Effects of Third year Medical Technology Students' Amount of Sleep, Screen Time, and Physical Activity to their Academic Performance

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Abstract: - In the past few decades, online learning has been emerging as an alternative to face-to-face learning in a traditional classroom setting. However, it is now the standard mode of delivering classes due to the SARS-CoV-2 pandemic. In relation to online education, there are predictors that might affect academic performance. A descriptive correlational quantitative approach was utilized to investigate the amount of sleep, screen time, and physical activity as predictors for the academic performance of regular 3rd year Medical Technology students of the University of Santo Tomas in board subjects during their first semester of AY 2020-2021. Participants were selected through voluntary sampling technique and online questionnaires were distributed through Google Forms to 287 volunteers that met the inclusion criteria. The questionnaire consists of 4 sections making use of Likert scales and questions mainly concerns participant's semestral average, the amount of time spent sleeping and on doing certain activities on a screen, and how physically active they were. The descriptive statistics showed that the majority of 3rd Year Medical Technology students met the recommended physical activity and sleeping time on weekends, while failing to meet recommended screen time and sleeping time on weekdays. No significant correlation was found between any of the independent variables and academic performance. Future researchers could search for possible confounding factors influencing both the independent and dependent variables. Conducting the study on the same sample once face-to-face classes resume may allow for further discussion to be made.

Key Words— ***Amount of Sleep, Screen Time, Physical Activity, Online Learning, Third Year Medical Technology Students.***

I. INTRODUCTION

The Bachelor of Science in Medical Technology (BSMT), also known as medical laboratory science or clinical laboratory science, is a college program that provides students with the necessary skills and training in laboratory science. Graduates of this program are expected to be able to aid the physician in the diagnosis, study, and treatment of diseases and in the promotion of health in general. Professionals in this field focus on analyzing body fluids, excretions, secretions, and tissues of the human body in the laboratory setting.

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Because of the nature of the profession, graduates of the program are expected to master certain practical laboratory skills on top of theoretical knowledge, and a majority would perceive that skill lab training would be a better teaching method for preclinical studies [1]. Most medical laboratory technology students were found to learn by doing, getting into the action, and experiencing what to learn [2]. This way of learning was open to professors while they engaged their students in what was face-to-face classes and laboratory settings; however, with the pandemic at hand, students are now expected to learn and master these skills through an online medium.

In the past few decades, online learning has been emerging as an alternative to face-to-face learning. From being considered as an alternative, it is now the standard mode of delivering classes because of the SARS-CoV-2 pandemic. The rapid

change to online learning was described by Mohmmed et al. (2020) as emergency remote learning, which in contrast to well-planned online learning courses, was a result of the need to provide a quick, temporary, and reliable substitute for the original mode of instruction [3].

Although there is a lot of literature that proves the effectiveness of online learning in correlation to face-to-face learning, it is important to note that these studies were on online courses that were developed and created with the purpose of being delivered online. Because of the increasing and continuous toll of the pandemic, professors have worked on modifying and improving their curricula to be suitable for online learning without sacrificing on what students need to learn. This was to ensure that students can continue their education amid the quarantine.

The shift to online teaching has changed the way students go about their learning. Bali and Liu (2018) examined the students' perception regarding online learning and revealed that face-to-face learning offers more social presence, social interaction, and satisfaction albeit the statistically insignificant difference in learning preference [4]. Indeed, some students were comfortable in online learning.

Online education benefits students in a lot of aspects such as being innovative and flexible. However, with the advantages given, there are also other disadvantages that come along, specifically regarding lifestyle and behavioral factors as affected by the higher amounts of screen time required by online learning. Nevertheless, it was important that one would be able to balance gadget usage to alot time for other activities that promote relationships, creativity and development [5]. Excessive use of technology was found to negatively impact the physical, mental, emotional and social development of the youth which is why caution is encouraged upon gadget use. In contrast, Chavez et al. (2018) found that healthy behavioral choices positively impacted academic performance, commitment to learning, and educational aspirations [6]. These behavioral choices included those that affect the physical, psychological, or social well-being of a person. In relation to online education, some predictors that might affect academic performance are sleep, physical activity, and screen time.

Sleep is very important for a person's wellbeing and overall health. Getting enough sleep was found to have a lot of benefits for the body such as being able to relieve stress, prevent certain diseases, and improve memory. Okano et al. (2019) assessed and found that sleep duration, sleep quality, and sleep consistency all would positively affect academic performance [7]. Controlled sleep studies focused on healthy adults showed that better sleep can have a positive effect on a multitude of superior cognitive functions, with studies having found that there was a significant relationship with sleep quality and stress, but no significant relationship between sleep quality and academic performance [8].

Online education is often correlated with an irreversible increased amount of screen time for students as learning happens when facing the screen, be it watching video lectures, answering tests, or making requirements that involve the use of gadgets. Distractions, which include the habitual nature of screen time and time management struggles, and poor sleep hygiene, negatively impacted academic performance in certain studies [9]. The Internet contains a treasure trove of information which, unfortunately, can overwhelm anyone, especially students. When trying to learn new things online, the amount of information can confuse and scare students, especially when the information from each source is different. This adds up to the screen time they consume when trying to find the right information that they need. This can further be amplified by a poor Internet connection which will further prolong the student's screen time.

According to the US Centre for Disease Control and Prevention (CDC, 2020), physical activity has an impact on cognitive skills of an individual such as concentration, attention, attitudes and behaviors, all of which are important components of improved academic performance [10]. The physical activity levels of students have been negatively affected by online learning. Students have to be in front of their computer for hours, and they don't have to travel to attend their classes. Al Sabih et al. (2018) determined that exercise positively affected concentration in classes, and punctuality in attending lectures, but yielded no notable effect on the GPA of students [11]. As for Jose and Sruthi (2019), physical activity was found to be related proportionally to mental health and showed a positive influence on academic performance [12].

Some studies have shown that online learning has the capability to positively influence the academic performance of the students, but this pattern may not always be exhibited when its impact on the sleep quality, screen time and physical activity of the students were taken into consideration. Some studies showed that these factors would have negative effects on academic performance. Wu et al. (2015) assessed the correlation of the amount of physical activity and screen time with poor sleep quality and stress among Chinese college students and found that high physical activity and low screen time was indicative of low stress [13]. It is then unknown if online learning's effect on amount of sleep, screen time, and physical activity may be predictors for the academic performance of Medical Technology Students.

Before the pandemic, there were already established healthy limits for sleep time, screen time, and physical activity. The CDC (2021) recommended 7 or more hours of sleep per day [14]. In addition, Zhang et al. (2017) recommended only 2 hours of screen time per day [15]. Lastly, the WHO would recommend around 75/150 minutes of vigorous/moderate physical activity per week [16].

This study then aims to determine the implications of the amount of sleep, screen time, and physical activity to the academic performance of regular third year Medical Technology students currently enrolled in the University of Santo Tomas. This was done while the university was implementing their own curriculum on online learning and while the Medical Technology students were taking their professional courses. The study would assess the amount of sleep, screen time, and physical activity of 3rd year medical technology students during their first semester of online classes and then determine the relationship between the variables through statistical analysis. After which, the implications of the results of the research on the academic performance of the third year Medical Technology students during online classes would be further discussed.

The researchers were able to develop two hypotheses: first, the null hypothesis, which assumes that there will be no significant correlation between amount of sleep, screen time, and physical activities and performance in board subject grades. Second, the alternative hypothesis, which assumes that there will be a significant correlation between amount of sleep, screen time, and physical activities and performance in board subject grades.

The conceptual framework In Figure 1 shows how online classes may affect different aspects of a student's routine, namely amount of sleep, amount of screen time, and the number of physical activities. The amount of sleep of students, and the time it takes to fall asleep also contributes to the academic performance of students. Usually screen time was viewed to minimize the opportunities of a student to work on activities such as studying, doing homework, or sleeping, which may affect academic achievement. However, with the rise of e-learning where electronic devices are used more for academics, there could be another effect. How much time a student spends engaging in physical activities may also affect a student's academic performance with how time demanding it can be. Literature has shown that there is a positive relationship between physical activity and academic performance. These factors all play a role and contribute to the overall academic performance of a student.

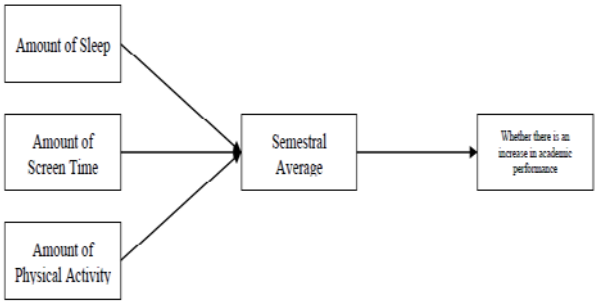

Fig. 1. Conceptual Framework

The research is critical and relevant for Medical Technology students and other college students that were continuing their education during the COVID-19 pandemic through online learning. The study is timely because it assesses the amount of sleep, screen time, and physical activity of Medical Technology students during the online semester, and its relationship to their academic performance. By determining the relationship between the predictors and academic performance, the study can help college students, professors, and school administrators in preparing for future online classes by serving as a guide to attain better academic performance without sacrificing the quality of education. Lastly, this could add new knowledge or fill in existing related literature.

The study is limited to University of Santo Tomas third-year Medical Technology students who were formally enrolled for the School Year 2020-2021. Second, only screen time, sleep, and physical activity will be taken into account as significant factors affecting a student's academic performance. Any additional variables in the research setting will be eliminated. The semester average which is calculated automatically by the university for the first term of the school year 2020-2021 will be used as the baseline criteria for a student's academic performance. Finally, to achieve the research's goal, the methodologies used were primarily quantitative.

II. METHODOLOGY

2.1 Research Design

The study utilized a descriptive correlational quantitative approach. This design described the association between two or more variables, such as the amount of sleep, screen time, and physical activity and its impact on students' academic achievement amidst online classes. For the study, the amount of sleep, screen time, and physical activity served as the independent variables. The semestral average of each student during set grading period was the dependent variable.

2.2 Subjects and Study Site

The study was conducted in the first two weeks of April 2021 at the University of Santo Tomas. The Bachelor of Science in Medical Technology program follows a 4-year competency based academic program. The respondents are composed of Third year Medical Technology students. They were chosen as respondents of the study since board subjects are taken during the third year of the program. It is also during this year when students are trained to enhance their laboratory and practical skills which are traditionally done face-to-face. However, due to the COVID-19 pandemic, traditional face-to face classes shifted to the online education system.

The sample size for the survey was 287 participants based on the population size of B.S. Medical Technology. The minimum sample size was determined using the Raosoft Sample Size Calculator, which makes use of Slovin's formula, at a 5% margin of error and 95% confidence interval. The sampling technique used was voluntary sampling method and the final sample was selected from the potential respondents who were willing and qualified to participate in the survey.

The respondents consisted of 3rd year Medical Technology students in the University of Santo Tomas taking up board subjects during the academic year 2020-2021. Respondents included in this study have the following criteria: regular students and taking full units of the program, male or female between the ages of 19-22, can read and understand English because instructions are given in this language, and those who are willing to participate in the study because the respondents have the right to decide whether they would participate or not. The exclusion criteria were those with incomplete grades on a particular board subject or irregular students who are not taking a full load.

2.3 Data Measurement/Instrumentation

The data from the third-year Medical Technology students was obtained using an online self-administered questionnaire through Google Forms. The questionnaire is composed of four parts, each containing close-ended questions. The first part contains the student's consent, demographic data, along with the student's raw semestral average. The second part is adapted from the previous studies of Cross et al. (2016), and Monk, Buysee, Kennedy, Pods, DeGrazia, & Miewald (2003) which contains items on sleep profile for the assessment of a participant's sleeping habits [17, 18]. Participants record their usual sleeping and waking times on workdays and day offs on an exam week and a non-exam week work. Further questions regarding sleep ask about daytime sleepiness as well as if the participants believed that daytime sleepiness affects their academic performance.

The third part was adapted from Zhang et al. (2017), to gauge the amount of student's screen time usage on different screen activities [15]. Lastly, the fourth part which is adapted from the existing International Physical Activity Questionnaire (IPAQ) (2015) to measure the student's physical activity levels. The physical activity of the participants is quantitated based on the amount of time that they spend doing physical activities in 4 different domains [19]. These questionnaires are chosen based on the study's objectives, research question, and hypotheses.

2.4 Data Gathering Procedure

This study was conducted to 287 3rd year regular students taking BS Medical Technology in The University of

Santo Tomas, officially enrolled for the school year 2020-2021. Participants involved were sampled through voluntary sampling. Data gathering was done using a self-administered questionnaire adopted from previous studies that were duly validated by different professionals. The tool was administered online through Google Forms. The self-administered questionnaire includes a consent form prior to questioning to obtain the permission of the participants, and to inform them of the different details that would be asked from them. There was no monetary or other direct compensation given to the participants for their participation. The Google Forms questionnaire was available for two weeks to give the respondents ample time to answer the survey. The data gathered from the respondents was then be subjected to statistical analysis.

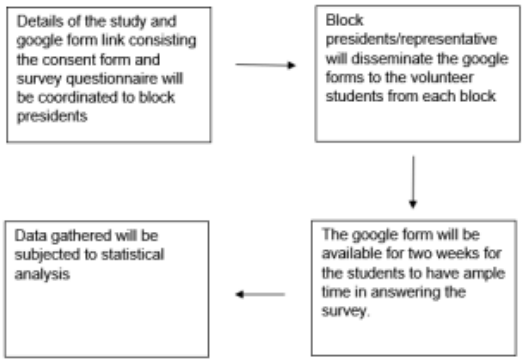

Fig. 2. Data gathering procedure flowchart

2.5 Ethical Considerations

The researchers ensure that all information and data obtained over the span of the study is kept confidential. The self-administered questionnaire does not require students to state their names or contact numbers to uphold their anonymity and privacy. The results of the study were the only information used for the presentation of the final research paper. The research proposal was submitted for evaluation by the Faculty of Pharmacy Research Ethics Committee (FOPREC) and was later approved before data collection.

The questionnaire contained the informed consent. In which, the research's purpose, how the findings will be used, and who will still have access to the findings after data collection were stated. Respondents were allowed to have a copy of their own response sent to them if they should want a copy. Participants were allowed to withdraw participation from the study at any time during the study

2.6 Data Analysis

The Statistical Package for Social Science (IBM SPSS Statistics 23) software was used to tabulate all the data collected from the sample participants. The data treatment used included descriptive statistics to describe the data, IPAQ scoring protocol to interpret the IPAQ data, and correlational analyses to test for correlation with each variable.

Descriptive statistics were used to assess the amount of sleep, screen time, and physical activity of the respondents. Measures of central tendency were used as a reference point for the researchers to evaluate the respondents. As the data for each variable was gathered through different sections of the questionnaire, each variable was separately analyzed. For consistency, time was expressed in military format.

Lastly, Pearson's Test for correlation was conducted to test for the relationship of the three independent variables to the semestral average of third year Medical Technology during the online semester. Should a relationship be established, multiple linear regression would be performed to develop a model to further describe the correlation.

III. Results And Discussion

3.1 Assessment of amount of sleep, screen time, and physical activity of 3rd year medical technology students during their first semester of online classes

Table.1. Semestral Averages of the Respondents During the First Semester AY 2020-2021

	N	Minimum	Maximum	Mean	Std. Deviation
Grade Average	287	1.03	2.62	1.5910	.27856
Valid N (listwise)	287				

Table 1 describes the semestral averages of the respondents. The computed mean of the semestral averages of

287 participants was 1.5910. Quite notably, it was also found that the minimum semestral average from the respondents was 1.03, and the maximum semestral average from the respondents was 2.62.

Table. 2. Sleep Duration of the Respondents During the First Semester AY 2020-2021

	N	Minimum	Maximum	Mean	Std. Deviation
On School Days					
School Hours Sleep	287	0.00	15.00	6.6743	1.99313
Valid N (listwise)	287				
On Non-School Days					
Non-School Hours Sleep	287	0.00	23.00	9.3799	2.31087
Valid N (listwise)	287				

Table 2 shows the respondents' average sleep duration over school days and non-school days. The mean sleep duration during a school day was 6.6743 hours and 9.3799 hours on a non-school day. It was also found that the minimum amount of sleep respondents would have on either a school day or a non-school day was 0.00 hours. The maximum amount of sleep recorded was 15.00 hours on a school day and 23.00 hours on a non-school day.

Table. 3. Weekly Amount of Sleep of the Respondents During the First Semester AY 2020-2021

	N	Minimum	Maximum	Mean	Std. Deviation
Wave Sleep	287	0.00	100.00	49.8948	12.3667
Valid N (listwise)	287				

Table 3 portrays the amount of sleep respondents would get weekly. On average, it was found that the respondents during the first semester of academic year 2020-2021 were receiving a total of 49.89 hours of sleep each week. Additionally, the most amount of sleep any respondent was able to receive in the span of a week was 100 hours total.

Table. 4. Sleep and Wake Times of the Respondents During the First Semester AY 2020-2021

		Sleeping Hour	Waking Hour
On School Days			
N	Valid	287	287
	Missing	0	0
Median		2.00	6.45
Mode		0	7
On Non-School Days			
N	Valid	287	287
	Missing	0	0
Median		2.00	9.00
Mode		0	10

Table 4 presents the times respondents would sleep and wake up on school days and non-school days. As seen in the table, the most common time respondents would sleep during a school day was 00:00 while the most common time respondents would wake up was 07:00. It was also found that on non-school days, the common time respondents would sleep was also 0:00 and the time they would wake up was 10:00.

Table. 5. Duration to Fall Asleep, Lost Amount of Sleep Due to Interruption, and the Sleep Sufficiency of the Respondents During the First Semester AY 2020-2021

		Falling Asleep Duration	Lost Sleep Duration	Sufficient Sleep
N	Valid	287	287	287
	Missing	0	0	0
Median		2.0000	1.0000	2.0000

Mode	1.00	1.00	2.00

Table 5 displays the time it takes for a respondent to fall asleep, the amount of sleep lost due to waking up in the middle of the night, and the attitude of the participants towards the sufficiency of their sleep. As shown in the table, the median score for the time it takes for a respondent to fall asleep was 2.000 which meant that the majority of the respondents take around 16-30 minutes to fall asleep once they go to bed. Additionally, the median score for the amount of sleep lost due to waking up in the middle of the night was 1.0000 which indicated that most respondents lose 0-10 minutes of sleep during the entire night whenever they suddenly wake up. The median score of 2.0000 for the attitude of the participants towards the sufficiency of their sleep indicated that the majority of the respondents felt that they do not get sufficient sleep.

Table. 6. Regularity of Sleep Schedule, and the Average Amount of Sleep on a Night Before an Examination of the Respondents During the First Semester AY 2020-2021

		Regular Sleep	Sleep Exam	Duration Sleep Exam
N	Valid	287	287	287
	Missing	0	0	0
Median		2.0000	1.0000	5.0000
Mode		2.00	1.00	5.00

Table 6 exhibits the attitude of respondents to the regularity of their sleep schedule and the amount of sleep they receive on a night before an exam when compared to a normal day, and the average amount of sleep respondents receive on a night before the exams. The mode of 2.0000 as shown in the table established that the majority of the students believe that they don't regularly exhibit a regular sleep schedule. Additionally, the score of 1 under the "Sleep Exam" column indicated that the majority of the respondents believe they receive much less sleep on a night before an exam when compared to the amount of sleep they receive on a regular day. Lastly, with the amount of sleep the respondents receive on a night before an exam rated 5.0000 suggested that majority of respondents only get 4 hours of sleep on a night before an examination.

Table.7. Frequency of Daytime Sleepiness and Attitude of Respondents Towards its effect on Academic Performance During the First Semester AY 2020-2021

		FreqDaytime Sleepiness	Daytime Sleep Grades
N	Valid	287	287
	Missing	0	0
Median		4.0000	4.0000
Mode		4.00	3.00

Table 7 shows how frequently the respondents experience daytime sleepiness and their perceptions on whether daytime sleepiness would have an effect on their academic performance. The mode for the frequency of daytime sleepiness was 4.00 which indicated that the respondents would frequently experience daytime sleepiness. The mode score for their belief on whether or not daytime sleepiness had an effect on academic performance was 3.00 which meant that the respondents would occasionally believe that their daytime sleepiness adversely affects their academic performance.

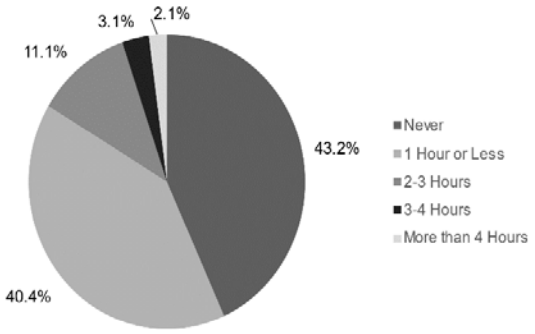

Fig.3. Hours Watching Television during Work or School Days

Figure 3 presents the amount of time respondents spend watching television during school days. The percentage distribution was as follows: majority of the respondents (43.2%) do not watch television during school days, 40.4% said

they spend 1 hour or less, 11.1% claimed to spend 2-3 hours watching the television, 3.1% answered 3-4 hours, and 2.1% said they spend more than 4 hours doing the said activity.

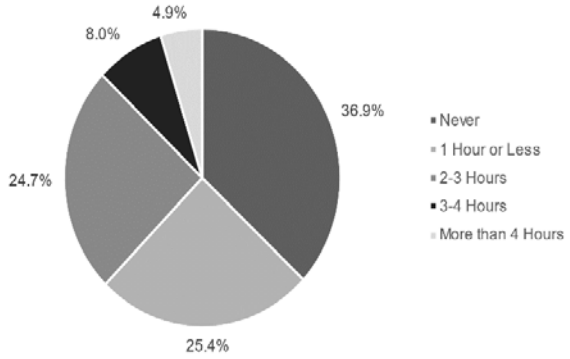

Fig. 4. Hours Playing Electronic Games during Work or School Days

Figure 4 shows the hours spent by the respondents playing electronic games during work or school days. Responses revealed that the majority of the students (36.9%) do not play electronic games during school days, followed by 25.4% who spend 1 hour or less. 24.7% of the students spend 2-3 hours, 8% said they spend 3-4 hours, and 4.9% answered more than 4 hours playing.

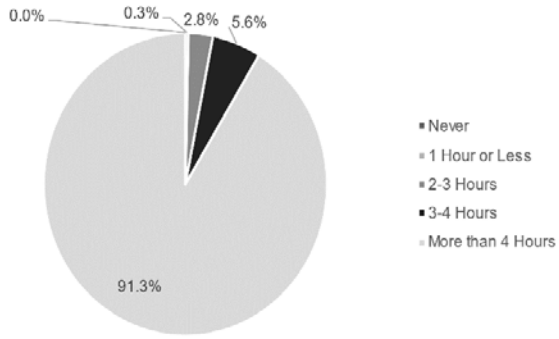

Fig. 5. Hours Using Electronic Devices for Academic Purposes during Work or School Days

Figure 5 shows the hours spent by the respondents using electronic devices for academic purposes during work or school days. It shows that most of the students (91.3%) spend more than 4 hours during a school day using their electronic devices for academic purposes. 5.6% claimed they spend 3-4 hours, 2.8% spend 2-3 hours, and 0.3% said they spend 1 hour or less doing the same activity.

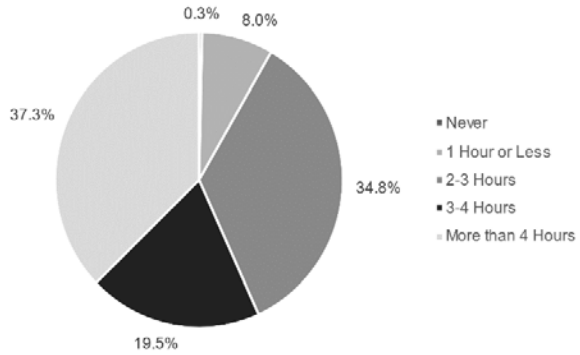

Fig. 6. Hours Watching Videos/Using Social Media during Work or School Days

Figure 6 presents the number of hours respondents watch videos or use social media during work or school days. The percentage distribution was as follows: 37.3% said they spend more than 4 hours, followed by 34.8% who answered 2-3 hours, 19.5% claimed they spend 3-4 hours, 8% spend 2-3 hours, and 0.3% said they do not engage in the said activity during work or school days.

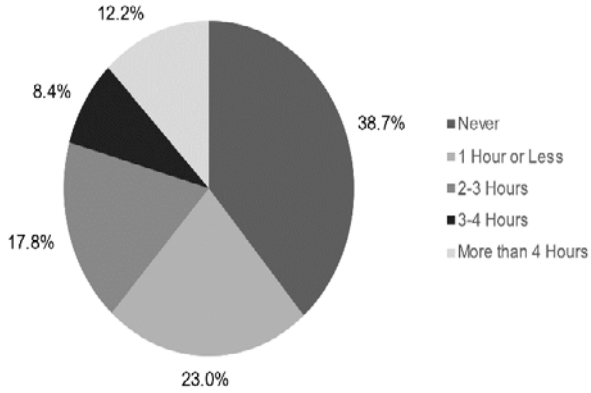

Fig.7. Hours Watching Television during a Day Off

Figure 7 presents how long the respondents watch television during their day off. The percentage distribution was as follows: majority of the respondents (38.7) did not watch television during their days off, 23% said they spend 1 hour or less, 17.8% claimed to spend 2-3 hours watching television, 12.2% spend more than 4 hours, and 8.4% said they spend 3-4 hours doing the said activity.

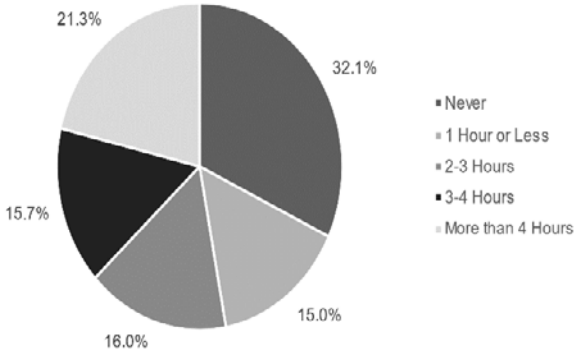

Fig. 8. Hours Playing Electronic Games during a Day Off

Figure 8 shows the hours spent by the respondents' playing electronic games during their days off. Responses revealed that the majority of students (32.1%) do not play electronic games during days off, followed by 21.3% who spend more than 4 hours playing electronic games, while 16% claimed to spend 2-3 hours, 15.7% said they spend 3-4 hours and 15% answered 1 hour or less.

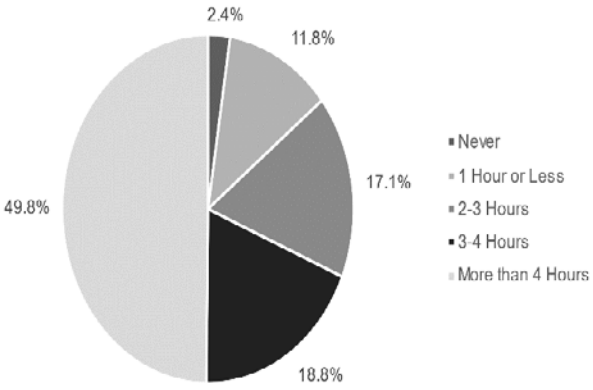

Fig. 9. Hours Using Electronic Devices for Academic Purposes during a Day Off

Figure 9 shows the hours spent by the respondents using electronic devices for academic purposes during days off. Most of the students (49.8%) spend more than 4 hours using their electronic devices for academic purposes during days off. 18.8% claimed they spend 3-4 hours, 17.8% spend 2-3 hours, 11.8% said they spend 1 hour or less, and 2.4% said they never spend an hour doing the said activity during days off.

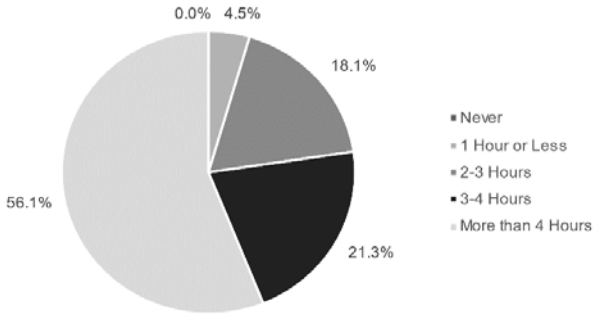

Fig.10. Hours Watching Videos/Using Social Media during a Day Off

Figure 10 shows how long respondents' watch videos or use social media during their days off. The percentage distribution was as follows: Majority (56.1%) said they spend more than 4 hours, followed by 21.3% who answered 3-4 hours. 18.1% claimed they spend 2-3 hours, and 4.5% said they spend 1 hour or less doing the said activity during their days off.

Table. 8. Weekly MET Minutes Expended During the First Semester AY 2020-2021

	Low Activity	Moderate Activity	High Activity	Median
MET minutes	51	126	110	2100.00

Table 8 shows the MET minutes expended by the respondents in terms of low, moderate, and high physical activity as well as the median of the calculated MET minutes. It was found that the majority of the respondents had fallen under the moderately active category with only a small fraction belonging to the low activity category. The median MET minutes expended by the 287 respondents was 2100.00.

3.2 Correlational Analysis

Table. 9. Correlation Between the Respondents' Academic Performance and Amount of Sleep on School Days and Non-School Days

		SchoolHoursSleep	NonSchoolHoursSleep
Grade Average	Pearson Correlation	-0.032	-0.096

	Sig. (2-tailed)	0.587	0.105
	N	287	287

Table 9 displays the correlation between the respondents' academic performance and the amount of time spent on sleep during either school or non-school days. Results revealed a -0.032 correlation on school days and a -0.096 on non-school days, indicating that there was a negative correlation with no significant relationship between the amount of sleep to academic performance. The significance values found were 0.587 on a school day, and 0.105 on a non-school day.

Table. 10. Correlation Between the Respondents' Academic Performance and Screen Time Watching Television during School Days.

		SchoolTv
Grade Average	Pearson Correlation	0.053
	Sig. (2-tailed)	0.370
	N	287

Table 10 shows the correlation between the students' academic performance and their screen time watching television during school days. Results revealed a 0.053 correlation, indicating that there was no significant relationship between the two variables. The significance value was found to be 0.370.

Table. 11. Correlation Between the Respondents' Academic Performance and Screen Time Playing Electronic Games during School Days.

		SchoolGame
Grade Average	Pearson Correlation	-0.021
	Sig. (2-tailed)	0.720
	N	287

Table 11 displays the correlation between the respondent's academic performance and their screen time playing electronic games during school days. A Pearson correlation value of -0.021 was obtained, indicating that there was negative correlation with negligible correlation between the two variables. The significance value was found to be 0.720.

Table. 12. Correlation Between the Respondents' Academic Performance and Screen Time Using Electronic Devices for Academic Purposes during School Days.

		SchoolMobileD
Grade Average	Pearson Correlation	-0.035
	Sig. (2-tailed)	0.557
	N	287

Table 12 portrays the correlation between the respondents' academic performance and their use of electronic devices for academic purposes during school days. Results showed a Pearson value of -0.035, indicating a negative correlation. However, with a significance value 0.557, the finding was considered non-significant.

Table. 13. Correlation Between the Respondents' Academic Performance and Screen Time Watching Videos/Using Social Media during School Days.

		SchoolSocMed
Grade Average	Pearson Correlation	-0.065
	Sig. (2-tailed)	0.274
	N	287

Table.13. presents the correlation between the respondents' academic performance and screen time watching television/using social media during school days. It shows a Pearson value of -0.035, which indicates a negative correlation that was non-significant. The significance value was found to be 0.274 which shows no significant correlation between the two variables

Table. 14. Correlation Between the Respondents' Academic Performance and Screen Time Watching Television during Non-School Days

		NonSchoolTv
Grade Average	Pearson Correlation	0.066
	Sig. (2-tailed)	0.268

	N	287

Table 14 shows the correlation between the students' academic performance and their screen time watching television during non-school days. Results revealed a 0.066 Pearson correlation, indicating that there was a positive correlation, however not significant. The significance value was found to be 0.268 and would also show that there was no significant correlation between the two variables.

Table. 15. Correlation Between the Respondents' Academic Performance and Screen Time Playing Electronic Games during Non-School Days.

		NonSchoolGame
Grade Average	Pearson Correlation	0.038
	Sig. (2-tailed)	0.521
	N	287

Table 15 displays the correlation between the respondents' academic performance and their screen time playing electronic games during non-school days. A Pearson correlation value of 0.038 was obtained, indicating that there was a positive correlation between the two variables although not significant. With a significance value of 0.521, there was no significant correlation found between the two variables.

Table. 16. Correlation Between the Respondents' Academic Performance and Screen Time Using Electronic Devices for Academic Purposes during Non-School Days.

		NonSchoolMobileD
Grade Average	Pearson Correlation	-0.039
	Sig. (2-tailed)	0.508
	N	287

Table 16 portrays the correlation between the respondents' academic performance and use of electronic devices for academic purposes during non-school days. Results showed a Pearson value of -0.039 correlation, a negative correlation that was considered negligible. The significance value was 0.508, which was outside the significance range indicating no significant correlation.

Table. 17. Correlation Between the Respondents' Academic Performance and Screen Time Watching Videos/Using Social Media during Non-School Days.

		NonSchoolSocMed
Grade Average	Pearson Correlation	-0.046
	Sig. (2-tailed)	0.434
	N	287

Table 17 presents the correlation between the respondents' academic performance and screen time watching television/using social media during non-school days. It shows a Pearson value of -0.046 which would show a negative correlation albeit non-significant. No significant correlation was found between the two variables according to the significance value (sig.=0.434).

Table. 18. Correlation Between the Respondents' Academic Performance and Physical Activity of the Respondents During the First Semester AY 2020-2021

		MET Minutes
Grade Average	Pearson Correlation	0.003
	Sig (2-tailed)	0.960
	N	287

Table 18 shows the result of the correlation between physical activity and academic performance of the 287 respondents. The Pearson correlation between the two variables was 0.003, showing a positive correlation that showed no significant correlation. The significance value was 0.960, also indicating that no significant correlation could be found.

3.3 Discussion

The study was conducted to assess the amount of sleep, screen time, and physical activity of 3rd year Medical Technology students during their first semester of online classes. As seen on Table 2, the average amount of sleep of respondents during school days was 6.67 hours and this was found to be below the 7-hour recommendation given by the CDC (2021) for healthy adults aged 18 and above [14]. On the other hand, the average amount of sleep of respondents during non-school days was 9.37 hours and this was within the 7-hour

recommendation of the CDC. Based on Table 4, respondents were found to have a shorter sleep duration during school days when compared to non-school days. This result was consistent with the study of Abdullah et al. (2015) who discovered that students suffered sleep deprivation when attempting to learn a large amount of information during a school day [20].

Respondents were found to fall asleep relatively quickly and lose little sleep if they were to wake up in the middle of the night, yet a majority of respondents admitted to receiving insufficient amounts of sleep on a regular basis. This was backed by the findings of Rose (2018) wherein college students would often have erratic sleep schedules, poor sleep quality, and poor sleep hygiene due to heavy academic workload [21]. As presented on Table 6, a large percentage of the participants received only 4 hours of sleep on a night prior to an examination. This finding was supported by the study of Raley, et al. (2016) wherein students were found to procrastinate and study the entire night before an exam which resulted in shorter sleep times [18]. Most of the respondents were found to frequently experience daytime sleepiness. Majority of them believed that their daytime sleepiness affected their academic performance. Bahammam et al. (2012) mentioned a similar finding in their study that increased daytime sleepiness affected the medical performance of students [23].

Attempting to assess the amount of screen time respondents would spend, Figures 3 and 4 showed that a majority of respondents did not watch television or play electronic games during school days. Meanwhile, Figures 5 and 6 showed that most respondents would spend more than 4 hours during a school day to use their electronic devices for academic purposes as well as watch videos or use social media which was beyond the recommended amount of screen time set by Zhang et al. (2017) of 2 hours screen exposure per day [15]. However, Nagata, et al. (2020) would argue that there was no specified universally accepted daily screen time limit, especially among university students [24]. During a day off, most respondents would not watch television or play electronic games as shown by Figures 7 and 8 yet spending more than 4 hours using their electronic devices for academic purposes and watching videos or using social media. This was similar to the trend found in Figures 5 and 6 wherein respondents were exceeding the recommended amount of screen time set by Zhang et al. (2017) [15]. The trend of increased screen time for academic performances would be in line with the results Nagata, et al. (2020) who found that excessive screen time among students was a result of the policies and laws implemented based on the situation during their time in which schools were obliged to conduct online classes in order to mitigate the spread of the pandemic [24].

According to the WHO, individuals aged 18-64 must perform at least 150 minutes of moderate-intensity physical activity throughout the week, or at least 75 minutes for vigorous physical activity [16]. However, in an effort to better analyze a person's physical activity status, the IPAQ uses a measurement in MET minutes to better quantify physical activity [20]. Table 8 shows the weekly MET minutes expended by respondents during their first semester. Based on the survey, it was found that a large fraction of the respondents was either moderately or highly active (82.23%) based on the IPAQ criteria. From this, the respondents have met the cut-off by both IPAQ's and WHO's standards for physical activity.

Sleep, according to Fonseca & Genzel (2019), was an important factor on the ability of the students to encode, consolidate, and recall the information to use it in different contexts [24]. This was greatly supported by Mattina (2019), noting that higher quality, longer duration, and greater consistency of sleep was directly associated with getting higher scores on quizzes and midterms examination [25]. However, this was not observed in the results in Table 9 showing no significant prediction of academic performance in board subject grades by amount of sleep on both school days (Sig. = 0.587) and non-school days (Sig. = 0.105). This contradicted the aforementioned findings regarding the relationship between the two variables.

Increased media use (e.g., watching televisions and surfing the social media) negatively affects student's academic performance (Zhang, et al., 2017) [15]. Al-Menayes (2015) also found the same which showed poor academic performance on college students who use social media more often [26]. These findings, however, are in contrast with the results obtained in Tables 10, 11, 12, and 13 which showed no significant correlation between the respondents' academic performance and the hours they spent on different screen activities during school days. Similarly, no correlation was established between the respondents' academic performance and the time they spent on different screen activities during non-school days, as presented in Tables 14, 15, 16, and 17.

Physical activity was found to improve academic performance of students by improving their attention, work memory, and executive functions (Cid, et al. ,2017), and by helping decrease depression, stress, and anxiety (S. Kayani et al., 2018) [27, 28]. A contrapositive result was found by Zhai, et al. (2020) where poor academic performance of students from three Chinese universities was related to low overall physical fitness [29]. In the same study, those who belonged to the group with high physical fitness had a lower odds ratio of low academic performance than those with low physical fitness. Table 18 showed that there was insufficient evidence to conclude a significant correlation between academic performance and physical activity (Sig. = 0.960). This contradicted previous studies that showed significant positive correlation between these variables.

In contrast to the many previous studies which proved that there was a correlation between academic performance to the amount of sleep, screen time, and physical activity of a student, this study has found no such significant correlation. Respondents who were found to sleep less, spend more time on a screen, or be less active seemed to not have been adversely affected with regards to their academic performance. This would not mean that there was no correlation between academic performance to the variables analyzed, but instead there was not enough data to sufficiently conclude that there was a significant relationship. It could be surmised from the findings that there may exist confounding factors that may have influenced the relationship between the independent and dependent variables. The contrasting findings could have been a result of different approaches to learning, especially with the present study being conducted in the era of enriched virtual learning. Rashid, & Ashgar (2016) arrived at findings which would support this implication as their research found that academic performance was only being indirectly affected by technology via self-directed learning [30]. As no significant correlation was found, creating a regression model which would predict the effects changing one variable would have on academic performance was not possible.

IV. Conclusion

In view of the foregoing findings of the study, this concludes that there are no significant correlations between the amount of sleep, screen time, and physical activity of third year Medical Technology students and their academic performance. The students' semestral averages seem to not have been affected with their sleep, screen time, or physical activity habits. Notwithstanding, the research cannot claim that there was no correlation between the studied variables. On the other hand, it implies that there was not enough data to sufficiently prove that there was a significant relationship between the variables and confounders that might have been present which the researchers failed to observe.

Further recommendations are made for future studies. First, the further investigation of the students' different study styles is recommended to better understand each student's learning processes and identify the underlying factors that affect and contribute to academic success. This would also help suggest the best practice strategies that the students can incorporate into their activities and assessments. Further research is also recommended to explore other confounding variables which may have impacted the outcome of the study. Second is the use of a different study design which would instead track the amount of sleep time, screen time, and physical activity of the participants instead of respondents inputting it themselves to capture a more truthful data. Third, participants of the study were limited to third year Medical Technology students of only one university. Deployment of the study to other universities would help future researchers to increase the diversity of the results. Therefore, including participants from other universities in the Philippines to be subjected to the study is highly recommended. Fourth, the findings only covered a particular age group. Therefore, additional studies could also be undertaken with respondents of varying age. Lastly, given that the study was conducted through an online survey with regards to online classes, a similar test could also be conducted at the time that traditional face-to-face classes resume to identify if there are similarities or differences in the outcome of the study.

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