honest insights based on their experiences. By removing personal identifiers, the researchers aimed to increase response accuracy and reliability, ensuring that students freely shared their perspectives without concerns over privacy. The data collected encompassed all essential variables required for the study, allowing for a comprehensive analysis of sleep patterns, academic stress, rigid scheduling, classroom engagement, and coping strategies. The information obtained provided the researchers with valuable insights into the relationship between circadian rhythm disruption and student academic performance, contributing to the study's overall findings and recommendations.

Data Analysis

The researchers employed various statistical tools to analyze the data obtained from the survey responses, ensuring a structured and insightful approach to interpreting the results. To examine the demographic characteristics of the respondents, the percentage frequency distribution was utilized. This method facilitated the categorization and representation of students by program, year level, and sex, allowing the researchers to convert raw frequencies into percentages for a clearer understanding of the sample composition. These demographic distributions provided essential context for interpreting trends in academic performance and circadian rhythm disruptions.

In addition, descriptive statistics were applied to summarize key characteristics of the dataset. Mean values were computed to determine the average response for each variable, while standard deviation measured the variability within the responses. These measures enhanced the interpretation of students' experiences and provided a basis for understanding patterns in sleep quality, academic stress, and engagement levels.

Since the Shapiro-Wilk test indicated that the data was not normally distributed, the researchers utilized Spearman's rho correlation to analyze relationships between circadian rhythm disruption and academic performance factors. This non-parametric statistical method allowed the researchers to quantify associations between average sleep duration, academic stress, class schedules, attendance, and classroom engagement, assessing the strength and direction of their correlations. By conducting this analysis, the study provided insights into whether disruptions in circadian rhythms significantly affected students' engagement and attendance patterns

Table 1 Spearman's rho Correlation Coefficient

Spearman's rho Correlation Coefficient (r) value	Strength	Direction
Greater than .5	Strong	Positive
Between .3 and .5	Moderate	Positive
Between 0 and .3	Weak	Positive
0	None	None
Between 0 and -.3	Weak	Negative
Between -.3 and -.5	Moderate	Negative
Less than -.5	Strong	Negative

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The data was also analyzed using the following verbal interpretations:

Likert Scale. Rensis Likert developed the Likert scale in 1932 as an approach for analyzing attitudes by asking a sequence of associated questions designed to evaluate an individual's opinion about a particular subject. The categorized response options provided by each question, which consist of "strongly agree," "agree," "undecided," "disagree," and "strongly disagree," enabled participants to indicate to what extent they support or oppose the idea. The actual Likert scale was created by adding the answers from several related questions in order to measure the underlying attitude. (Batterton and Hale, 2017)

Table 2 Likert Scale Verbal Interpretation

Scale	Weighted Mean	Verbal Interpretation
1	1.00 – 1.80	Strongly Disagree/ Extremely unlikely/ Never
2	1.81 – 2.60	Disagree/ Unlikely/ Rarely
3	2.61 – 3.40	Undecided/ Neutral/ Sometimes
4	3.41 – 4.20	Agree/ Likely/ Often
5	4.21 – 5.00	Strongly Agree/ Extremely Likely/ Always

RESULTS

The table showed that out of 172 respondents, 116 (67.44%) were enrolled in the Bachelor of Science in Accountancy (BSA) program, while 56 respondents (32.56%) were enrolled in the Bachelor of Science in Information Systems (BSAIS) program. This data indicated a higher representation of students in the BSA program within the sample.

Table 3 Demographic Profile of Respondents According to Program

	f	%
Bachelor of Science in Accountancy (BSA)	116	67.44%
Bachelor of Science in Accounting Information System (BSAIS)	56	32.56%
TOTAL	172	100%

The data presented in Table 4 indicated that among the respondents, 54 individuals (31.40%) were in their first year, 26 individuals (15.12%) were in their second year, 36 individuals (20.93%) were in their third year, and 56 individuals (32.56%) were in their fourth year. The data reflected a relatively balanced distribution across the various year levels, with fourth-year students representing the highest percentage.

Table 4 Demographic Profile of Respondents According to Year Level

	f	%
1st Year	54	31.40%
2nd Year	26	15.12%
3rd Year	36	20.93%
4th Year	56	32.56%
TOTAL	172	100%

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Table 5 Demographic Profile of Respondents According to Sex

	f	%
Female	135	78.49%
Male	37	21.51%
TOTAL	172	100%

Among the 172 respondents, 135 (78.49%) identified as female, while 37 (21.51%) identified as male. This distribution indicated a predominance of female participants within the sample, with a markedly smaller representation of male respondents.

Table 6 Sleep Patterns — Ease of Waking Up Early

	f	%
Relatively easy	67	38.95%
Super easy	16	9.30%
Waking up in the morning is quite a challenge	64	37.21%
Waking up isn't easy because I never get a good night sleep	25	14.53%
TOTAL	172	100%

The table indicated how easy it was for respondents to wake up early with regards to their sleep patterns. The largest number (38.95%) showed that it was relatively easy to wake up early, followed by those respondents (37.21%) who found it quite a challenge. Meanwhile, 14.53% of respondents considered it difficult because they never got a good night's sleep while 9.30% said it was super easy. This concurred with the research conducted by Yeo et al. (2023), which stated that the ability to wake up early depends on the sleep patterns and daily schedules. The ease of waking up early may be a challenge because of insufficient or disrupted sleep.

Table 7 Sleep Patterns — Natural Time of Waking Up

	f	%
As late as possible	20	11.63%
Before the sunrise	32	18.60%
It varies	55	31.98%
With the sun	65	37.79%
TOTAL	172	100%

Among 172 participants, 37.79% revealed that their natural waking time, without an alarm, coincided with sunrise. This observation supported Jon Johnson's (2020) medically reviewed article, which highlighted the alignment of the human body with natural environmental cues, such as the rising and setting of the sun. These natural cycles play an important role in regulating sleep and wakefulness. Meanwhile, 31.98% of participants noted that their waking time varies, while 18.60% naturally woke up before sunrise, and 11.63% preferred to wake up as late as possible.

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Table 8 Sleep Patterns — Peak Productivity Time

	f	%
Afternoon (12 PM - 6 PM)	29	16.86%
Evening (6 PM - 12 AM)	75	43.60%
Morning (6 AM - 12 PM)	46	26.74%
Night (12 AM - 6 AM)	22	12.79%
TOTAL	172	100%

The table provided the data about the time of the day when the respondents felt most productive. 43.60% of the respondents were most productive in the evening (6 PM - 12 AM), followed by 26.74% who voted for morning (6 AM - 12 PM). Subsequently, 16.86% thought that they were most productive in the afternoon (12 PM - 6 PM) and 12.79% preferred night (12 AM - 6 AM). In accordance with Boiling et al (2018), evening-oriented individuals had a tendency to be more effective later in the day as compared to morning-oriented individuals, as productivity differed based on personal chronotypes.

Table 9 Sleep Patterns — Evening Energy Level

	f	%
High	30	17.44%
Moderate to high	108	62.79%
Relatively low	29	16.86%
Very low	5	2.91%
TOTAL	172	100%

Majority of the respondents, taking 62.79% of the 172 respondents, said that their energy level at night was moderate to high. Then, 17.44% indicated that their energy level was high while 16.86% reported a relatively low level. The smallest percentage, 2.91%, experienced very low energy at night. Findings by Zavgorodniaia et al. (2021) showed that students have different chronotypes, with certain students being more active and productive in the evening. However, studying in the evening did not always correlate with good academic performance, as there were students who struggled to study at night.

Table 10 Sleep Patterns — Evening Person or Morning Person

	f	%
Both	25	14.53%
Evening Person	93	54.07%
Morning Person	40	23.26%
Neither	14	8.14%
TOTAL	172	100%

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The table showed the classification of the respondents, whether they were an evening or morning person. 54.07% of the respondents identified themselves as an evening person in contrast to 23.26% who indicated that they were a morning person. Meanwhile, 14.53% said that they were both an evening and morning person, and 8.14% chose neither of the two. The findings suggested that many respondents are more active during the evening. This is aligned with the study of Hershner and Chervin (2014), which showed that young adults experience a delayed circadian rhythm, leading to increased activity levels at night.

Table 11 Academic Stress

	Mean	SD	Description
1. Anxiety related to academic performance causes more difficulty falling asleep or staying asleep.	4.33	0.786	Strongly Agree
2. I feel pressured by my academic responsibilities, which makes it difficult for me to get enough sleep.	3.99	0.937	Agree
3. My sleep routine gets interrupted since I usually find myself staying up late to study or finish tasks.	4.14	0.981	Agree
4. My ability to have a regular sleep schedule is negatively affected by my increased anxiety levels, which happen to be a result of the pressure to perform well academically.	3.78	0.996	Agree
5. I frequently find myself awake at night worrying about deadlines and my academic performance.	3.90	1.087	Agree
OVERALL	**4.03**	**0.752**	**Agree**

Table 11 shows that academic performance anxiety significantly results to academic stress, as evidenced by the highest agreement observed in the difficulty falling or staying asleep (μ = 4.33, SD = 0.786), highlighting that disrupted sleep patterns are a prevalent issue among respondents. Additionally, staying up late to complete tasks (μ = 4.14, SD = 0.981) and feeling pressured from academic responsibilities (μ = 3.99, SD = .937) further reinforce the connection between academic pressure and inconsistent sleep routines. This is aligned with the findings of Almojali et al. (2017) and Fischer et al. (2019), which underscored the strong correlation of higher levels of academic stress and sleep disruption, such as trouble falling asleep and staying asleep during the night.

Significant concerns regarding deadlines and performance further contributed to sleeplessness (μ = 3.90, SD = 1.087). Respondents also reported that high anxiety levels impeded their ability to maintain a consistent sleep schedule (μ = 3.78, SD = 0.996). These findings underscored the substantial role of academic stress on students' daily routines and overall well-being, highlighting the urgent need for effective strategies to manage academic pressure and its impacts on health. The overall mean of 4.03 (SD = 0.752) indicated that respondents agreed that academic stress significantly affected their sleep routines. Similar to research conducted by Wang and Fan (2023), academic stress negatively affected the sleep quality of students, with academic overload and anxiety being the main factors.

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Table 12 Rigid Class Schedule

	Mean	SD	Description
1. I find it challenging to maintain a regular sleep schedule during times of heavy academic stress (exams, deadlines, etc.).	4.25	0.944	Strongly Agree
2. I find it challenging to maintain a consistent bedtime and go to sleep at the same time every night because of my inconsistent class schedule.	3.80	1.174	Agree
3.I frequently experience daytime fatigue or exhaustion as a result of irregular or insufficient sleep caused by my rigorous class schedule.	3.84	1.101	Agree
4. My sleep duration and quality have changed as a result of my shifting academic schedule.	3.85	1.096	Agree
5. My natural sleep-wake cycle is disrupted by a tight class schedule, which often results in late-night cramming sessions.	3.87	1.081	Agree
OVERALL	**3.92**	**0.831**	**Agree**

Table 12 suggests that rigid class schedules significantly impact students' sleep patterns, with an overall mean of 3.92 (SD = 0.831) indicating a general agreement that academic schedules contribute to sleep disturbances. The highest-rated challenge, maintaining a regular sleep schedule during periods of high academic stress (μ = 4.25, SD = 0.944), highlights that exams and deadlines create significant disruptions in students' sleep routines. Additionally, rigid class schedules disrupted their natural sleep-wake cycle, resulting in late-night cramming sessions (μ = 3.87, SD = 1.081), and shifting schedules negatively affected sleep duration and quality (μ = 3.85, SD = 1.096). Inconsistent class timings also made it difficult to maintain a consistent bedtime (μ = 3.80, SD = 1.174), leading to daytime fatigue (μ = 3.84, SD = 1.101). According to Crowley et al. (2022), irregular or late class timings may disrupt sleep patterns of students resulting in sleep deprivation and fatigue which may negatively affect cognitive function and academic performance. These findings highlighted the negative effects that rigid academic routines have on students' sleep patterns, emphasizing the role of academic demands in disrupting their daily lives and overall well-being.

Table 13 Lifestyle Choices

	Mean	SD	Description
1. It is easier for me to control my sleep-wake cycle when I exercise during the day.	3.63	1.009	Agree
2. I struggle to fall asleep when I drink caffeinated beverages (coffee, tea, or soda) prior to bedtime.	3.50	1.318	Agree
3. I found that I can relax and get ready for bed by following a regular schedule (reading, for example).	3.96	0.951	Agree
4. Using electronics before bed, such as laptops and smartphones, has a negative effect on my quality of sleep.	3.85	1.071	Agree
5. I find that eating heavy meals or snacks right before bedtime interferes with the quality of my sleep.	3.55	1.234	Agree
OVERALL	**3.70**	**0.703**	**Agree**

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The findings presented in Table 13 indicate that lifestyle choices significantly impact sleep quality, with an overall mean of 3.70 (SD = 0.703) reflecting general agreement among respondents. The highest-rated statement, following a regular bedtime routine (μ = 3.96, SD = 0.951), suggests that consistency in pre-sleep activities helps individuals relax and prepare for rest. Additionally, the use of electronics before bed (μ = 3.85, SD = 1.071) and exercise during the day improving sleep control (μ = 3.63, SD = 1.009) reinforce the idea that environmental and behavioral factors play a role in sleep regulation. These results suggested that adopting structured and health-conscious habits can enhance overall sleep quality and promote better sleep hygiene. In accordance with Zheng et al. (2024), a healthy lifestyle, such as regular exercise, was linked to higher chance of good sleep quality and reduced risk of sleep disorder.

Lower mean scores for caffeine intake before bedtime (μ = 3.50, SD = 1.318) and eating heavy meals before sleep (μ = 3.55, SD = 1.234) suggest that while these habits impact sleep, their effects may vary across individuals. This result concurred with the findings of Shimura et. al (2018), which indicated caffeine intake, excessive screen time, and late night dinner as a significant factor in the sleep disturbance of the students. It emphasized that students who consumed higher quantities of caffeinated beverages, especially during late hours, experienced evident difficulties in achieving quality sleep. The minimal variability in their responses indicated a consistent perception of how these lifestyle choices affect sleep health.

Table 14 Class Attendance

	Mean	SD	Description
1. When I feel tired or exhausted, I find it difficult to attend my scheduled classes.	1.27	0.650	Never
2. I skip classes because I'm too exhausted or don't get enough sleep.	1.71	1.096	Never
3. Irregular class attendance does not affect my academic performance.	1.47	0.721	Never
4. Maintaining consistent attendance in class is difficult for me.	1.97	1.259	Rarely
5. I have difficulty getting out of bed in the morning for classes.	3.37	1.200	Sometimes
6. I believe that inconsistent sleeping habits have a negative impact on my attendance in class.	3.58	1.443	Often
OVERALL	**2.43**	**0.665**	**Rarely**

The results presented in Table 14 indicate that class attendance is generally consistent, with an overall mean of 2.43 (SD = 0.665) suggesting that students rarely face difficulty attending scheduled classes. The lowest mean scores are seen in difficulty attending classes due to exhaustion (μ = 1.27, SD = 0.650) and skipping classes due to insufficient sleep (μ = 1.71, SD = 1.096), demonstrating that fatigue does not frequently result in absenteeism. Similarly, negative findings on the belief that irregular attendance does not impact academic performance (μ = 1.47, SD = 0.721) further reinforces the commitment to class attendance.

However, challenges arise with morning wakefulness (μ = 3.37, SD = 1.200) and the effect of inconsistent sleep habits on attendance (μ = 3.58, SD = 1.443), indicating that while students generally attend their classes, disrupted sleep cycles might affect their ability to be fully engaged. This suggested that students' attendance patterns and perceptions were somewhat inconsistent. While students generally recognized the importance of attending classes and prioritized it in certain situations, factors such as duration of sleep, sleep habits and tiredness occasionally hindered their ability to attend consistently (Hysing et al., 2015). These findings implied that, although attendance was valued, external factors can occasionally affect students' attendance patterns.

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Table 15 Classroom Engagement

	Mean	SD	Description
1. Due to feeling tired, I have trouble concentrating in class.	3.99	0.943	Often
2. Because I didn't get enough sleep the night before, I have struggles focusing in class.	3.97	0.904	Often
3. My inability to concentrate in class is caused by my sleepiness.	3.85	1.036	Often
4. I have difficulties staying awake during lectures.	3.32	1.122	Sometimes
5. I find it challenging to complete in-class activities due to fatigue.	2.95	1.301	Sometimes
6. I often need to take breaks or zone out during class because I am tired.	3.50	1.187	Often
OVERALL	**3.60**	**0.812**	**Often**

Table 15 shows that **f**atigue and sleep deprivation significantly impact classroom engagement, with an overall mean of 3.60 (SD = 0.812) suggesting that students often struggle with focus and participation due to tiredness. The highest-rated statements—trouble concentrating du**e** to tiredness (μ = 3.99, SD = 0.943) and difficulty focusing after inadequate sleep (μ = 3.97, SD = 0.904)—highlight that sleep disturbances directly affect cognitive function during class. Additionally, sleepiness negatively affecting concentration (μ = 3.85, SD = 1.036) reinforces the idea that exhaustion is a recurring barrier to learning. The findings suggested that inadequate sleep impaired certain cognitive functions, including the capacity to learn and process information, supporting journalist Eric Suni's medically verified article (2023).

However, responses regarding staying awake during lectures (μ = 3.32, SD = 1.122) and difficulty completing tasks due to fatigue (μ = 2.95, SD = 1.301) show slightly lower ratings, suggesting that while students struggle, they still manage to remain somewhat engaged in coursework. The data revealed that tiredness and lack of sleep are significant factors affecting classroom engagement, with respondents acknowledging these issues as frequent barriers to their academic focus and performance.

Table 16 Significant Correlation Between Disruption of Circadian Rhythm and Academic Performance

Variable Pair	Rs	*p* value	Interpretation
Academic Stress - Class Attendance	0.032	0.673	Weak *(Positive)*
Academic Stress - Classroom Engagement	0.350	< 0.001	Moderate *(Positive)*
Rigid Schedule - Class Attendance	0.141	0.065	Weak *(Positive)*
Rigid Schedule - Classroom Engagement	0.398	< 0.001	Moderate *(Positive)*
Lifestyle Choices - Class Attendance	0.173	0.023	Weak *(Positive)*
Lifestyle Choices - Classroom Engagement	0.365	< 0.001	Moderate *(Positive)*

The results indicate a significant correlation between circadian rhythm disruption and academic performance, particularly in classroom engagement. The findings show that academic stress (Rs = 0.350, p < 0.001), rigid class schedules (Rs = 0.398, p < 0.001), and lifestyle choices (Rs = 0.365, p < 0.001) all moderately impact

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students' ability to engage in class, suggesting that disrupted biological rhythms negatively affect their focus and participation. In terms of class attendance, the correlations were weaker overall. Academic stress (Rs = 0.032, p = 0.673) and rigid schedules (Rs = 0.141, p = 0.065) were not statistically significant, indicating that these factors do not meaningfully influence attendance. However, lifestyle choices exhibited a significant but weak positive correlation with attendance (Rs = 0.173, p = 0.023). This suggests that while lifestyle-related circadian disruptions modestly affect students' ability to attend classes, their attendance remains relatively consistent despite challenges with sleep–wake alignment.

Multiple regression analyses were conducted to examine the predictors of classroom engagement (CE) and class attendance (CA) while controlling for key covariates, including program, year level, and sex.

Table 17 Multiple Regression Predicting Classroom Engagement (CE)

Predictor	**Estimate**	**SE**	**t**	**p**	**95% CI Lower**	**95% CI Upper**
Intercept	0.793	0.4007	1.979	0.049		
Academic Stress	0.176	0.0967	1.816	0.071	-0.01423	0.339
Rigid Schedule	0.185	0.0862	2.147	0.033	0.01524	0.363
Lifestyle Choices	0.328	0.0823	3.985	< .001	0.14323	0.425
Program:						
BSAIS – BSA	-0.114	0.1481	-0.772	0.441	-0.50052	0.219
Year Level:						
3rd Year – 1st Year	0.141	0.1739	0.813	0.417	-0.24857	0.597
2nd Year – 1st Year	0.162	0.1726	0.936	0.350	-0.22054	0.618
4th Year – 1st Year	0.329	0.1647	1.995	0.048	0.00419	0.805
Sex:						
Male – Female	0.159	0.1339	1.186	0.237	-0.12996	0.521

Model Fit: $R^2 = 0.270$, Adjusted $R^2 = 0.234$, $F(8, 163) = 7.54$, $p < .001$

The multiple regression model predicting CE was significant, $F(8,163) = 7.54, p < .001$, explaining approximately 27% of the variance ($R^2 = 0.270$). Among the predictors, lifestyle choices ($\beta = 0.328, p < .001$) and rigid schedule ($\beta = 0.185, p = 0.033$) were positively associated with engagement, indicating that students with healthier routines and more structured schedules tended to participate more actively in class. Additionally, 4th-year students demonstrated higher engagement than 1st-year students ($\beta = 0.329, p = 0.048$). Other covariates, including academic stress, program, sex, and lower year levels, were not statistically significant.

Table 18 Multiple Regression Predicting Class Attendance (CA)

Predictor	**Estimate**	**SE**	**t**	**p**	**95% CI Lower**	**95% CI Upper**
Intercept [a]	1.5490	0.3673	4.217	< .001		
Academic Stress	-0.1174	0.0887	-1.324	0.187	-0.33096	0.0652
Rigid Schedule	0.1524	0.0791	1.928	0.056	-0.00457	0.3856
Lifestyle Choice	0.1292	0.0754	1.713	0.089	-0.02090	0.2944
Program:						
BSAIS – BSA	-0.0572	0.1357	-0.422	0.674	-0.48946	0.3173
Year Level:						
3rd Year – 1st Year	-0.1100	0.1594	-0.690	0.491	-0.63907	0.3081
2nd Year – 1st Year	0.1453	0.1582	0.919	0.360	-0.25143	0.6889
4th Year – 1st Year	0.2013	0.1510	1.333	0.184	-0.14574	0.7515
Sex:						
Male – Female	0.1480	0.1227	1.206	0.229	-0.14184	0.5874

Model Fit: $R^2 = 0.0829$, Adjusted $R^2 = 0.0379$, $F(8, 163) = 1.84$, $p = 0.073$

The model predicting CA was not statistically significant overall ($F(8,163) = 1.84, p = 0.073, R^2 = 0.083$). While rigid schedules ($p = 0.056$) and lifestyle choices ($p = 0.089$) showed trends toward positive associations with attendance, no predictors reached conventional significance levels. This suggests that attendance may be influenced by factors beyond those included in the model, such as motivation, commuting, or external obligations.

These results extend the initial bivariate correlation analysis by demonstrating that classroom engagement is more strongly associated with structured routines and healthy lifestyle behaviors than with demographic variables. Attendance, in contrast, appears less predictable from these factors alone. The findings highlight the importance of supporting students' daily routines and promoting lifestyle behaviors that enhance active participation in learning.

Table 19 Coping Strategies

	Mean	SD	Description
1. Maintaining a regular sleep routine, even on weekends.	3.87	1.129	Likely
2. Avoid stimulants like caffeine before bedtime.	3.81	1.211	Likely
3.Using methods of relaxation, such as deep breathing and meditation, to enhance sleep.	3.71	1.198	Likely
4. Reducing the screen time spent using phone or computer before bed.	3.69	1.090	Likely
5. Before going to bed, engage in relaxing activities like reading or listening to soothing music.	4.08	1.054	Likely
6. Regular exercise can help control sleep patterns.	3.92	1.089	Likely
7. Stay away from heavy meals right before bed.	3.78	1.169	Likely
8. Napping slightly during the day to deal with sleepiness.	3.94	1.098	Likely
9. Obtaining professional advice or therapy for concerns pertaining to sleep.	3.37	1.298	Neutral
10. Avoiding stimulating activities right before bedtime, such as lengthy study sessions or video game playing.	3.63	1.170	Likely
OVERALL	**3.41**	**0.724**	**Likely**

Table 19 highlighted the coping strategies respondents are likely to use to manage sleep-related issues. The findings suggest that students generally adopt sleep-related coping strategies, with an overall mean of 3.41 (SD = 0.724) indicating that most practices are likely utilized. Among the strategies, engaging in relaxing activities before bed (μ = 4.08, SD = 1.054) appears to be the most preferred, reinforcing the importance of winding down before sleep through reading or listening to soothing music. Similarly, daytime napping (μ = 3.94, SD = 1.098) and regular exercise (μ = 3.92, SD = 1.089) rank high, suggesting that physical activity and brief naps help students manage sleepiness. In accordance with the study conducted by Zeng et al. (2024) and Gale et al. (2024), engaging in exercise activity during the evening may possibly enhance duration of sleep without negatively affecting other factors of sleep quality.

Avoiding stimulants (μ = 3.81, SD = 1.211), maintaining a regular sleep routine (μ = 3.87, SD = 1.129), staying away from heavy meals before bed time (μ = 3.78 SD = 1.169), using methods of relaxation (μ = 3.71, SD = 1.198), and reducing screen exposure (μ = 3.69, SD = 1.090) are also commonly practiced, though variability in responses suggests differences in individual adherence. Avoiding stimulating activities, such as video games or studying late at night, was rated slightly higher with a mean of 3.63 (SD = 1.170) but was less emphasized compared to other strategies. Notably, seeking professional advice for sleep concerns (μ = 3.37, SD = 1.298) has the lowest rating, indicating that students may not actively pursue formal interventions, relying instead on self-regulated coping strategies. According to Zochil & Thorsteinsson (2020), even though students experienced poor sleep quality, their intention to seek professional help was minimal. Overall,

respondents tended to favor easily implementable solutions that enhance relaxation and promote healthy sleep habits, while more formal interventions like professional therapy were less commonly considered.

DISCUSSION

This chapter investigated the link between circadian disruption and the academic performance of students. It related the findings to current research, discussed their implications, and suggested strategies to mitigate circadian misalignment in order to enhance student performance.

The demographic profile of the 172 respondents indicated that a majority, 67.44%, were enrolled in the Bachelor of Science in Accountancy (BSA) program, while 32.56% were from the Bachelor of Science in Accounting Information Systems (BSAIS). In terms of year level, fourth-year students constituted the largest group at 32.56%, followed by first-year students at 31.40%, third-year students at 20.93%, and second-year students at 15.12%. Gender distribution showed that the sample was predominantly female, with 78.49% identified as female and 21.51% as male. This data revealed a higher representation of BSA students, fourth-year students, and female participants in the sample.

The data presented offered valuable insights into the sleep patterns, ease of waking, and productivity preferences of a sample of 172 respondents. A noteworthy portion of the respondents, specifically 38.95%, reported relatively easy experiences when waking up early, whereas 37.21% encountered difficulties in this regard. Additionally, 14.53% of participants attributed their challenges to insufficient sleep quality, while 9.30% indicated they wake up effortlessly.

In terms of natural wake-up times, 37.79% of respondents rose with the sun, 31.98% experienced variability in their wake-up times, 18.60% woke prior to sunrise, and 11.63% preferred to wake as late as possible. Regarding productivity levels, a significant majority (43.60%) reported that their highest productivity occurs in the evening, followed by 26.74% in the morning, 16.86% in the afternoon, and 12.79% during the late-night hours.When assessing energy levels at night, a substantial majority (62.79%) reported moderate to high energy, with 17.44% indicated high energy levels and 16.86% reported low energy. Only 2.91% of respondents noted very low energy levels during nighttime. Concerning circadian preferences, 54.07% were identified as evening-oriented individuals, while 23.26% considered themselves morning-oriented. A smaller segment, constituting 14.53% of respondents, identified as both, and 8.14% did not align with either category. These findings suggested a predominant inclination towards evening productivity and activity, moderate energy levels at night, and a diverse array of sleep and wake patterns among the respondents.

Academic stress, rigid class schedules, and lifestyle choices were significantly linked to sleep disruptions. Anxiety related to academic responsibilities impacts their ability to both fall asleep and stay asleep (μ= 4.33). High academic demands, such as exams and deadlines, greatly hindered individuals' ability to maintain consistent sleep routines (μ= 4.25). Rigid schedules disrupted natural sleep-wake cycles, leading to fatigue and irregular sleep patterns (μ= 3.84). Structured routines, including exercise and reading, had a positive influence on sleep quality (μ= 3.96), while habits like using electronics or consuming caffeine before bed negatively impacted sleep quality (μ= 3.85). These findings emphasized the importance of balanced schedules and healthy habits for improving sleep hygiene and reducing stress.

The data demonstrated how irregular sleep patterns and fatigue affect class attendance. Despite feeling exhausted, respondents exhibited a strong commitment to attending their classes, reflected in a low score of 1.27 for finding it difficult to attend classes when they are tired and exhausted. This dedication showed students' awareness of the importance of attendance for academic performance. However, the students sometimes find it difficult to get out of bed in the morning, and often they experienced the negative impact of inconsistent sleep pattern to their attendance. These findings highlighted the impact of circadian misalignment caused by shifting sleep schedules, as discussed in the study, where disruptions in sleep-wake cycles impaired focus and energy levels, making attendance more difficult.

Classroom engagement was significantly affected by sleep deprivation and irregular sleeping patterns. Respondents often reported difficulties concentrating during class due to tiredness (μ = 3.99) and struggled to

focus after inadequate sleep (μ = 3.97). Additionally, respondents frequently zoned out or took breaks due to tiredness (μ = 3.50) and encountered challenges staying awake during lectures (μ = 3.32). These findings highlighted how irregular sleep schedules negatively impact the synchronization of the circadian clock, leading to reduced energy levels and engagement. Overall, the data underscored that poor sleep habits result in lower classroom engagement, decreased comprehension, and less effective participation. This emphasized the urgent need to address sleep deprivation among students to improve academic performance. The findings show that disruption of circadian rhythm due to academic stress, rigid class schedules, and lifestyle choices is significantly and moderately correlated to classroom engagement, suggesting negative effect on focus and participation. On the other hand, weak correlation exists between these circadian rhythm disruption factors and class attendance, with p-values greater that 0.05 among all factors, indicating insignificance.

The findings reveal that BSA and BSAIS students prefer simple, self-guided coping strategies over formal interventions to manage disruptions in their circadian rhythm. The most commonly used methods include reading or listening to calming music before bed (μ=4.08), taking short naps during the day (μ=3.94), and engaging in regular exercise (μ=3.92), all of which support relaxation and energy regulation. Maintaining a consistent sleep schedule, even on weekends (μ=3.87) further demonstrates their efforts to stabilize sleep patterns. Additionally, students actively avoid stimulants like caffeine (μ=3.81) and heavy meals before bedtime (μ=3.78) to minimize sleep disturbances. While reducing screen time before sleep (μ=3.69) and practicing relaxation techniques like meditation and deep breathing (μ=3.71) are also adopted, seeking professional advice for sleep concerns (μ=3.37) is the least utilized strategy, suggesting a preference for independent solutions. Overall, students rely on manageable, everyday habits to regulate sleep and enhance well-being, rather than structured therapeutic interventions.

CONCLUSION

The findings highlight a strong relationship between circadian rhythm disruption and academic performance, particularly in classroom engagement rather than attendance. Academic stress, rigid schedules, and lifestyle choices significantly influence students' ability to focus and participate in class, while their commitment to attending despite exhaustion remains evident. Furthermore, students predominantly adopt self-guided coping strategies, such as engaging in relaxation techniques, maintaining regular sleep schedules, and avoiding stimulants, rather than seeking professional interventions. The preference for evening productivity and activity patterns among the respondents further emphasizes the need for academic institutions to recognize the impact of sleep hygiene on overall student performance and well-being.

RECOMMENDATIONS

To mitigate the effects of circadian rhythm disruptions, institutions should explore flexible scheduling options that accommodate students' peak productivity hours, reducing the negative impact of rigid class structures. Additionally, incorporating wellness programs, such as sleep hygiene workshops, guided relaxation techniques, and physical activity initiatives, can help students develop healthier sleep patterns and improve engagement in class. Encouraging structured bedtime routines while raising awareness of the benefits of seeking professional support for sleep-related concerns can further enhance academic performance. By addressing these factors, institutions can foster an environment that supports student well-being, optimizes learning efficiency, and minimizes the long-term effects of sleep deprivation on academic success.

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