



Sleep Quality, Academic Stress, Time Management, and Academic Performance among Medical Technology Students

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Abstract

This study examined the relationships among sleep quality, academic stress, time management, and academic performance among Medical Technology students at Centro Escolar University-Manila. Using a quantitative descriptive-correlational and comparative design, the study surveyed 168 first- to third-year Medical Technology students selected through stratified proportionate random sampling. Data were gathered using adapted standardized measures, including a Pittsburgh Sleep Quality Index-based sleep quality questionnaire, the Perceived Academic Stress Scale, and a time management questionnaire. Academic performance was measured through self-reported General Weighted Average for the first semester of Academic Year 2024-2025. Descriptive statistics, Spearman correlation, Welch's one-way analysis of variance, Kruskal-Wallis tests, post hoc comparisons, and multiple linear regression were used to analyze the data. Results showed significant year-level differences in sleep quality and academic stress, while time management did not differ significantly across year levels. A weak but significant positive relationship was found between sleep quality scores and academic stress, indicating that poorer sleep quality was associated with higher academic stress. However, sleep quality, academic stress, and time management did not significantly predict academic performance. The findings suggest that academic performance in demanding health science programs may be shaped by broader contextual, motivational, instructional, and institutional factors beyond the behavioral variables examined. The study supports targeted student wellness interventions, particularly in stress management and sleep hygiene, to strengthen student well-being in allied health education.

Keywords: *academic performance; academic stress; medical technology students; sleep quality; student well-being; time management*

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1. Introduction

Sleep quality, academic stress, and time management are important behavioral and academic factors that shape students' capacity to function effectively in demanding higher education programs. In health science education, these concerns become more pronounced because students must manage intensive coursework, laboratory requirements, examinations, and professional preparation within competitive academic environments. Medical Technology students are trained for a profession that requires accuracy, discipline, sustained attention, and readiness for future clinical responsibilities. Their academic experience therefore provides a relevant context for examining how sleep, stress, time use, and academic outcomes interact.

Sleep is essential for cognitive functioning, emotional regulation, memory consolidation, and general health. Sleep quality is not limited to duration but includes the perceived depth, continuity, restorativeness, and effectiveness of sleep (Nelson et al., 2022). In educational contexts, sleep is closely associated with learning because

sleep amount, quality, and timing may influence students' capacity to encode, consolidate, and retrieve information (Fonseca & Genzel, 2020). Among medical students, poor sleep quality has been reported as a common concern and has been associated with elevated stress, although its relationship with academic performance is not always direct or consistent (Alotaibi et al., 2020; Saputri & Ritunga, 2023).

Academic stress is likewise a recurring issue among students in medical and allied health programs. The Perception of Academic Stress framework recognizes that students experience stress from academic expectations, workload, self-perceptions, and examination-related demands (Bedewy & Gabriel, 2015). Broader research among college students also shows that academic stress is associated with poorer mental well-being and may vary across student groups and academic contexts (Barbayannis et al., 2022). These stressors may affect students' health, motivation, social functioning, study behavior, and capacity to sustain engagement across the semester.

Time management is often viewed as a protective academic behavior because it helps students organize tasks, allocate study periods, meet deadlines, and balance rest with academic responsibilities. Prior studies suggest that time management is linked with academic stress and achievement, although the strength and direction of these relationships may vary by setting and population (Ahmady et al., 2021; Gallardo-Lolandes et al., 2020). Recent evidence has also connected time management behavior with global sleep quality among university students, suggesting that students' capacity to organize time may affect both academic functioning and rest patterns (Knowlden & Naher, 2023).

Despite these links, the relationship among sleep quality, academic stress, time management, and academic performance may not follow a simple linear pattern. Some students may manage their time well yet still experience high academic stress because of program-level demands. Others may sustain acceptable academic performance despite poor sleep or stress because of motivation, coping strategies, instructional support, or prior academic preparation. These complexities are especially important in health science programs, where academic performance may reflect not only individual behavior but also curricular sequencing, assessment difficulty, institutional support, and professional expectations.

In the Philippine Medical Technology education context, limited localized evidence explains how sleep quality, academic stress, and time management jointly relate to academic performance. This gap is important because allied health students are future healthcare professionals whose preparation requires both technical competence and personal resilience. Understanding these relationships may help academic institutions develop targeted student support programs, including stress management initiatives, sleep hygiene education, academic advising, and workload-sensitive interventions.

This study aimed to examine the relationships among sleep quality, academic stress, time management, and academic performance among Medical Technology students at Centro Escolar University-Manila. Specifically, it sought to: (1) describe the respondents in terms of year level and General Weighted Average; (2) assess the respondents' sleep quality, academic stress, and time management; (3) determine the extent to which sleep quality, academic stress, and time management influence academic performance; (4) examine the interrelationships among sleep quality, academic stress, time management, and academic performance; and (5) determine whether significant differences exist in sleep quality, academic stress, time management, and academic performance across first-, second-, and third-year Medical Technology students.

2. Review of Related Literature

2.1 Sleep Quality and Academic Functioning

Sleep quality is a multidimensional construct that involves the subjective and behavioral characteristics of sleep, including difficulty initiating sleep, continuity of sleep, perceived restfulness, and daytime functioning.

Nelson et al. (2022) emphasized that sleep quality is not reducible to total sleep duration alone, because individuals may sleep for sufficient hours yet still report non-restorative or interrupted sleep. The Pittsburgh Sleep Quality Index has been widely used to assess sleep quality and sleep disturbances over a one-month interval, making it a common instrument in studies involving student and clinical populations (Buysse et al., 1989).

In academic settings, sleep quality is relevant because learning requires attention, executive function, memory consolidation, and sustained cognitive effort. Fonseca and Genzel (2020) argued that sleep and academic performance have a complex relationship because sleep amount, quality, and timing interact with chronotype and educational schedules. This relationship may be particularly important for students in medical and allied health programs, where academic demands are cumulative and assessment tasks require both memorization and applied reasoning.

Evidence among medical students shows that poor sleep quality is common and often coexists with elevated stress. Alotaibi et al. (2020) found that sleep quality among medical students was poor and that sleep quality was associated with stress, but their findings also showed that sleep and stress do not necessarily translate into direct academic performance effects. Similarly, Saputri and Ritunga (2023) reported that sleep disturbance was significantly related to stress, but sleep quality due to stress did not significantly affect academic achievement. These findings suggest that sleep quality is behaviorally important even when its statistical association with grades is weak or indirect. In a related Philippine student context, San Juan et al. (2026) reported poor baseline PSQI classifications among civil engineering students and treated digital sleep-diary self-monitoring as a feasible awareness-building tool, suggesting that sleep difficulty may be shaped by workload-sensitive routines beyond health science programs.

2.2 Academic Stress in Higher Education and Health Science Programs

Academic stress refers to students' perceived pressure arising from academic demands, examinations, workload, expectations, and perceived capacity to meet institutional requirements. Bedewy and Gabriel (2015) developed the Perception of Academic Stress Scale to capture sources of academic stress among university students, including pressures to perform, perceptions of workload, and academic self-confidence. This conceptualization is relevant to health science education because students often face successive examinations, laboratory activities, practical competencies, and high expectations regarding professional readiness.

Research among college students indicates that academic stress has implications for mental well-being. Barbayannis et al. (2022) found a significant relationship between higher academic stress and poorer mental well-being, showing that academic pressure may extend beyond study behavior and affect broader psychosocial functioning. Lovin and Bernardeau-Moreau (2022) also observed that students experiencing stress may report difficulty relaxing and sleeping, indicating that academic pressure may interfere with recovery and daily functioning.

Among medical students, stress may be especially consequential because the academic environment is rigorous and failure may carry significant professional implications. Alotaibi et al. (2020) reported elevated stress among medical students and found an association between stress and sleep quality. However, the direct link between stress and academic performance was not consistently established. This suggests that stress may function more clearly as a well-being concern than as a simple grade predictor. Related evidence from dormitory medical students also links lifestyle behaviors, sleep duration, screen time, and distress indicators with burnout profiles, supporting a broader student-wellness view of academic strain (Quinto et al., 2025).

2.3 Time Management, Sleep Quality, and Academic Stress

Time management involves organizing, prioritizing, and allocating time across competing responsibilities. In higher education, it is often treated as an academic self-regulation skill because it helps students distribute workload, avoid last-minute cramming, and align study routines with deadlines. Gallardo-Lolandes et al. (2020) found that

time management was linked with academic stress among university students, suggesting that weak time organization may intensify pressure and reduce students' perceived control over academic demands.

Time management may also relate to sleep because disorganized schedules can lead to late-night studying, irregular sleep onset, and reduced recovery time. Knowlden and Naher (2023) found that time management behavior predicted global sleep quality among traditional-entry university students. Their findings support the view that student sleep cannot be separated from daily routines and academic self-regulation. When students fail to distribute tasks across available time, sleep may become the sacrificed behavior during periods of high workload.

The relationship between time management and academic stress may also be reciprocal. Stress can impair planning and concentration, while poor planning can intensify stress as deadlines approach. Lovin and Bernardeau-Moreau (2022) described students' difficulty with time management as part of a broader stress experience. Ahmady et al. (2021), in a systematic review and meta-analysis of preclinical medical education, also linked time management and stress with academic achievement. These findings indicate that time management may be useful but should not be treated as the only determinant of student success.

2.4 Integrated Relationships and Contextual Gaps

The combined relationship among sleep quality, academic stress, time management, and academic performance is more complex than a direct chain of effects. Poor time management may increase academic stress; heightened stress may disrupt sleep; and poor sleep may weaken attention and learning. However, the empirical literature does not consistently show that these variables directly predict grades. Alotaibi et al. (2020) and Saputri and Ritunga (2023) both indicate that sleep quality and stress may be related without necessarily producing a direct academic performance effect.

Time-related constructs may also influence well-being through indirect pathways. Rönnlund et al. (2021) found that time perspective was related to sleep quality and life satisfaction, suggesting that how students organize and orient themselves toward time may shape both rest and subjective well-being. Saputra et al. (2023) likewise examined time management and sleep quality in relation to well-being among working students, highlighting that behavioral regulation and sleep patterns are relevant to student functioning beyond grades alone.

The reviewed literature therefore supports the relevance of sleep quality, academic stress, and time management as student well-being indicators, but it leaves open the question of how strongly these variables explain academic performance in specific programs. The gap addressed by the present study is the limited context-specific evidence on Medical Technology students in the Philippines. By examining these variables among first- to third-year students, the study contributes to behavioral and social analytics by clarifying whether these student-level behavioral factors operate as direct academic predictors or as part of a broader well-being profile. A systems-level view is also supported by Bermido et al. (2025), who synthesize health professions education challenges as interconnected pressures involving student well-being, faculty capacity, licensure culture, resource constraints, and leadership conditions.

2.5 Synthesis and Literature Gaps

The reviewed literature collectively shows that sleep quality, academic stress, and time management are interrelated concerns in higher education. Poor sleep quality is associated with stress among medical students (Alotaibi et al., 2020; Saputri & Ritunga, 2023), while academic stress is associated with poorer psychosocial well-being among college students (Barbayannis et al., 2022). Time management is also related to academic stress and sleep quality, although the strength of this relationship depends on context and student characteristics (Gallardo-Lolandes et al., 2020; Knowlden & Naher, 2023; Lovin & Bernardeau-Moreau, 2022).

However, the reviewed studies do not establish a uniform direct pathway from sleep, stress, or time management to academic performance. The evidence suggests that academic outcomes may be affected by mediating or moderating factors such as motivation, coping strategies, workload distribution, academic support, curricular difficulty, and assessment structure. The present study responds to this gap by examining whether these

variables significantly relate to academic performance and whether they differ across year levels among Medical Technology students in a Philippine university context. Adjacent work on AI-supported education similarly suggests that engagement, feedback, and access conditions may be perceived as more directly affected by institutional technologies than academic performance itself, reinforcing the need to interpret grades within a wider instructional environment (Rao et al., 2025).

3. Methodology

3.1 Research Design

This study used a quantitative descriptive-correlational and comparative research design to examine the relationships among sleep quality, academic stress, time management, and academic performance among Medical Technology students. The correlational component was used to determine whether sleep quality, academic stress, and time management were associated with academic performance, while the comparative component was used to determine whether these variables differed significantly across year levels. The design was appropriate because the study examined naturally occurring student characteristics and did not involve experimental manipulation.

3.2 Respondents of the Study

The respondents were first-, second-, and third-year Bachelor of Science in Medical Technology students enrolled at Centro Escolar University-Manila during the first semester of Academic Year 2024-2025. The total population consisted of 1,630 regular Medical Technology students, composed of 392 first-year, 438 second-year, and 800 third-year students. From this population, 168 respondents were included in the study: 40 first-year students, 44 second-year students, and 84 third-year students. Academic performance was measured using the respondents' self-reported General Weighted Average for the first semester of Academic Year 2024-2025.

3.3 Sampling Technique

The study used stratified proportionate random sampling to ensure that the sample reflected the year-level distribution of the total population. The sample represented approximately 10% of the population, with proportional allocation across first-, second-, and third-year levels. A G*Power calculation was conducted for multiple linear regression with three predictors, using a medium effect size, an alpha level of 0.05, and statistical power of 0.80. The required minimum sample size was 77 respondents; therefore, the actual sample of 168 exceeded the minimum requirement for the planned regression analysis.

3.4 Research Instruments

The study used three survey instruments to measure the major variables. Sleep quality was measured using an adapted sleep quality questionnaire based on the Pittsburgh Sleep Quality Index, a self-rated instrument originally developed to assess sleep quality and sleep disturbances over a one-month interval (Buysse et al., 1989). In the scoring direction reported in the study methodology, higher sleep quality scores indicated poorer sleep quality. Academic stress was measured using the Perception of Academic Stress Scale, which assesses students' perceived academic pressure, workload, and academic self-perceptions (Bedewy & Gabriel, 2015). Time management was measured using an adapted time management questionnaire covering planning, prioritization, deadline management, task completion, and control over interruptions. Academic performance was measured through self-reported GWA. Since the Philippine grading scale generally treats lower numerical GWA values as better academic performance, higher GWA values were interpreted as weaker academic performance.

3.5 Data Gathering Procedure

The researchers secured approval from the research adviser and the Dean of Medical Technology before proceeding with data collection. Ethical clearance procedures were also undertaken through the institutional ethics review process. Respondents were informed of the purpose of the study, the voluntary nature of their participation, their right to withdraw, and the confidentiality of their responses. Data were gathered through survey questionnaires

administered to qualified respondents. Responses were encoded through Google Forms and exported into spreadsheet format for cleaning, coding, and statistical analysis.

3.6 Data Analysis

Descriptive statistics, including frequency, percentage, mean, standard deviation, and measures of distribution, were used to summarize the respondents' year level, GWA, sleep quality, academic stress, and time management. Spearman correlation was used to examine the relationships among sleep quality, academic stress, time management, and academic performance because some variables were ordinal or non-normally distributed. Multiple linear regression was used to determine whether sleep quality, academic stress, and time management predicted academic performance. For year-level comparisons, Welch's one-way ANOVA was used for sleep quality, while the Kruskal-Wallis test was used for academic stress, time management, and GWA where non-parametric analysis was more appropriate. Post hoc tests were conducted to identify specific group differences. Assumption checks included the Shapiro-Wilk test for normality, Levene's test for homogeneity of variance, and collinearity diagnostics using variance inflation factor and tolerance values.

3.7 Ethical Considerations

The study followed ethical procedures for research involving student respondents. Participation was voluntary, and informed consent was obtained prior to survey participation. Respondents were informed that they could withdraw from the study without penalty. The researchers maintained anonymity and confidentiality by assigning unique identifiers and storing the data in password-protected files accessible only to the research team. The data were retained for a limited period in accordance with institutional and ethical guidelines and were to be securely disposed of after the retention period.

4. Results and Discussion

4.1 Respondent Profile and Academic Performance

The study included 168 Medical Technology students from Centro Escolar University-Manila. The respondents were distributed proportionately across three year levels, with third-year students comprising the largest group. Specifically, 40 respondents were first-year students, 44 were second-year students, and 84 were third-year students. This distribution reflects the stratified proportionate sampling procedure used in the study.

Table 1 Respondent Distribution by Year Level

Year Level	Frequency	Percentage
First Year	40	23.8%
Second Year	44	26.2%
Third Year	84	50.0%
Total	168	100.0%

Academic performance was measured through GWA for the first semester of Academic Year 2024-2025. The mean GWA was 2.01, with a standard deviation of 0.576. The scores ranged from 1.25 to 5.00. The distribution was positively skewed and non-normal based on the Shapiro-Wilk test, indicating that subsequent inferential procedures required caution and, where appropriate, non-parametric analysis.

Table 2. Descriptive Statistics for Academic Performance

Indicator	Value
N	168
Mean GWA	2.01
Median	2.00
Standard Deviation	0.576
Minimum	1.25

Maximum	5.00
Shapiro-Wilk W	0.848
Shapiro-Wilk p-value	< .001

4.2 Sleep Quality, Academic Stress, and Time Management

The respondents' sleep quality, academic stress, and time management were assessed using survey-based measures. The overall descriptive results showed a mean sleep quality score of 25.7, a mean academic stress score of 32.8, and a mean time management score of 33.6. Because the sleep quality scale was interpreted such that higher scores indicate poorer sleep quality, the sleep results were interpreted in that direction.

Table 3. Overall Descriptive Results for Major Study Variables

Variable	Mean	Standard Deviation	Interpretation Note
Sleep Quality	25.7	3.24	Higher = poorer sleep quality
Academic Stress	32.8	4.55	Higher = greater academic stress
Time Management	33.6	5.28	Higher = stronger time management
GWA	2.01	0.576	Lower = better academic performance

Sleep quality results by year level showed that third-year students recorded the highest score, followed by first-year and second-year students. Because higher scores indicate poorer sleep quality, this means that third-year students reported poorer sleep quality than second-year students.

Table 4. Sleep Quality Scores by Year Level

Year Level	N	Mean	SD	SE
First Year	40	25.8	3.82	0.604
Second Year	44	24.6	3.40	0.512
Third Year	84	26.2	2.73	0.298

4.3 Relationships among Sleep Quality, Academic Stress, Time Management, and Academic Performance

Spearman correlation was used to examine the interrelationships among GWA, sleep quality, academic stress, and time management. The correlation results showed that GWA was not significantly correlated with sleep quality, academic stress, or time management. This indicates that none of the three behavioral variables had a direct bivariate association with academic performance in the sample.

Table 5. Spearman Correlation Matrix among Major Variables

Variable Pair	Spearman rho	p-value	Interpretation
GWA and Sleep Quality	0.089	0.249	Not significant
GWA and Academic Stress	0.096	0.216	Not significant
GWA and Time Management	0.013	0.866	Not significant
Sleep Quality and Academic Stress	0.178	0.021	Significant, weak positive relationship
Sleep Quality and Time Management	-0.051	0.515	Not significant
Academic Stress and Time Management	0.034	0.661	Not significant

The only statistically significant relationship was between sleep quality and academic stress. Since higher sleep quality scores indicate poorer sleep quality, the positive correlation means that poorer sleep quality was associated with higher academic stress. However, the relationship was weak. This finding supports the general pattern in the literature that sleep problems and stress tend to be related among students, although the effect in this

sample was modest. Time management did not significantly correlate with either sleep quality or academic stress, suggesting that time management may not function as a direct protective factor against poor sleep or elevated stress within this group.

4.4 Predictive Influence of Sleep Quality, Academic Stress, and Time Management on Academic Performance

Multiple linear regression was used to determine whether sleep quality, academic stress, and time management predicted academic performance. The regression model was not statistically significant, $F(3, 164) = 0.408$, $p = 0.747$. The model explained less than 1% of the variance in GWA, with $R^2 = 0.007$.

Table 6. Regression Model Predicting Academic Performance

R	R ²	F	df1	df2	p-value
0.086	0.007	0.408	3	164	0.747

Table 7. Regression Coefficients for Predictors of Academic Performance

Predictor	Estimate	SE	T	p-value	Standardized Estimate
Intercept	1.59955	0.51644	3.097	0.002	—
Sleep Quality	0.00740	0.01419	0.522	0.603	0.0416
Academic Stress	0.00835	0.01013	0.825	0.411	0.0659
Time Management	-0.00172	0.00851	-0.203	0.840	-0.0158

The coefficients show that poorer sleep quality and higher academic stress were associated with slightly higher GWA values, while stronger time management was associated with slightly lower GWA values. However, all effects were statistically non-significant. Therefore, these results should not be interpreted as evidence of predictive influence. The collinearity diagnostics indicated that multicollinearity was not a concern, with variance inflation factor values close to 1.00. However, the Shapiro-Wilk test for residuals was significant, suggesting non-normality of residuals. This reinforces the need for caution in interpreting the regression results.

4.5 Year-Level Differences in Sleep Quality, Academic Stress, Time Management, and Academic Performance

Year-level comparisons were conducted to determine whether first-, second-, and third-year students differed significantly in sleep quality, academic stress, time management, and academic performance. Welch's ANOVA showed a significant difference in sleep quality across year levels, $F(2, 77.6) = 3.40$, $p = 0.038$. Post hoc analysis indicated a significant difference between second-year and third-year students, $p = 0.026$. Given the scoring direction, third-year students reported poorer sleep quality than second-year students.

Kruskal-Wallis results showed a significant difference in academic stress across year levels, $\chi^2(2) = 9.181$, $p = 0.010$. Pairwise comparison indicated a significant difference between second-year and third-year students, $p = 0.010$, with the original results narrative identifying third-year students as reporting higher academic stress than second-year students. Time management did not differ significantly across year levels, $\chi^2(2) = 0.682$, $p = 0.711$. GWA also differed significantly across year levels, $\chi^2(2) = 52.90$, $p < .001$. Pairwise comparisons showed significant differences involving third-year students.

Table 8. Summary of Year-Level Difference Tests

Variable	Test Used	Test Statistic	p-value	Interpretation
Sleep Quality	Welch's ANOVA	$F = 3.40$	0.038	Significant difference across year levels
Academic Stress	Kruskal-Wallis	$\chi^2 = 9.181$	0.010	Significant difference across year levels
Time Management	Kruskal-Wallis	$\chi^2 = 0.682$	0.711	Not significant

GWA	Kruskal-Wallis	$\chi^2 = 52.90$	< .001	Significant difference across year levels
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Table 9. Significant Pairwise Differences by Year Level

Variable	Significant Pairwise Comparison	p-value	Interpretation
Sleep Quality	Second Year vs. Third Year	0.026	Third-year students reported poorer sleep quality than second-year students
Academic Stress	Second Year vs. Third Year	0.010	Third-year students reported higher academic stress than second-year students
GWA	First Year vs. Third Year	< .001	Academic performance differed significantly between first- and third-year students
GWA	Second Year vs. Third Year	< .001	Academic performance differed significantly between second- and third-year students

These results suggest that third-year students may represent an important group for academic and wellness monitoring. The significant differences involving third-year students may reflect the increasing complexity of upper-year coursework, greater laboratory or clinical preparation demands, and higher expectations associated with progression in the Medical Technology program.

4.6 Discussion

The findings show that sleep quality, academic stress, and time management were not direct predictors of academic performance among the Medical Technology students surveyed. Although poorer sleep quality and higher academic stress showed slight positive associations with higher GWA values, these effects were not statistically significant. Time management also showed no meaningful association with academic performance. These findings align with studies indicating that sleep quality and stress do not always directly predict academic achievement among medical students (Alotaibi et al., 2020; Saputri & Ritunga, 2023). Academic performance may instead be shaped by a wider set of factors, including motivation, study strategies, instructor support, curricular difficulty, prior academic preparation, and institutional support mechanisms.

The significant weak positive relationship between sleep quality scores and academic stress suggests that students with poorer sleep quality tended to experience higher academic stress. This finding is consistent with literature linking sleep problems with stress among medical students (Alotaibi et al., 2020; Saputri & Ritunga, 2023). However, the weak magnitude of the relationship indicates that sleep quality alone does not fully explain academic stress. Stress among Medical Technology students may also arise from examinations, laboratory workloads, professional expectations, and progression-related demands.

The non-significant relationship between time management and the other major variables is notable. Much of the reviewed literature treats time management as a stress-reducing and sleep-supporting behavior (Gallardo-Lolandes et al., 2020; Knowlden & Naher, 2023; Lovin & Bernardeau-Moreau, 2022). In the present results, however, time management did not significantly relate to sleep quality, academic stress, or academic performance. This may suggest that time management is necessary but not sufficient in highly demanding academic programs. Students may plan and organize their work, yet still experience stress and sleep difficulties because the academic demands themselves remain heavy.

The year-level findings provide a clear institutional implication. Third-year students reported poorer sleep quality and higher academic stress than second-year students, and GWA differed significantly across year levels. These findings point to the possibility that upper-year students face intensified academic pressures. In this context, student support should not be generic. Sleep hygiene education, stress management programs, academic advising, and workload-sensitive scheduling may be more useful if targeted toward year levels where stress and sleep problems are most evident.

Overall, the results indicate that student well-being variables are behaviorally meaningful even when they do not directly predict academic performance. For behavioral and social analytics, the contribution of the study lies in showing that academic performance cannot be reduced to sleep, stress, or time management alone. Instead, these variables form part of a broader behavioral profile that reflects how students experience and manage academic pressure in a demanding health science program.

5. Conclusions, Recommendations, and Implications

5.1 Conclusions

The findings indicate that sleep quality, academic stress, and time management are relevant behavioral concerns among Medical Technology students, but they did not directly predict academic performance as measured by GWA. Although students generally reported poor sleep quality, moderately high academic stress, and good time management, the regression model showed that these variables did not significantly explain variations in GWA. This suggests that academic performance in the Medical Technology context may be shaped by broader academic, motivational, instructional, and institutional factors beyond the behavioral variables examined.

A weak but statistically significant positive relationship was found between sleep quality scores and academic stress. Since higher sleep quality scores indicate poorer sleep quality, this means that poorer sleep quality was associated with higher academic stress. This supports the view that sleep and stress are behaviorally connected, although the weak strength of the relationship indicates that sleep quality alone does not fully account for students' academic stress experience.

Time management was not significantly associated with sleep quality, academic stress, or academic performance. This finding suggests that time management, while still an important student skill, may not be sufficient by itself to reduce stress, improve sleep, or improve grades in a highly demanding health science program. The academic environment may impose pressures that remain present even when students report adequate time management practices.

Year-level differences provided the clearest institutional insight. Sleep quality and academic stress differed significantly across year levels, while time management did not. Third-year students appeared to be particularly vulnerable, showing significantly higher academic stress and poorer sleep quality compared with second-year students. This pattern suggests that upper-year academic demands may intensify behavioral and psychological strain among Medical Technology students.

5.2 Recommendations

Academic units handling Medical Technology programs should consider developing targeted student wellness interventions, particularly for upper-year students. Since third-year students showed higher academic stress and poorer sleep quality, support programs should include stress management sessions, sleep hygiene education, structured academic advising, and mechanisms for identifying students who may be experiencing excessive academic strain.

Faculty members and program administrators may review the sequencing of academic requirements, especially during peak periods of examinations, laboratory work, and major submissions. The findings do not necessarily

suggest reducing academic rigor; rather, they point to the need for workload-sensitive scheduling and clearer academic support structures that help students manage pressure without compromising program standards.

Students should be encouraged to strengthen their self-regulation practices, including sleep routines, study scheduling, and stress-monitoring habits. However, the results suggest that students should not be made solely responsible for managing academic pressure. Institutional and instructional support remain necessary because time management alone did not significantly reduce stress or improve sleep quality in the sample.

Future researchers should use longitudinal designs to track how sleep quality, academic stress, time management, and academic performance change as students progress through the program. Future studies should also consider objective academic records, validated sleep measures, and possible moderating or mediating variables such as coping strategies, motivation, social support, teaching quality, and curriculum load. Broader samples across institutions may also strengthen the generalizability of findings.

5.3 Implications of the Study

For behavioral and social analytics, the study shows that student performance should not be interpreted through isolated behavioral variables alone. Sleep quality, academic stress, and time management are meaningful indicators of student well-being, but their direct statistical relationship with academic performance was limited in this sample. This implies that academic achievement in health science education may be better understood through a broader ecological model involving student behavior, curriculum design, institutional support, and academic culture.

For institutional practice, the findings support the value of year-level-sensitive interventions. Since third-year students appeared more affected by stress and sleep-related concerns, student support services may be more effective if aligned with specific academic transition points rather than delivered as generic wellness programs.

For future research, the study highlights the need for stronger measurement design. The scoring direction of sleep quality and possible reverse-scored items in academic stress instruments should be handled with precision. This is especially important because unclear scoring can alter the interpretation of relationships among variables. Future IJBeSA-type studies may build from this work by using cleaner instrument validation, longitudinal tracking, and more complex models that test mediation and moderation rather than direct effects alone.

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