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Influence of Sleep Quality and Study Habits on the Mathematics Competence of Junior High School Students

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Abstract

Mathematics competence remains a challenge among junior high school students. With this, the influence of sleep quality and study habits was examined through a quantitative descriptive-predictive design, specifically using multiple regression analysis, involving 206 students selected via cluster sampling. It was found that both sleep quality and study habits have significant positive effects on mathematics competence, with study habits demonstrating a stronger influence. Together, these predictors significantly explain variations in mathematics competence, indicating that both behavioral and physiological factors contribute to students' academic performance. These findings support Social Cognitive Theory, which emphasizes that learning outcomes are shaped by the interaction of personal and behavioral factors. The results suggest that improving study practices and maintaining healthy sleep patterns are essential in enhancing students' mathematical competence. Further studies may explore additional variables such as motivation, math anxiety, and learning environment, as well as employ qualitative approaches to capture deeper insights into students' learning experiences and develop more comprehensive models of academic performance.

Keywords: Sleep quality, study habits, mathematics competence, junior high school students, social cognitive theory

INTRODUCTION

The Problem and Its Scope

Even though math proficiency is essential to students' academic growth and future success, many students continue to struggle with it. Although it is designed to develop critical thinking, problem-solving, and logical reasoning skills necessary for everyday life and career endeavors (OECD, 2019), many students find it difficult to reach sufficient levels of mathematical comprehension. Many show deficiencies in computation, pattern recognition, and conceptual analysis rather than confidently applying concepts and reasoning quantitatively (Areepattamannil & Kaur, 2020).

Around the world, people who study things have found that teenagers have a hard time learning the basic ideas of math. The International Student Assessment Program, which is also called PISA, conducted a study in 2022. Found out that a lot of students in many countries are not good at math. They are not even able to do the math that they need to solve problems in the world today. For example, in the United States, the PISA 2022 results showed that many students are not good at math. They did not even get the score that they needed to be considered proficient in math. This shows that there are still a lot of problems with

the way we teach math. We need to find ways to teach math that are based on evidence and that will really help students learn the math skills they need. The math education system has a lot of problems. We need to do something to fix it. Math is very important. We need to make sure that students are learning it properly.

In the Philippines, people are really worried about this. The results of the 2018 PISA test showed that the country did much worse than the OECD average in math. This is a problem because it means that only one out of five Filipino students is good enough at math to understand it in a useful way. The Department of Education said this in 2019. Tests and reports in the Philippines also show that Filipino students have a hard time with math when it comes to thinking about problem-solving and using what they learn in real life. The Philippines is struggling with this. It is a big concern because math is important for Filipino students. The results of the 2018 PISA test are a reminder that the Philippines needs to improve its math education. Filipino students need to be able to think about math problems and solve them in order to do well in school and in life (Reyes, 2022; Quirante et al., 2023).

Mathematics is really important for a country to develop and for people to do well in school. It is very important to know what makes students good at mathematics. If we understand what helps students learn mathematics, teachers can make plans to help students learn better, feel more confident, and do well in mathematics. This is especially important in high school, where students learn the basics of mathematics that will help them later in school and in their careers, as shown by Areepattamannil and Kaur in 2020.

Some studies have shown that students who lose interest in mathematics get nervous when they have to do math problems and do not know how to study mathematics. These things can make students not very good at mathematics, according to Ramirez and his team in 2018 and Wigfield and Cambria in 2019. When students are not good at mathematics, they do not feel confident. They have a hard time making decisions. They also do not do well in school overall. Have a hard time solving real-life problems that are complicated, as found by Cai and his team in 2021. Mathematics is something that students need to be good at to succeed.

Significance of the Study

Junior high school students face a lot of problems when it comes to Mathematics. They need to concentrate and be good at solving problems. They also need to be able to think and make good use of their brain power. This is important for Sustainable Development Goal 4, which is all about making sure everyone gets a good education, or what they call Quality Education. Sleep is really important for how we think and remember things. It helps us learn and understand things. Good study habits are also very important because they help us be disciplined and understand math concepts. The thing is, not many people have looked at how sleep and study habits affect how well Philippine junior high school students do in math. Sleep and good study habits are both crucial for math competence among junior high school students. The findings may help school administrators and teachers develop programs and instructional strategies that support student learning and well-being. Additionally, students and future researchers may use the results to promote better academic practices and further explore factors affecting academic performance.

Statement of The Problem

The main objective of this study was to examine the combined influence of sleep quality and study habits on the mathematics competence of junior high school students in the Philippines, in support of Sustainable Development Goal 4 (Quality Education). Specifically, this study aimed to address the following objectives:

1. To determine the level of sleep quality in terms of:

a. sleep duration;
b. sleep efficiency; and
c. sleep disturbances.
2. To determine the level of study habits in terms of:
a. time management;
b. study techniques; and
c. consistency and discipline.
3. To determine the Mathematical competence in terms of:
a. conceptual understanding and problem-solving;
b. application of mathematical knowledge; and
c. Math self-efficacy.
4. To analyze the significance of relationship of sleep quality and study habits with mathematics competence.
5. To examine the significance of influence of sleep quality and study habits towards mathematics competence.

Hypothesis

The following null hypotheses were tested at a 0.05 level of significance:

H_{01}: There is no significant relationship between sleep quality and mathematics competence.

H_{02}: There is no significant relationship between study habits and mathematics competence.

H_{03}: Sleep quality has no significant influence on mathematics competence.

H_{04}: Study habits have no significant influence on mathematics competence.

Theoretical Framework

This study is based on Social Cognitive Theory by Bandura from 1986. Social Cognitive Theory says that what we learn is affected by our thoughts, the things we do, and the world around us. When we talk about students, sleep quality is a thing that affects how well they can think, pay attention, and want to learn. The way students study is a thing; it is about how they learn and remember math. The place where students learn and the help they get is a thing that can either help or hurt how well they do in school. How good students are at math is the result of all these things. The study used Social Cognitive Theory to find out how sleep quality and study habits affect how well students perform in math. It looks at how our thoughts, actions, and the way we learn math are all connected to each other. Math skills are influenced by sleep quality and study habits. The study wants to know how this works. Our thoughts, what we do every day, and how we learn things are all part of this. The study is really about how sleep quality and study habits affect. Learning new math skills is all linked together.

Figure 1 shows how personal things, behavioral things, and environmental things all work together to affect how well students do in math. The quality of sleep is something that affects how alert students are and how motivated they are. The way students study is something that shows how well they can control themselves and how much they want to learn math. All these things, like things and behavioral things and environmental things, work together in the place where students learn, the classroom, to affect how well math students understand math, how well math students can use math, and how math students feel about their math skills.

Conceptual Framework

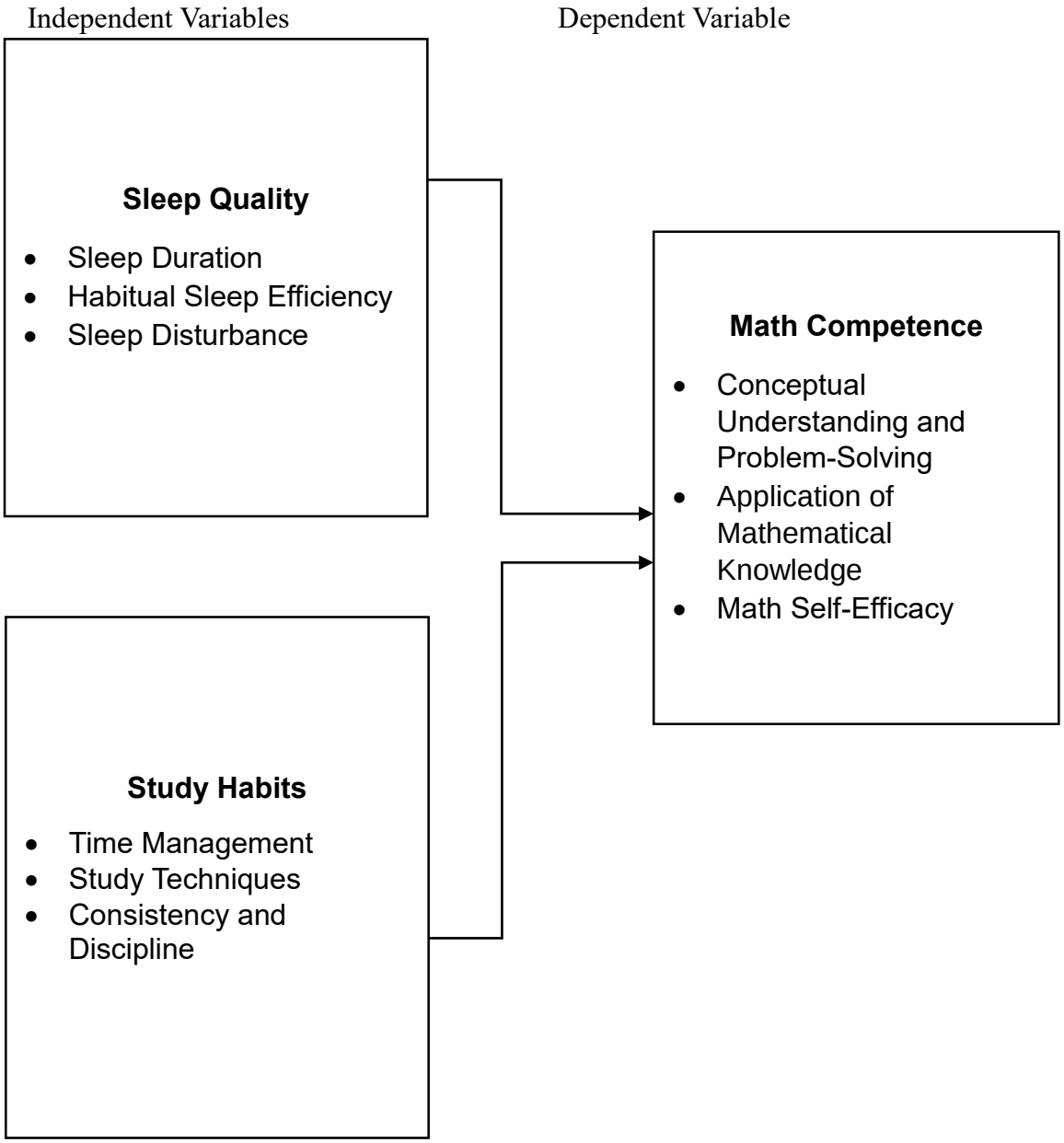

Figure 1. Conceptual Framework of the Study

METHODOLOGY

The chapter identified the research procedures and tools that were necessary on conducting the study. This included the research design, sample and sampling, locale of the study, research instruments, ethical considerations, data gathering procedure, and data analysis.

Research Design

The study looked at how sleep quality and study habits affect math skills in high school students through a quantitative descriptive-predictive design. I wanted to see how these things are connected. The people doing the study used a way to look at the numbers and see how sleep and study habits affect math skills. They did this by looking at how things are now and seeing how these things can predict what will happen. This way, the researcher can see how much sleep quality and study habits really affect math skills in high

school students without changing anything about the study (Creswell & Creswell, 2018). Using this approach, the study assessed the levels of sleep quality and study habits of students, as well as their performance in mathematics. The findings may help identify whether variations in sleep quality and study habits were associated with differences in math competence among junior high school students.

Locale of the Study

The study took place in a secondary school in Talagutong, Don Marcelino, Davao Occidental. This school was a choice for the study because it has all the junior high school levels, which is what the study was looking for. The school also has a mix of students, which makes it a good place to get a variety of information. Doing the study here made it easy for the researcher to get what they needed because they already knew people at the school. The school was also a place to look at how sleep quality, study habits, and math skills are related for junior high school students. The study of sleep quality, study habits, and math competence was the focus. The school in Talagutong, Don Marcelino, Davao Occidental, was a place to conduct this study on junior high school students and their sleep quality, study habits, and math competence.

Sample and Sampling

The respondents of this study consisted of 206 out of 700 junior high school students, determined using the Raosoft sample size calculator that ensured statistical reliability. Two sections from each of the four-year levels were randomly selected to represent the population, giving every group an equal chance of inclusion. Cluster sampling was employed for its practicality and efficiency in gathering data from naturally formed groups such as class sections (Etikan & Bala, 2017). Only students who were currently enrolled and have secured parental consent were included in the study. Those who were absent during data collection, have diagnosed sleep disorders or learning disabilities, or fail to complete the survey instruments were excluded.

Research Instrument

This study used a tool to collect information. The tool was made to look at a few things: sleep quality, study habits, and how good people are at mathematics. The researcher made this tool to get answers from students. It wanted to make sure it was fair. Followed the ideas of Social Cognitive Theory. To make sure the tool was good, we checked it several times to see if it was clear and suitable for the students at the school we were working with. We did this to make sure the tool was really measuring what we wanted it to measure. The tool was used at an educational institution. We looked at sleep quality, study habits, and mathematics competence.

Sleep Quality (IV1). This variable was measured using a Likert scale questionnaire that aimed to capture students' sleep quality by requesting to provide information about their sleep habits and patterns. It included items developed to measure three indicators: sleep duration, habitual sleep efficiency, and sleep disturbance. The tool used was adapted from Pittsburgh Sleep Quality Index (PSQI) developed by Buysse et al. (1989). This index was a self-reported questionnaire that assesses seven aspects of sleep quality, such as subjective quality of sleep, duration of sleep, sleep efficiency, and disturbances.

Study Habits (IV2). This variable was measured using a Likert-scale questionnaire designed to assess the study habits of students. The instrument evaluated three indicators: time management, study techniques, and consistency and discipline. The questionnaire was taken from things that other people have written about, such as how to manage your time and how to control your own learning. This questionnaire looked at how students plan their study time, what methods they use to learn, if they study at the same time every

day, and if they are disciplined when it comes to finishing their school work so that they can learn effectively. The questionnaire is based on what people, like Fernandez, have said about learning.

Mathematics Competence (DV). We used a kind of questionnaire to figure out how good students are at mathematics. This questionnaire is called a Likert-scale questionnaire. It was designed to see how well students understand mathematics. The questionnaire looked at three things: how well students understand the concepts and can solve problems, how well students can use what they know about mathematics, and how students feel about their own ability to do mathematics. The mathematics competence of students was measured using this questionnaire. The questionnaire was made using three tests that already existed. Each of these tests measured something about the students. The questions that tested how well the students understood ideas and could solve problems were taken from the Solving Problems Survey Instrument that Barkman and Machtmes made in 2002. This test checks if the students can look at a situation, think about it. Come up with a solution. The questions that tested whether the students could use math in life were taken from the Mathematics Proficiency Survey by Startquestion. This survey asks the students if they think they can use math in situations, such as in school or in their daily lives. The questions that tested how confident the students felt about math were taken from the Mathematics Self-Efficacy and Anxiety Questionnaire made by May in 2009. This test checks if the students believe they can do math problems and if they think they can succeed in math. The math self-efficacy questions are important because they show how the students feel about math. The Mathematics Self-Efficacy and Anxiety Questionnaire is a tool for measuring math self-efficacy.

The Likert scale below was used to interpret the data for sleep quality:

Level	Mean Interval	Descriptive Level	Descriptive Interpretation
4	3.26-4.00	Always Observed	Sleep Quality is excellent
3	2.50-3.25	Often Observed	Sleep Quality is very good.
2	1.75-2.49	Rarely Observed	Sleep Quality is poor
1	1.00-1.74	Never Observed	Sleep Quality is very poor

The Likert scale below was used to interpret the data for study habits:

Level	Mean Interval	Descriptive Level	Descriptive Interpretation
4	3.26-4.00	Always Observed	Study Habits is excellent
3	2.50-3.25	Often Observed	Study Habits is very good.
2	1.75-2.49	Rarely Observed	Study Habits is poor
1	1.00-1.74	Never Observed	Study Habits is very poor

The Likert scale below was used to interpret the data for mathematics competence:

Level	Mean Interval	Descriptive Level	Descriptive Interpretation
4	3.26-4.00	Very Strong	Mathematics Competence is excellent.
3	2.50-3.25	Strong	Mathematics Competence is very good.

2	1.75-2.49	Weak	Mathematics Competence is poor.
1	1.00-1.74	Very Weak	Mathematics Competence is very poor.

Data Gathering Technique

The researcher had undergone the following steps and procedures in gathering the data for this study:

Asking for permission to conduct the study. The researcher initially secured a certificate of approval from the relevant institutional ethics body and solicited an endorsement letter from the adviser or school authority. The study, along with the survey instruments, has been submitted for verification to ensure its validity and integrity. Upon receipt of approval, the researcher requested authorization to perform the study from the Schools Division Superintendent (SDS) of Davao Occidental and obtained consent from the principals of the participating schools.

Data collection and pilot testing. When the researcher got the okay, they did a test with a few students. These students were, like the people, the researcher really wanted to talk to. They were not going to be part of the main study. The researcher did this test to see if the questions were easy to understand and if they made sense for the people being asked. They wanted to make sure the questions were good and would give them the information they needed. The test showed them what they needed to change to make the questions better. After they made the changes and made sure everything was good, the researcher started collecting all the information they needed from the students.

Administration and retrieval of informed consent. Obtaining informed consent was crucial to ensure ethical research with human respondents. Respondents and their parents were given an Informed Consent Form and an Informed Assent Form, which they will be asked to read carefully and clarify any doubts before signing. The signing of the form indicated their voluntary participation in the study, and respondents were assured of their right to withdraw at any time without penalty. All signed consent forms were securely archived to maintain confidentiality and privacy.

Administration and retrieval of questionnaires. After securing permissions and informed consent, the researcher administered the questionnaires to the selected respondents. The questionnaires included sections on sleep quality, study habits, and math competence. To ensure clarity and accuracy of responses, the questions were explained or translated into the local dialect when necessary. Respondents were given sufficient time to answer the survey independently, and the researcher collected all completed questionnaires immediately after completion.

Tabulation and organization of data. Once the survey questionnaires have been collected, the data were collated, tabulated, and organized systematically. The gathered data were then be analyzed and interpreted using appropriate statistical tools to determine the relationships between sleep quality, study habits, and math competence of the respondents.

Data Analysis

The researcher employed several statistical tools to analyze the respondents' data, including the weighted mean, standard deviation, and Pearson product-moment correlation coefficient. These tools provided insights into the relationships among sleep quality, study habits, and math competence among junior high school students.

Mean. The study looked at sleep quality, study habits, and math competence of the people who took part. To do this, the researcher worked out the scores for sleep quality, study habits, and math competence. This

showed the trends and average performance levels of the students, giving a clear picture of what was going on with sleep quality, study habits, and math competence. The researcher got an idea of the trends and patterns in the data for sleep quality, study habits, and math competence.

Standard Deviation. This measure was applied to examine the variation or dispersion of responses. In the context of this study, standard deviation helped determine how much the respondents' scores for sleep quality, study habits, and math competence differ from the mean. A low standard deviation indicates that responses are relatively consistent, while a high standard deviation suggests a wide range of responses.

Pearson Product-Moment Correlation Coefficient (Pearson's r). This tool is used to look at how sleep quality, study habits, and math competence are connected to each other. It helps figure out if sleep quality and study habits are really linked to math competence. The results show whether there is a connection between sleep quality and math competence, and between study habits and math competence. They also show how much of a linear relationship there is between these things, like sleep quality and math competence, and study habits and math competence.

Multiple Linear Regression Analysis. This statistical method was employed to predict the extent to which sleep quality and study habits contribute to students' math competence. Regression analysis identified which variables serve as significant predictors, allowing the researcher to determine the most influential factors affecting math performance. Stepwise regression might be used to enhance model accuracy and interpretability (Tabachnick & Fidell, 2019).

Computed r	Descriptive Interpretation
± 1.00	Perfect Correlation
± 0.75 – ± 0.99	High Correlation
± 0.51 – ± 0.74	Moderately High Correlation
± 0.31 – ± 0.50	Moderately Low Correlation
± 0.01 – ± 0.30	Low Correlation

Ethical Considerations

This study looked at how junior high school students sleep, how they study, and how well they are at math. The researcher doing the study made sure to think about what is right and wrong. They wanted to keep the students who were part of the study safe. They followed the rules that the ethics review board made. The ethics review board is a group that makes sure studies are done in a way that is ethical. They said it was okay to do the study and use the questions they had. The ethics review board approved the study and the questions to protect the students who were part of the study. The researcher did what the ethics review board said to keep the students safe.

The researcher made sure to follow rules about being fair and honest. These rules include making sure people know what is going on, thinking about the bad things that could happen, keeping people's private information safe, being fair to everyone, and being open about what is happening. The researcher also made sure they were qualified to do the study and that they had a place to work. They talked to the community. Made sure they were involved. The researcher wants to make a difference in what happens with education and how students feel about school. They were especially interested in math education for high school students. The students who were part of the study were in Grades 7 to 10. They agreed to be part of the study after they understood what it was about and what would happen. They signed a form that

said they agreed to be part of the study, and their parents also signed a form. The researcher made sure the students knew that there were no risks and that they would be taken care of. They were open with the student and gave them support.

The researcher worked closely with the school to make sure the study did not disrupt the classes. The people who took part in the study were protected following the rules of the Data Privacy Act of 2012. This means they kept all the information safe and got rid of it properly when we were done. they made sure everything was fair when we picked the people to talk to. We also made sure to say thank you to everyone who helped us. The person who did the study is a teacher with a lot of experience and the right education. They used the school's facilities and resources to do the study. They thought about how the community would feel and made sure the questions were respectful. They also promised to share what they have found out with the people in the community and other researchers in some way.

RESULTS

This chapter presents the descriptive, correlational, and regression results of the study examining the influence of sleep quality and study habits on the math competence of junior high school students.

Descriptive Results

Table 1 presents the descriptive statistical results of the study variables, namely: sleep quality, study habits, and math competence, including their respective indicators. The table also shows the sample size, mean, standard deviation, and corresponding descriptive level for each variable. An asterisk (*) indicates items that underwent reverse coding.

Table 1. Descriptive Analysis. (n = 206)

Variables	SD	Mean	Interpretation
Sleep Quality (IV)	**0.295**	**3.08**	**High**
Sleep Duration	0.349	3.14	High
Habitual Sleep Efficiency	0.381	3.14	High
Sleep Disturbance*	0.460	2.95	High
Study Habits (IV)	**0.354**	**3.20**	**High**
Time Management	0.420	3.21	High
Study Techniques	0.431	3.15	High
Consistency and Discipline	0.440	3.23	High
Math Competence (DV)	**0.379**	**3.27**	**Very High**
Conceptual Understanding and Problem-Solving	0.464	3.33	Very High
Application of Mathematical Knowledge	0.466	3.18	High
Math Self-Efficacy	0.458	3.28	Very High

SQ and SH: 1.00-1.74 Very Low, 1.75-2.49 Low, 2.50-3.24 High, 3.25-4.00 Very high
MC: 1.00-1.74 Very Low, 1.75-2.49 Low, 2.50-3.24 High, 3.25-4.00 Very high

The table shows that the respondents achieved high levels of sleep quality (Mean = 3.08, SD = 0.295). This implies that the participants are attaining desirable and satisfactory levels of sleep behavior. Additionally, all the indicators of sleep quality, including sleep duration, habitual sleep efficiency, and sleep disturbance, had mean scores that were considered high.

Moreover, as per the table, respondents indicated that they have high study habits (Mean = 3.20, SD = 0.354). Specifically, all the indicators of study habits, which include time management, study techniques, and consistency and discipline, were rated high, implying that respondents practice proper study habits that promote learning.

Finally, the statistical results show that the respondents exhibited an overall very high level of mathematics competence (Mean = 3.27, SD = 0.379). Among its indicators, conceptual understanding, problem-solving skills, and mathematics self-efficacy obtained mean scores interpreted as very high. At the same time, the application of mathematical knowledge achieved a mean score described as high. These findings imply that the respondents possess strong mathematical abilities, confidence, and understanding in performing mathematical tasks and applying learned concepts.

Correlation Results

Presented in Table 2 are the relationships between the predictor variables (sleep quality and study habits) and the criterion variable (math competence), including the r-values, p-values, decision on hypotheses, and interpretations.

Table 2. Correlation Analysis. (n = 206)

Independent Variables	Math Competence (DV)			
	r	**p-value**	**Decision of H_0**	**Interpretation**
Sleep Quality	0.506	0.000	Reject H_{01}	Moderately High Correlation
Study Habits	0.710	0.000	Reject H_{02}	Moderately High Correlation

Level of Significance: 0.05

Decision Rule: Reject H_0 if $p<0.05$

The results reveal that sleep quality has a moderately high positive correlation with math competence (r = 0.506, p = 0.000). Since the p-value is less than 0.05, the null hypothesis stating that there is no significant relationship between sleep quality and math competence among Junior High School students is rejected. This indicates that better sleep quality is associated with higher levels of math competence. Similarly, study habits show a moderately high positive correlation with math competence (r = 0.710, p = 0.000). The null hypothesis stating that there is no significant relationship between study habits and math competence among Junior High School students is likewise rejected, indicating that improved study habits are strongly associated with increased math competence. Both relationships are statistically significant at the 0.05 level, suggesting that sleep quality and study habits are important factors related to students' mathematical performance.

Regression Results

The multiple regression analysis's findings, which demonstrated how study habits and sleep quality affect math competence, are displayed in Table 3.

Table 3. Regression Analysis

	Math Competence (DV)						
	Unstandardized Coefficients		Standardized Coefficients				
	B	**Std. Error**	**Beta**	**t**	**p**	**Decision on H_0**	**Interpretation**
Constant	0.51	0.21	-	2.47	0.014	-	-
Sleep Quality	0.20	0.08	0.16	2.72	0.007	Reject H_{03}	Positive Significant Influence
Study Habits	0.67	0.06	0.62	10.62	0.000	Reject H_{04}	Positive Significant Influence

Model Summary:

$R = 0.722$ | $R^2 = 0.522$ | Adjusted $R^2 = 0.517$ | $F(2, 203) = 111$ | $p = 0.000$

Level of Significance= 0.05

Decision Rule: Reject H_0 if $p<0.05$

The regression model reveals that sleep quality has a statistically significant and favorable impact on math proficiency (B = 0.204, β = 0.159, p = 0.007). In a similar vein, study habits have a stronger impact on math proficiency than sleep quality, with a positive and statistically significant influence (B = 0.665, β = 0.621, p = 0.000). Since the p-values are less than 0.05, the null hypothesis stating that there is no significant influence of sleep quality and study habits on mathematics competence among junior high school students is rejected. Furthermore, the overall regression model is statistically significant, F (2, 203) = 111, p = 0.000. The model shows a strong relationship between the predictors and mathematics competence, with R = 0.722, R^2 = 0.522, and an adjusted R^2 = 0.517. This indicates that approximately 52.2% of the variance in mathematics competence is explained by sleep quality and study habits combined. At the same time, the adjusted R^2 suggests that the model remains a strong and reliable fit even after accounting for the number of predictors included.

Both variables were found to be statistically significant, thus rejecting the null hypothesis. However, study habits were found to be a more influential factor than sleep quality, which is evident from the values of standardized beta coefficients.

Summary of Findings

In light of the statistical outcomes, the conclusions of this study are summarized as follows:

1. The level of sleep quality is high.
2. The level of study habits is high.
3. The level of math competence is very high.
4. There is a moderately high relationship between sleep quality and Mathematics competence. Additionally, there is a moderately high relationship between study habits and Mathematics competence.
5. Both sleep quality and study habits have a positive significant influence towards mathematics competence.

DISCUSSIONS

This study discusses the study's findings, with an emphasis on the impact of study habits and sleep quality on junior high school students' proficiency. The results obtained from the descriptive, correlational, and regression analyses are interpreted in relation to existing theories and related literature to provide a deeper understanding of the variables involved.

Levels of Sleep Quality, Study Habits, and Mathematics Competence

The results reveal that the respondents exhibit a high level of sleep quality, indicating that students generally maintain adequate sleep patterns in terms of duration, efficiency, and minimal disturbances. This implies that most students are able to get the rest they need to ensure good cognitive performance. Research has indicated that sleep is essential for improving memory, enhancing performance, and generally improving brain function in humans (Curcio et al., 2006; Dewald et al., 2010). In addition, Walker and Stickgold (2006) emphasized that sleep plays a crucial role in learning and memory processing, while Gilbert and Weaver (2010) found that students with better sleep quality typically perform better academically than those with poor sleep patterns. These results suggest that participants who experience improved sleep tend to perform better on activities requiring more sophisticated cognitive processing, such as in math tests.

Additionally, those surveyed appear to display a high degree of study skills, suggesting that they are able to perform time management, study skills, and discipline to promote academic achievement. According to Credé and Kuncel (2008), study habits are strong predictors of academic performance, as they reflect students' ability to organize, process, and retain information. Furthermore, Gettinger and Seibert (2002) emphasize that developing effective study skills promotes students' academic achievement and independent learning. In contrast, Nonis and Hudson (2010) found that effective learning behavior and time management correlate positively with students' performance. The current findings support these arguments by indicating that students' study habits have a positive effect on their performance.

Moreover, the respondents showed a very high level of mathematics competence, which indicates their abilities in conceptual understanding, application knowledge, and self-efficacy. This suggests that the students are highly skilled in math. Indeed, previous studies highlight that mathematical competence determines students' skills and capabilities to demonstrate their knowledge and effectively apply the acquired understandings (Band, Kilpatrick et al., 2001). Furthermore, Hattie (2009) argued that students' confidence and engagement play a critical role in achieving academic and mathematical competence, while the NCTM (2000) highlighted the importance of students' capabilities to solve problems, communicate, reason, and demonstrate conceptual understanding. Thus, it can be argued that the students' level of math competence is determined by their abilities and skills, and high engagement in the process of learning the subject.

Correlation of Sleep Quality and Study Habits with Mathematics Competence

The results suggest that there is a moderately strong, positive, and significant relationship between sleep quality and performance in math. This means that the better students sleep, the more likely they are to perform better in math, probably due to the various benefits sleep has on attention, memory, and other cognitive functions. The results are in line with previous research that established the negative effect of lack of sleep and poor quality of sleep on students' performance while highlighting the benefits of sufficient sleep on learning and cognitive functioning (Dewald et al., 2010; Owens, 2014). Therefore, the current results confirm that sleep quality is a significant predictor of students' performance in math. In addition, students'bits exhibit a moderately high, significantly positive correlation with mathematics

competence, indicating that students with better study practices tend to achieve higher levels of mathematical performance. The finding is consistent with the existing literature, which highlights that structured and consistent study behaviors significantly contribute to academic success. Effective study habits enable students to understand mathematical concepts better, practice problem-solving, and retain learned material (Credé & Kuncel, 2008).

Overall, the results of the analysis indicate that sleep quality and study habits are positively correlated with mathematics competence. In essence, these research results demonstrate that their intelligence does not solely determine their performance in mathematics. A student's proficiency in a subject is shaped not only by academic effort but also by behavioral factors like sleep quality and study routines. For example, getting enough rest improves focus, which in turn strengthens cognitive function and the ability to understand mathematical ideas and techniques. Similarly, good study habits facilitate improved retention of the concepts and skills and therefore lead to increased students' engagement in the subject. It therefore follows that students must ensure they get sufficient sleep and adopt healthy study habits if they desire to be competent in mathematics.

Mathematics Competence as Influenced by Sleep Quality and Study Habits

The regression analysis showed that two predictors significantly influenced students' math competence, both independently and together. Specifically, sleep and study habits were identified as key factors affecting students' levels of mathematical ability.

Firstly, sleep quality positively affects the math competence of the students, meaning that the better one sleeps, the better their performance is in mathematics. This outcome reflects previous results conducted by Walker (2009), who stated that sleep plays a critical role in the brain's functionality, including learning and memory. Therefore, students with good sleeping habits are more likely to have better results in their academics due to the proper use of the brain. However, study habits show a more significant positive prediction of students' math competence, which means that students' learning behavior significantly contributes to their math skills. Therefore, students who purpose and maintain good study habits are most likely to achieve higher math competence. According to Zimmerman (2002), self-regulated learning is a vital aspect of learning since it enables learners to achieve their educational goals.

In addition, the two variables positively and significantly contribute to the students' math competence individually and collectively. Thus, students' sleeping patterns must be considered as a relevant factor when dealing with students' academic competence, specifically in mathematics. However, the study habits of students seem to be more predictive of their math comprehension and their sleep quality. The two variables, study habits and sleep quality, have a significant positive influence on each other and on math competence.

Conclusion

Based on the research, it can be concluded that the sleep and study habits of the junior high students contribute to their mathematical performance. The results supported the Social Cognitive Theory because it explained how the student's learning is affected by personal and behavior-related factors. Additionally, the study revealed that the two factors affecting the students' mathematical competence are behavioral and physiological, thus necessitating the need to consider both in improving performance.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are proposed:

School administrators may utilize the findings of the study in developing student wellness and students' enhancement programs that specifically target sleep quality, study habits, and mathematics competence. Schools can hold events such as "Sleep and Study Management Seminars," wellness weeks, time-management workshops, and monitor the students' academic routine to help students establish a balanced daily schedule. Schools can also enforce designated homework times and discourage late-night activities, and" provide a quiet place for students "to do their homework. All of the above measures will promote the students' ability to get enough sleep, enhance study habits, and therefore improve the students' math competence, as getting enough sleep and establishing a good study rhythm can help students maintain a better focus on their studies, which in turn can improve their math skills.

Math teachers can ensure that students participate in interactive classes, peer teaching, weekly math tests, learning journals, and scheduled review sessions to improve students' study habits and mathematics ability. Furthermore, teachers can also provide a short brain break, minimal homework, and a motivational environment to prevent students from having a fatigued mind, which will allow them to have a healthy study routine, resulting in improved sleep patterns. All the strategies can enhance mathematics capability by motivating and inspiring students to gain an edge, improve their analytical skills, and boost their overall mathematical abilities.

Students are advised to engage in developing sleeping and studying routines, make a personal study plan/schedule, adhere to a sleeping regimen, limit the use of devices before bedtime, participate in study groups, and practice doing daily math problems or exercises. Students can use planners or apps to help them stay organized. In turn, they ensure healthy sleeping patterns by getting enough sleep, improve their study habits by managing time wisely and staying focused, and enhance their math abilities by practicing and exercising their skills to gain a better understanding and retention of the subject matter.

The study can be a foundation for future research in the area of math competencies. Future research could include additional aspects, such as stress levels, motivation, study environment, use of technology, and emotional well-being, among others, to discover more ways of improving students' performance using experimental, descriptive, or comparative studies.

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