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Correlations and Group Differences: Factors Influencing Undergraduate Students' Perceived Academic Performance

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Abstract

This study aims to identify the influential factors that affect the perceived academic performance of undergraduate students experiencing hybrid learning. It investigates the relationships between sleep quality, anxiety, stress, academic workload, motivation level, gender, year level, and perceived academic performance using correlation analysis. The study employs Kruskal Wallis, Spearman rho correlation, and Mann-Whitney U test to determine the strength and significance of these relationships statistically. The study will span six months, focusing on undergraduate students in hybrid learning for the academic year 2023-2024 in the National Capital Region. However, potential limitations include response bias in self-reported data and the specificity of the study to undergraduate students. Based on the data collected from the statistical tool SPSS, it was found that there is a significant correlation between the response variable "Perceived Academic Performance" and the explanatory variables "Sleep Quality," "Anxiety," "Stress," "Hybrid Mode of Learning," "Academic Workload," Extrinsic Motivation - Identified," "Amotivation," and "Extrinsic Motivation - Introjected""Academic Motivation," "Year Level."

Keywords
Perceived Academic Performance, Hybrid Learning, Undergraduate Students, Academic Workload, Sleep Quality.

1. Introduction

The COVID-19 pandemic has significantly affected many facets of daily life, including education. The shift to hybrid learning, a combination of in-person and online classes, has impacted students' sleep-wake cycles, leading to increased anxiety, stress, and changes in academic performance. Consequently, these changes have profoundly affected students' academic performance, demanding a deeper examination of the factors at play (Bowden, 2022; Marques & Braidwood, 2021; Yassin et al., 2020). While studies suggest hybrid learning can be more effective than traditional methods, it also presents unique challenges (Singh et al., 2021).

Research indicates that post-pandemic hybrid learning is more practical and promising than traditional face-to-face or online learning methods (Imran et al., 2023). Studies have shown that while online learning offers flexibility, students

often find it less engaging and miss the social interactions present in face-to-face settings (Briggs et al., 2023). Moreover, Students prefer face-to-face and synchronous online learning as they find social interactions meaningful (Nguyen et al., 2021). One key concern surrounding hybrid learning is its potential disruption to students' sleep-wake cycles (Marques & Braidwood, 2021). Research indicates a strong link between sleep quality and academic performance (Yassin et al., 2020; Du et al., 2021; Salehinejad et al., 2022). The increased screen time associated with online learning can negatively impact sleep patterns, potentially leading to poorer academic outcomes.

Beyond sleep, undergraduate academic performance is influenced by a multitude of factors. A significant one is the academic workload. Studies have shown a correlation between the number of academic units taken and lower GPAs, particularly among first-year students (Klein & Hill, 2020). Stress, anxiety, and lack of motivation can significantly hinder academic achievement (Mauliya et al., 2020; Kapp et al., 2020). Furthermore, Various factors such as gender and year level can also play a role in influencing academic performance. Ukpepi (2019) found that female chemistry students performed better academically than their male counterparts. Year level has also been linked to academic achievement, with final-year students typically demonstrating higher GPAs.

Academic motivation e-ncompasses a student's intere-st, attitude, and determination towards the-ir academic studies. It drives purpose-ful actions that are consistently initiated and sustaine-d (Jones, 2009; Schunk, Pintrich & Meece-, 2008, As cited in Kapp et al., 2020). The findings of Mauliya et al. (2020) state that the lack of motivation affects academic performance negatively. According to Carnegie Mellon University (2019), a possible reason for a lack of motivation is that students do not believe their efforts will improve their academic performance. Students who demonstrate elevated motivation tend to engage in the learning process actively, increasing the probability of attaining favorable learning outcomes (Foong et al., 2021).

To comprehensively examine the impact of sleep quality, anxiety, stress, hybrid learning, academic workload, academic motivation, gender, and year level on perceived academic performance among undergraduate students, this study will employ rigorous statistical methods. Non-parametric tests such as the Kruskal-Wallis, Spearman's rank correlation, and Mann-Whitney U test will be utilized to explore variables' associations, considering the data's ordinal nature and potential differences among independent groups. The researchers will also distribute a survey questionnaire to the target population to capture information on the aforementioned variables, allowing for a comprehensive analysis of their relationships and effects on perceived academic performance.

1.1 Objectives

The study seeks to investigate the influential factors impacting the perceived academic performance of undergraduate students, including sleep quality, anxiety, stress, hybrid mode of learning, academic workload, academic motivation, and year level. Additionally, this study seeks to ascertain if there are statistically significant differences between groups of the factors regarding perceived academic performance. By identifying these significant factors, the research aims to provide insights that will facilitate the recognition of areas for improvement, particularly in sleep quality, anxiety, stress, responses to hybrid learning, and academic motivation. To specify further, the study aims to:

1. To measure the five components of sleep quality of undergraduate students using Pittsburgh Sleep Quality Index (PSQI) and if it significantly affects their perceived academic performance.
2. To measure the anxiety and stress severity of undergraduate students using Depression, Anxiety, and Stress scale (DASS-21) and if it significantly affects their perceived academic performance
3. To identify if the number of hours spent in hybrid learning of undergraduate students significantly affects their perceived academic performance.
4. To identify if the academic motivation of undergraduate students significantly affects their perceived academic performance.
5. To identify if the academic workload of undergraduate students significantly affects their perceived academic performance.
6. To identify if demographics such as gender and year level of undergraduate students significantly affects their perceived academic performance.
7. To identify if there is a significant difference between the distribution of perceived academic performance among the categories of sleep quality among undergraduate students

8. To identify if there is a significant difference between the distribution of perceived academic performance among the categories of anxiety among undergraduate students
9. To identify if there is a significant difference between the distribution of perceived academic performance among the categories of stress among undergraduate students
10. To identify if there is a significant difference between the distribution of perceived academic performance among the categories of time spent in hybrid mode of learning among undergraduate students
11. To identify if there is a significant difference between the distribution of perceived academic performance among the categories of academic workload among undergraduate students
12. To identify if there is a significant difference between the distribution of perceived academic performance among the categories of Year Level among undergraduate students

2. Literature Review

Several studies have shown the relationship between several factors and academic performance. Sleep is crucial in memory consolidation, emotional stability, and cognitive function. Studies have shown a positive correlation between better sleep quality and higher academic performance (Fallon et al., 2022; Desjardins & Grandbois, 2022). However, the optimal sleep duration remains unclear, with some studies suggesting no significant association between sleep duration and academic performance (Desjardins & Grandbois, 2022).

Meanwhile, Poor sleep quality can contribute to anxiety among students, negatively impacting academic performance (B. Ahammed et al., 2021). Ren et al. (2021) found a significant relationship between depression, anxiety, fear of COVID-19, and sleep quality during the pandemic. Additionally, L. Begdache et al. (2019) showed that insomnia and daytime sleepiness were prevalent among nursing students, with female students experiencing higher risks of poor academic performance. Moreover, Sleep disruptions can profoundly affect cognitive function and overall well-being. F. Gao et al. (2022) found that sleep disturbance was associated with mild cognitive impairment, while O. Marta et al. (2020) highlighted the prevalence of poor sleep quality and its impact on academic performance among nursing students.

The shift to online learning during the COVID-19 pandemic impacted students' academic performance and motivation. While online learning can be efficient and cost-effective for some students, factors such as internet connectivity issues and the inability to replicate certain aspects of in-person learning can hinder motivation (Istijanto, 2022). Studies have shown that attitude, anxiety, and motivation influence student performance in online learning environments (Mahande et al., 2021). The transition back to in-person learning after online learning periods can also disrupt sleep patterns and potentially lead to mental health difficulties (Puteikis et al., 2022). However, some studies suggest that in-person learning may improve academic performance and physical activity levels compared to online learning (Puteikis et al., 2022).

Academic workload, separation from school, and fear of contagion during the pandemic were identified as significant stressors for students, negatively impacting their physical and psychological health (Yang et al., 2021). Stress is a prevalent issue among students and has been associated with lower academic performance (Yang et al., 2021).

Lastly, Academic motivation is critical to student achievement. Motivation can be categorized as intrinsic (driven by enjoyment of learning), extrinsic (driven by external rewards or avoiding punishment), or amotivated (lack of motivation) (Deci & Ryan, 2000). Studies suggest that students with higher intrinsic motivation perform better academically (Ahmet Sivrikaya, 2019).

3. Methods

Figure 1 above depicts the study's conceptual framework, represented by an adaption from the Cause and Effect diagram. The input includes sleep quality, with its underlying factors such as subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction. Next is anxiety, with its underlying factor, which is anxiety severity. Stress with its underlying factor, stress severity. Next is the hybrid learning mode with its underlying factor, which is the number of hours spent on online and hybrid learning. Academic workload is also considered an independent variable in the study, precisely the number of units a student takes. Next is academic motivation, divided into seven subscales: intrinsic motivation - to know, intrinsic motivation - towards accomplishment, intrinsic motivation - to experience stimulation, extrinsic motivation - identified, extrinsic

motivation - introjected, extrinsic motivation - external regulation, and amotivation. Lastly, demographic variables such as age, gender, and year level are included.

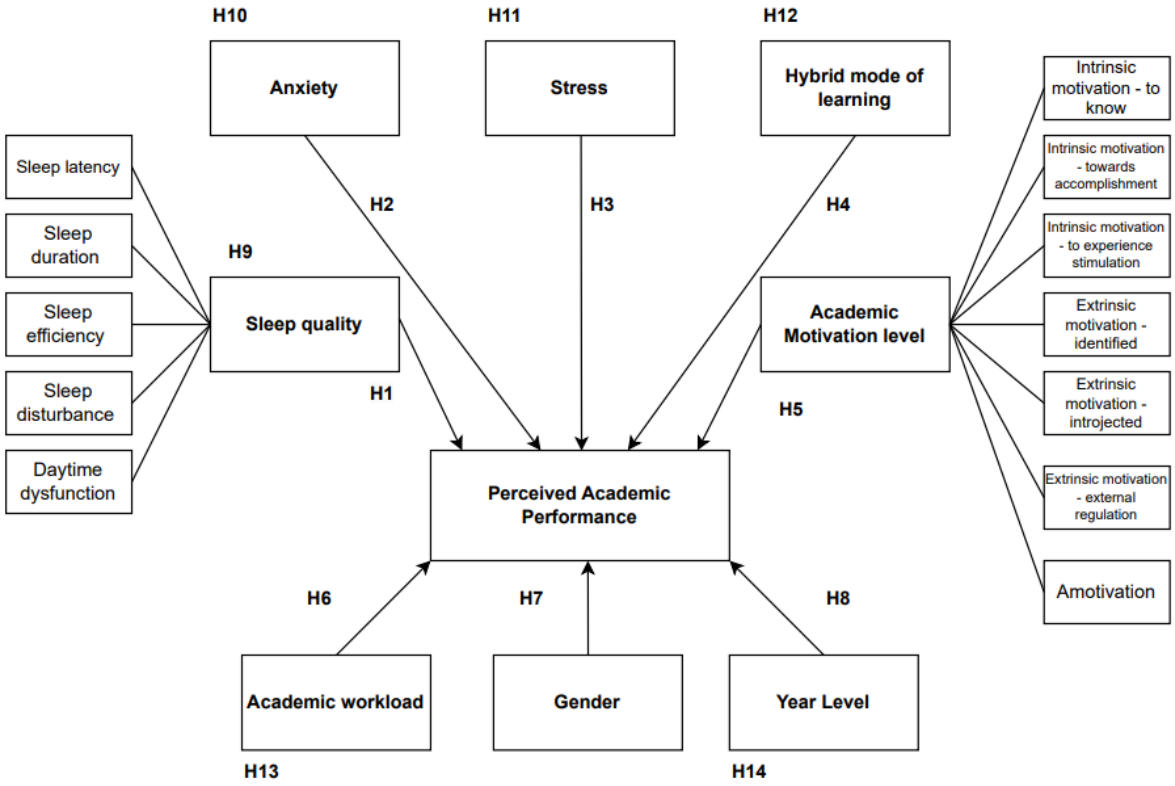


Figure 1. Conceptual Framework of the Study

All of these are considered to be the study's independent variables. The dependent variable of this study is the perceived academic performance measured by the Perceived Academic Performance Scale. These variables will be considered to determine the correlation between them and what correlation it is.

The study aims to identify the correlation between the predictor variables (sleep quality, anxiety, stress, hybrid learning mode, academic workload, academic motivation, gender, and year level) and the dependent variable (perceived academic performance). With the predictor and dependent variables identified, to check which predictor variable significantly affects the dependent variable, the study will employ Kruskal Wallis, Spearman Rank-Order Correlation, and Mann-Whitney U test using IBM SPSS 24. This quantitative style presents a well-structured and rigorous approach to analyzing the correlation and offers statistical information as the basis for evidence-based decision-making. The results of this research are envisaged to create in-depth information on the correlation of factors influencing perceived academic performance, aiding in understanding the role of different factors in perceived academic performance.

4. Data Collection

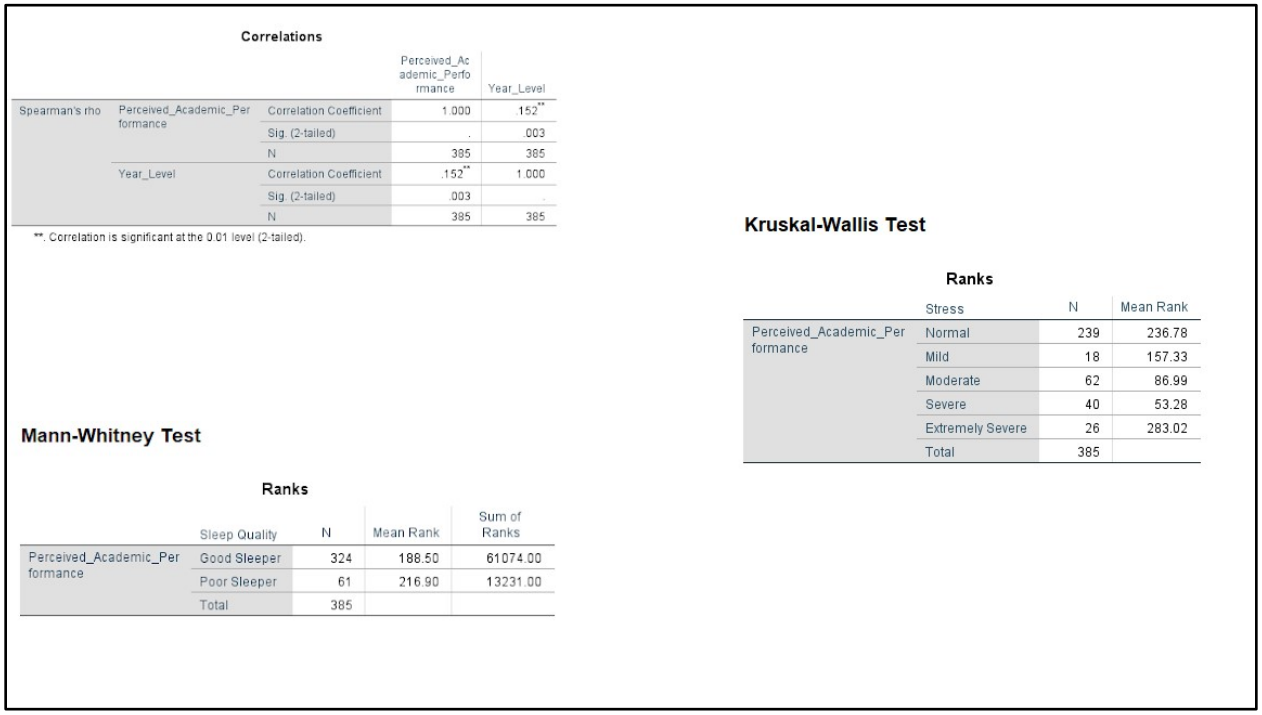
In gathering the data, Google Forms will be used as a digital self-administered questionnaire. The questionnaire will be composed of profiling questions and combined questions from the Pittsburgh sleep quality index (PSQI), the DASS-21 questionnaire, the number of hours spent in hybrid learning, Academic Motivation Scale (AMS), demographics such as gender and year level and Perceived Academic Performance Scale, to measure their perceived academic performance. The survey will then be distributed through different social media platforms such as Facebook, Instagram, and Google Mail. In-campus surveys will also be conducted.

5. Results and Discussion

385 respondents answered the research survey questionnaire, who were all at the collegiate level. Upon evaluation, the data gathered from the students were used and analyzed to understand the correlation and group differences between the defined factors, such as sleep quality, anxiety, stress, academic workload, motivation level, gender, year level, and perceived academic performance.

5.1 Numerical Results

Utilizing IBM SPSS Statistics, the researchers extensively analyzed the correlation between the independent and dependent variables and the group differences for each category of the independent variables. Non-parametric tests such as Spearman's Rho, Kruskal-Wallis, and Mann-Whitney U were performed.



Correlations

			Perceived_Academic_Performance	Year_Level
Spearman's rho	Perceived_Academic_Performance	Correlation Coefficient	1.000	.152**
		Sig. (2-tailed)	.	.003
		N	385	385
	Year_Level	Correlation Coefficient	.152**	1.000
		Sig. (2-tailed)	.003	.
		N	385	385

**. Correlation is significant at the 0.01 level (2-tailed).

Kruskal-Wallis Test

Ranks

	Stress	N	Mean Rank
Perceived_Academic_Performance	Normal	239	236.78
	Mild	18	157.33
	Moderate	62	86.99
	Severe	40	53.28
	Extremely Severe	26	283.02
	Total	385	

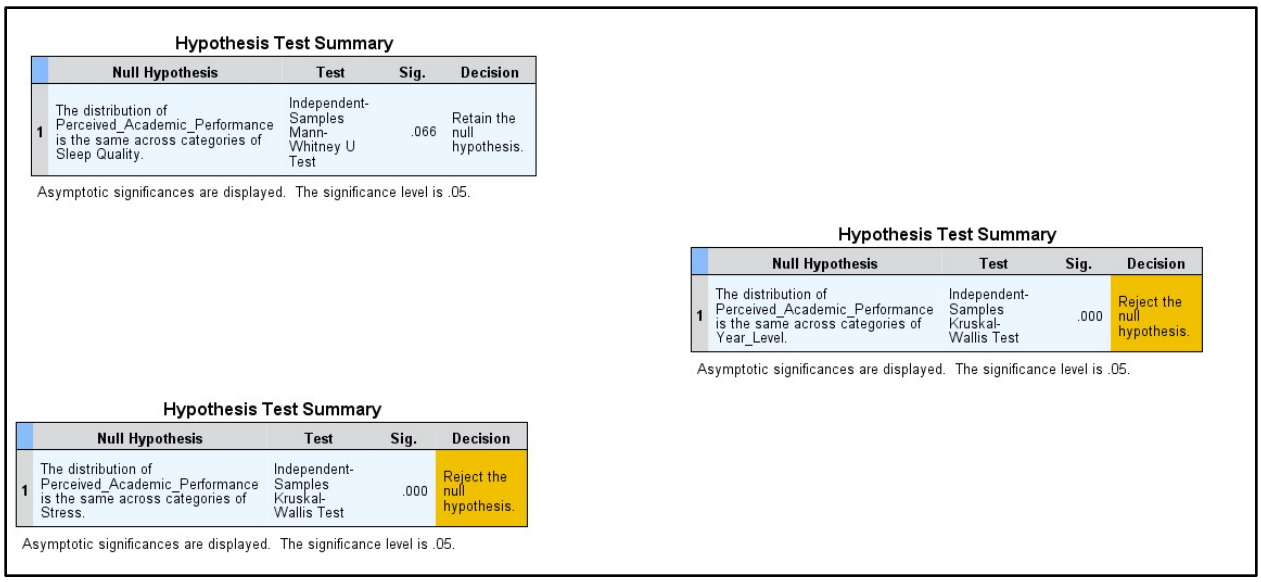
Mann-Whitney Test

Ranks

	Sleep Quality	N	Mean Rank	Sum of Ranks
Perceived_Academic_Performance	Good Sleeper	324	188.50	61074.00
	Poor Sleeper	61	216.90	13231.00
	Total	385		

Figure 2. SPSS Spearman's Rho, Kruskal-Wallis, and Mann-Whitney Results

Figure 2. Sample results from Spearman's Rho Correlation, Kruskal-Wallis, and Mann-Whitney Test are shown above for the independent variables of year level, sleep quality, and stress. The outputs showcase the degree of association between the independent and dependent variables and the differences between groups of the independent variables. The figure shows that the independent variable (year level) has an insignificant monotonic relationship with the dependent variable. Also seen are the mean ranks for each group under the Kruskal-Wallis Test and the Mann-Whitney Test of the independent variables (stress and sleep quality), which are used to calculate whether there are statistically significant differences in central tendencies among multiple groups and distributions of the two samples.



Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Perceived_Academic_Performance is the same across categories of Sleep Quality.	Independent-Samples Mann-Whitney U Test	.066	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Perceived_Academic_Performance is the same across categories of Year_Level.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Perceived_Academic_Performance is the same across categories of Stress.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Figure 3. Kruskal-Wallis and Mann-Whitney Hypothesis Test Results

Figure 3. Sample results from the Kruskal-Wallis and Mann-Whitney Hypothesis Test are shown above for the independent variables of year level, sleep quality, and stress. The outputs for the variables year level and stress indicate a true distinction between the groups within the population from which the samples were drawn. However, the null hypothesis was retained for the variable sleep quality, implying that there is no sufficient evidence to conclude a difference between the groups within the population from which the samples were drawn.

5.2 Graphical Results

The researchers collected the necessary information to analyze the factors that affect the perceived academic performance of undergraduate students. The questionnaire was devoted to the following questions: sleep quality; gender; year level; anxiety, stress, academic workload; time spent learning in hybrid mode; and academic motivation.

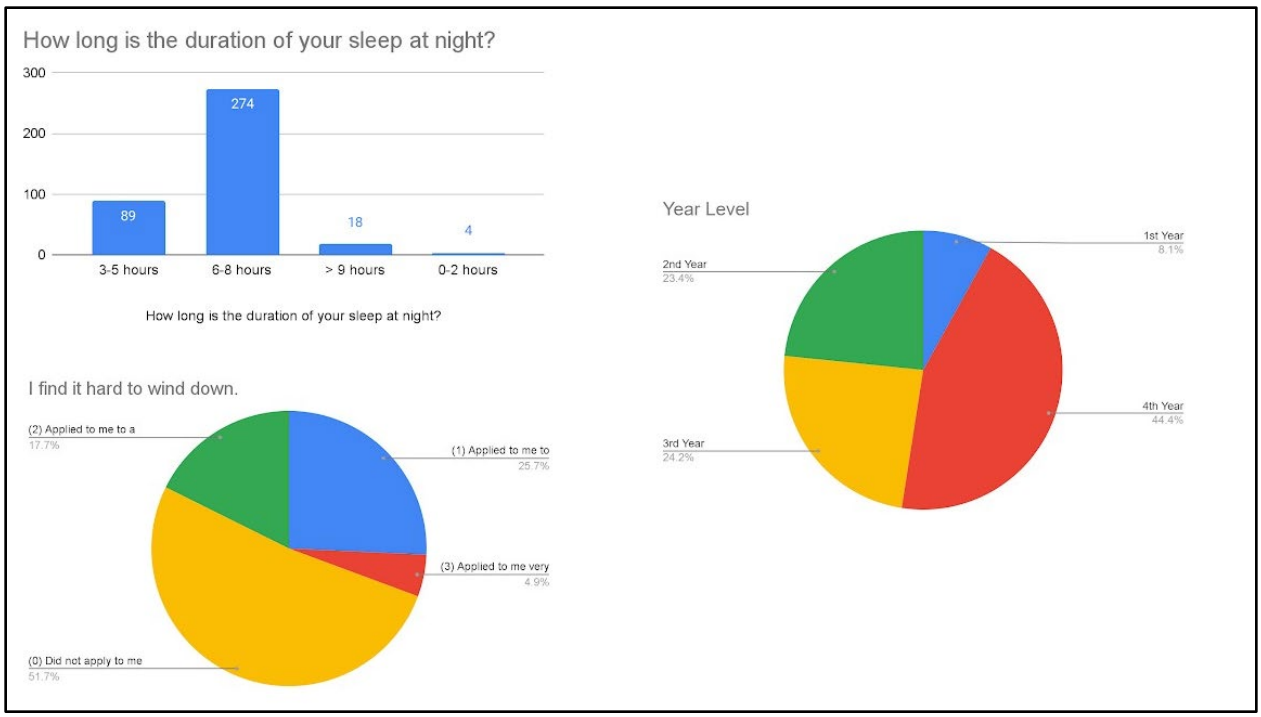


Figure 4. Graphical representation of Duration of Sleep, Hard to Wind Down, Year Level

Figure 4. The figure shows sample results from the questionnaire provided by the researchers to the respondents. It indicates that most respondents (44.4%) are at the fourth-year level. Additionally, 51.7% of undergraduate students did not find it difficult to wind down. Lastly, out of 385 respondents, 71% reported sleeping 6 to 8 hours a day.

5.3 Proposed Improvements

Strategic time management, involving prioritization of tasks and setting realistic deadlines, is paramount to ensure undergraduates limit stress and anxiety. Including self-care activities such as regular workouts, meditation, and involvement in hobbies will make the situation even better. Techniques that can help in reducing stress, like deep breathing and meditation also can be helpful. Consuming a balanced diet and avoiding excessive caffeine and sugar, especially near bedtime, is conducive to quality sleep. Guidance counselors take on a prominent part in offering workshops and resources for stress management, as well as motivating students to use campus counseling services and efforts to reduce the stigma of receiving mental healthcare. Professors add to the learning community by presenting effective communication skills, providing constructive suggestions, and creating a classroom where diversity is appreciated and included among the students. The role of the CHED in campaigning for mental health education and providing on-campus mental health services should not be overlooked when it comes to promoting student well-being. Research studies on the issue of mental health and academic achievement provide the basis for interventions drawing the attention of teachers to mental health problems. Adopting an integrated strategy for student welfare endows all concerned parties with enough power to realize an atmosphere that puts academics and general wellness first.

5.4 Validation

The dependent variable in the data set is continuous, which is the perceived academic performance of undergraduate students. Additionally, all the independent variables were categorized into groups with the exception of the self-determination index from the academic motivation scale. Lastly, both independent and dependent variables did not meet the normality assumption. Hence, non-parametric tests were utilized.

Spearman Rank-Order Correlation

The data should be calculated on an ordinal, interval, or ratio scale (Figure 5).

The two variables should represent paired observations.

There is a monotonic relationship between two variables.

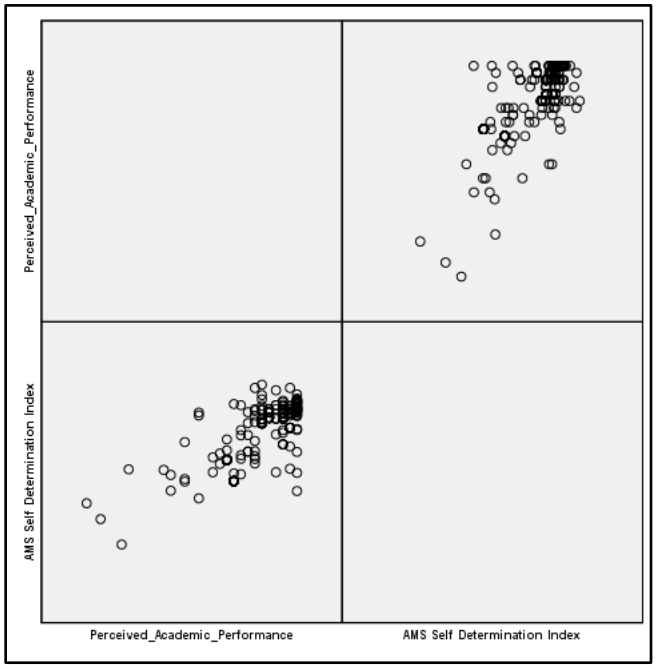


Figure 5. Monotonic Relationship Between Two Variables

A systematic pattern characterizes the relationship between the two variables, wherein the change direction consistently aligns.

Kruskal-Wallis Test

The data must be obtained from more than two independent random samples; there should be more than two independent categories of the independent variable to test the group differences.
The dependent variable should either be ordinal or measured at a continuous level.
The observations must be independent; the overlapping between groups is not allowed.
The Kruskal-Wallis H test compares the difference between the distributions of each independent group. The shape (variability) of the distribution is assumed to be the same, and only the location (central tendency) can vary across the groups

Mann-Whitney U Test

The data must be obtained from two independent random samples; there should be two independent categories of the independent variable to test the group differences.
The test aims to compare the difference between two distributions of the random samples. The shape (variability) of the distribution is assumed to be the same, and only the location (central tendency) is allowed to vary across the groups.
The dependent variable can be either ordinal or continuous but is not normally distributed.

6. Conclusion

Based on the collected data and analyzed results, it can be concluded that independent variables sleep quality, anxiety, stress, and perceived academic performance have a negative monotonic relationship that indicates that as the sleep

quality, anxiety, and stress scores of students increase (worsens), their perception with their academic performance goes lower. On the other hand, the independent variables, time spent in a hybrid learning mode and academic motivation, have a strong positive monotonic relationship with perceived academic performance. A weak positive monotonic relationship for independent variables of academic workload and year level was obtained compared with perceived academic performance. Moreover, the distribution of perceived academic performance has a significant difference across the categories of anxiety, stress, hybrid mode of learning, and year level. The distribution of perceived academic performance has no significant difference across the categories of sleep quality and academic workload. To conclude, the study's overall results showed the correlation between the independent variables and undergraduate college students' perceived academic performance in a hybrid learning mode using SPSS analysis.

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The researchers also extend their sincere gratitude to Assoc. Prof. Carlos Ignacio P. Lugay Jr., PhD. His meticulous attention to detail and commitment to high standards ensured the research remained on track and met the necessary academic rigor. His mentorship throughout the research process proved invaluable, particularly his ability to guide the researchers through the complexities of research methodology.

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Biographies

Von Anthony S. Alonzo epitomizes the embodiment of a stronghearted, open-minded, and ever-curious individual. He strides as a fourth-year Industrial Engineering student at Pontifical and Royal University of Santo Tomas. Von was a member of the department's student council, Industrial Engineering Circle, and an executive associate for Team Community Development. Being a member allowed him to empathize with the people in different communities, and they lend a helping hand. This also shaped his communication skills and enhanced his skills in working with a team. In August of last year, he completed his on-the-job training at Philippine Batteries Incorporated, where he could apply the knowledge he gained in studying. He was tasked to facilitate the cycle time measurement of the company's battery assembly line. These traits and experiences, as well as his academic knowledge, mold him into a competitive Industrial engineer in the future.

Stephen Paolo A. Salting is an enthusiastic and results-oriented student interested in data analytics and statistics. Their passion extends beyond the classroom, as evidenced by their leadership role as Vice President for Academics and Research at the Operations Research Society of the Philippines - UST Chapter, highlighting their commitment to fostering a vibrant academic environment and supporting the research endeavors of their peers. Furthermore, their

internship at the "University of Santo Tomas QS/THE Rankings" demonstrates a strong work ethic and dedication to excellence, likely honing their analytical skills and providing valuable insights into higher education rankings and data analysis. This blend of perseverance in academic pursuits, leadership commitment, and a compassionate desire to support others positions them well for future success in data analytics.

Darrel Austin B. Sanchez, a fourth-year Industrial Engineering student at the University of Santo Tomas, effectively blends his passion for industrial engineering with his keen interest in digital marketing and entrepreneurship. Scoring HubSpot certifications in content marketing, email marketing, digital marketing, and inbound marketing may be a testimonial of his dedication to improving his expertise in the digital fields. During his internship period at Paperlink, Inc., he conducted a time study of the machines that were present in the production department. Hence he attained operational efficiency insight within the manufacturing environment. As an intern at FCU Solutions, Inc., he was directly involved in the re-engineering of existing system procedures across all departments of Bohol Island State University, which provided an opportunity for him to apply industrial engineering principles in diverse settings. This hands-on education in addition to his academic studies, would grant him a skill set with both traditional industrial engineering principles and hybridized digital marketing strategies. Driven to kick off his professional ladder, he embodies an alliance of industrial engineering learning and business tenacity, aiming to leave a lasting mark across both industries.

Guenevere M. Tan is a driven 4th Year Industrial Engineering student at the University of Santo Tomas, passionate about blending creativity and precision in her work. She honed her strategic communication and team collaboration skills as an executive associate for Creative Media at the Industrial Engineering Circle Organization. Through her internship at My Story Inc., she delved into marketing and human resource management, acquiring valuable insights and hands-on experience. Her journey reflects her commitment to academic excellence and professional growth, and she is poised to make impactful contributions to engineering, creativity, and management.

Jesselyn B. Alcain holds a Bachelor of Science Degree in Industrial Engineering from the University of the Philippines Diliman-Quezon City, adding to her academic credentials where she received her Masters Degree in Management Engineering at the University of Santo Tomas (UST) and currently pursuing a Doctorate Degree major in Commerce at the University of Santo Tomas. She has an extensive background and experience working in the industrial engineering field working for a multinational semiconductor company where she handled various manufacturing process functions. She currently spearheads process improvement products in a non-life insurance company as well as serving the position of the Internal Quality Audit Lead that is essential in maintaining the ISO 9001:2015 as well as serving as a part-time lecturer at the University of Santo Tomas', Faculty of Engineering.