
Correlative Study Between Student Attributes and Physical Activity During the COVID-19 Pandemic

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ABSTRACT

Physical activity is an important factor associated with the quality of life and healthy longevity. The occurrence of the COVID-19 pandemic led to community restrictions, which limited opportunities for physical activity, especially for university students who had to transition to an online academic set-up. This study aimed to determine the correlation of various student attributes, such as age, sex, height, weight, year level, student status, and college program, to physical activity during the COVID-19 pandemic in 2nd and 3rd year undergraduate students of FEU-NRMF. Eighty- nine (89) students from seven (7) different undergraduate programs completed the Personal Data Sheet (PDS), Healthy Lifestyle Screening Tool (HLST), and International Physical Activity Questionnaire - Long Form (IPAQ-LF). Results showed a positive correlation of height ($r=.231$, $p=.029$) and weight ($r=.213$, $p=.045$) to physical activity through the Spearman correlation, and a significant association of female sex ($p=.001$) and regular student status ($p=.000$) with high levels of physical activity through the Chi-square test. The study concluded that during the COVID-19 pandemic, female and regular students tend to have increased physical activity. Increased physical activity leads to increased weight through muscle gain, and taller individuals are found to be more active.

Key words: physical activity, Covid-19, undergraduate students, lifestyle, exercise

Physical activity (PA) is defined by the World Health Organization as any bodily movement produced by skeletal muscles that requires energy expenditure, and therefore includes all kinds of movement whether as light as commuting to and from work or as vigorous as a game of basketball.¹ A previous study classifies PA as sedentary behavior (SB) with ≤ 1.5 METs, low-intensity PA (LIPA) for METs between > 1.5 and < 3.0 , or moderate-to-vigorous PA (MVPA) with > 3.0 METs.² Meanwhile, the International Physical Activity Questionnaire divides PA into three levels: 1) high PA with ≥ 3 days/week of vigorous PA for $\geq 1,500$ MET- min/week, or a total of ≥ 3000 MET-min/week, 2) moderate PA with ≥ 3 days/week of vigorous PA 20 min/day or ≥ 5 days/week of

moderate PA 30 min/day or a total of ≥ 600 MET-min/week, and 3) low PA for people who do not meet the criteria for the two previous levels.³

PA is known to provide health benefits such as reducing the risk for acquiring non- communicable diseases such as coronary heart disease, stroke, type 2 diabetes, cancer, osteoarthritis, fractures, falls, depression, and dementia.⁴ Specifically, it lowers blood pressure and improves cholesterol levels, which are risk factors for heart disease and stroke.⁵ It also improves blood glucose control, physical fitness, endothelial function, insulin sensitivity, well-being, body defense system, and reduces blood lipid profile, insulin resistance, cardiovascular diseases (CVDs), insulin requirements, blood pressure (BP), and mortality in people with type 1 diabetes.⁶ Additionally,

it lessens the risk for developing type 2 diabetes by serving as a weight loss strategy to combat obesity which reduces diabetes incidence in people with prediabetes, as well as improve glycemic control of those with the condition.⁷ In an earlier study, it was also found that university students who engage in vigorous PA have less perceived stress and depression, and better subjective good health.⁸ College students, falling under the adult age group, are recommended to have a weekly aerobic PA of at least 150-300 minutes for moderate intensity, at least 75-150 minutes for vigorous intensity, or a combination of both, accompanied by strengthening exercises twice weekly.⁹

In December 2019, the world was rattled by the report of a new virus in Wuhan, China which quickly spread due to its high contagiousness and variable incubation period of 2-14 days.¹⁰ Classes were suspended, while work in the private sector continued and the public sector adapted flexible work arrangements.¹¹ On March 16, 2020, the administration placed the country in a state of calamity, which was again renewed in September 2020 and extended up to September 2021.¹² To adapt to the on and off community quarantines, lockdowns, and need for physical distancing, flexible learning through distance education was implemented nationwide for the academic year 2020 to 2021, as mandated by the CHED Memorandum Order No. 04 S. 2020.¹³ However, due to this set-up, a decrease in PA among students was observed, as evidenced by a significant decrease in the overall PA of university students in the Philippines during the COVID-19 pandemic in comparison to the time period prior to the pandemic, with a notable reduction of walking activities and a rise in sitting time on weekends.¹⁴ Another study also noted a decrease in the number of students with daily intentional exercises, irregular exercises, and thrice a week exercises, while students with no intentional exercise increased. In a week, university students spend <1 day of vigorous exercise, <2 days of moderate exercise, and a little over 2 days of walking for at least 10 minutes.¹⁵ Various factors, such as age, sex, year level, student status, height, weight, lifestyle, and school programs played a role in the level of PA of university students before the pandemic.^{16,17,18,19,20,21,22,23} This is the trend pre-pandemic. There is low evidence in the current literature about the level of PA of students during pandemic. This is why the current study aims to determine the correlation between PA and the aforementioned factors in 2nd and 3rd year

undergraduate students of FEU-NRMF during the COVID-19 outbreak.

Review of Literature

A previous research reported that more than one-fourth of adults across the globe engage in inadequate PA in 2016, and this trend has not significantly improved from 2001 to 2016. East and Southeast Asia have an overall prevalence of 17.3% insufficient PA, with the Philippines having the maximum prevalence at 39.7%.²⁴ A systematic review has found a significant decrease in university students' PA levels during the pandemic compared to the pre-pandemic period.²⁵ Another study also discovered that among undergraduate students, 13.70% were inactive, while 27.76%, 41.29%, and 17.24% were under low, moderate, and high PA, respectively, where most of the students engaged in leisure PA (90.98%), transport-related PA (93.10%), and domestic-related PA (74.80%), and spent an average of 53.32 hrs/week and 7.61 hrs/day sitting.²⁶

Risk Factors

Age

In the Philippines, the Global Health Observatory records the prevalence rate of insufficient PA in 2016 of school going adolescents aged 11 to 17 years old to be 93.41%, with 92.76% prevalence in males and 94.11% in females.²⁷ Meanwhile, adults aged ≥ 18 years old have a prevalence of 39.66%, with 30.13% in males and 49.08% in females.²⁸ GHO pertains to insufficient PA as the inability to meet the WHO recommendations for PA among different age groups.

Sex

An earlier study found that male university students are deemed more physically active than female students, especially in their leisure time, and are more physically fit as evidenced by better scores in vertical jump, curl-ups, and aerobic output.²⁹ Similarly, females showed lower minutes/week and MET-minutes/week in both moderate and vigorous PA, less number of days walking for at least 10 minutes and MET-minutes/week in walking, and more hours per weekday spent sitting compared to males during the COVID-19. However, both genders

showed a decrease in parameters during the pandemic compared to the pre-pandemic period.³⁰

Year Level

A study mentioned that 84.8% of fourth year students who participated in the study were inactive, followed by the third year students (76.5%), second year students (66.5%), and lastly, the first year students (62.5%).³¹

Student Status

There are advantages and disadvantages of being an irregular college student. But one misconception or misunderstanding is related to the workload and schedule of an irregular student. According to one study, one overlooked disadvantage of being an irregular student is having a full schedule and encountering conflict with schedule.³² Previous research studied various students' barriers to physical activity in different dimensions such as emotional, cognitive, psychological, and environmental.³³ It was found out that the environmental aspect was associated with a lower level of physical activity. And it was also believed that the students with full-time study is considered a barrier to having physical activity, which affects physical activity negatively and leads to longer exposure time to sedentary behavior.³³

Weight

Past studies claimed that there are strong significant relationships between students' BMI, level of physical activity, and lipid profile.³⁴ Another study stated that maintaining a high level of activity into young adulthood, especially in women, may reduce weight increase as young adults enter middle age.³⁵ Furthermore, physical activity was only linked to decreased weight gain among women eating a typical diet when their BMI was under 25. Over the course of the trial, women who were successful in maintaining a healthy weight and gaining no more than 2.3 kg did moderate-intensity activity for an average of about 60 minutes each day.³⁶

Height

A study discovered that there was a positive and substantial correlation between weight and height in

PA. In this case, a study claimed that the Physical Fitness Index (PFI) was higher for respondents who were taller than 170cm than for subjects who were shorter than 170cm; the small stature is the cause.³⁷ Subjects who were under 170cm have increased muscle fatigue. Similarly, subjects under 70kg exhibit high PFI as a result of having to raise more weight during the stepping process. Moreover, through its stimulatory effects on Growth Hormone (GH) and other anabolic hormone release, exercise can aid in stature growth and is a crucial stimulant for reparative growth.³⁸

Body Mass Index (BMI)

In a previous study, it was stated that obese and overweight individuals are engaged more in PA. Another study states that there are various physiological benefits on a person's BMI that occur with increased PA.

Lifestyle

Unhealthy behaviors, such as sedentary lifestyle and insufficient intake of healthy food, and specifically, intake of dairy food, were seen in the students.³⁹ College students are seen to fall short of the recommended guidelines for PA.⁴⁰ They are seen to participate in low PA, high level of sedentary behavior, and do not meet the recommendation for vegetable and fruit intake.

College Program

According to one study, the undergraduate Physiotherapy students do not engage in adequate physical activity.⁴¹ Benefits associated with high PA related to physical performance and barriers associated with low PA scores related to physical exertion are associated with undergraduate Physical Therapy students. During lockdown, physiotherapists and students reduced physical activity by 48% and energy expenditure by 49% compared to pre-lockdown.⁴²

Physical Activity

According to previous research, numerous factors, including closing of gyms and recreational centers, decreased access to outdoor areas, and adjustments to daily routines brought on by remote learning, may be

responsible for the decline in physical activity levels.⁴³ The COVID-19 pandemic has affected many facets of daily life, including college students' physical activity habits which have changed as a result of remote learning and social isolation strategies, which may have had an impact on how active they are.⁴⁴

During COVID-19 pandemic, providing physical activity opportunities to students is essential because as students who participate solely in remote learning showed to have decreased physical activity, decreased time spent outside, less social time with friends, and worsened emotional and mental health as compared to those who participate in hybrid or fully in-person learning.⁴⁵ Nowadays, technologies such as videos, wearable sensors, online communication or smartphone applications with guided exercise programs could all be used to facilitate children's physical activity while they're staying at home.^{46,47,48,49,50}

Purpose of the Study

Students

Students will benefit by giving more importance to physical activity, which can contribute not only to a healthy lifestyle but also to their academic performance.

Educators

Educators may utilize the study for promoting positive behavior of students towards physical activity at school and at home. Educators can be aware of the extent of influence they should provide to their students.

Parents

As parents, they are aware of their impact on how their child may behave towards physical activities and this study may influence how they will perceive their role in terms of their child's involvement in physical activities. They may either motivate their children to increase physical activity at home or act as a role model instead of convincing their child, which may seem to be more effective.

School Administrators

School administrators may benefit from this study to understand the decline of physical activities of

students and how they can implement a more effective program to encourage an active lifestyle at home and within the school premises.

Future Researchers

Researchers can use this study as a reference for future research under the same context.

Problem Statement

1. What are the demographic characteristics of the FEU-NRMF 2nd and 3rd year undergraduate students in terms of: age; sex; weight; height; year level; student status; lifestyle and college program?
2. What is the level of physical activity of the 2nd and 3rd year undergraduate students of FEU-NRMF during the COVID-19?
3. What is the correlation of the aforementioned student attributes to the physical activity of the 2nd and 3rd year undergraduate students of FEU-NRMF?

Hypothesis

Ho: There is no significant correlation between confounding variables and physical activity during the COVID- 19 pandemic

Ha: There is an association between confounding variables and physical activity during the COVID-19 pandemic

Theoretical Framework

Goal Setting Theory

The Goal-Setting Theory was defined by Locke as what an individual is trying to accomplish or the aim of one's action. This theory states that goals that are distinct, precise, and difficult are more motivating than goals that are general or simple.⁵¹ According to this theory, task performance and goal setting are fundamentally related. It states that specific and challenging goals along with useful feedback help people do tasks more effectively. To put it simply, goals inform and steer an individual as to what has to be done and how much effort must be expended. Motivated individuals are better at achieving their objectives compared to those who are not motivated.

In the context of the study, the GST may be used to determine the students' motivation and self-efficacy during the COVID-19 pandemic and how that affects their level of physical activity. The Goal-Setting Theory served to explain human behavior in specific scenarios or situations.

Dynamic Systems Theory

The Dynamic Systems (DS) theory explains how innovative forms emerge within a complex system's inner workings and how these new forms arrange into useful patterns that serve the system. Since researchers are particularly interested in learning how new forms, functions, and organizational patterns emerge as humans evolve, this theory is appropriate in life-span human development studies. In addition, this theory understands that developmental systems function within a larger environmental context and change within that setting. It recognizes that hierarchies are how systems are structured, that hierarchies can be discovered within a system, and that the system itself might be a subset of a bigger hierarchy.⁵²

In relation to the study, how a student's PA was affected by the COVID-19 pandemic is the dynamic system. Interactions among other variables such as their year level, age, sex, residence location, student status, college program, weight, height, and lifestyle of the student also created a dynamic system in which of these variables influences or shapes one's behavior.

Ecological Theory

It explains the subject as an active explorer of his/her environment, and these exploratory efforts are what allow the subject to develop multiple ways of performing the task discovering the best solution for it, given the set of limitations.⁵³

International Classification of Functioning, Disability and Health (ICF)

The International Classification of Functioning, Disability and Health (ICF) is a framework created by the World Health Organization that deals with functioning and disability, in relation to the person's health condition/s, environmental factors, and personal factors. It is applicable to all kinds of people, and places all conditions on equal ground by focusing

on the level of functioning it causes, rather than the medical diagnosis itself.

In the context of this study, the ICF model may be used to determine which factors are present or may be caused by the COVID-19 pandemic, which resulted in the level of physical activity of students. Specific activity limitations and participation restrictions that occurred during the time period will also be noted, thus giving a clearer picture of how the pandemic affected the physical health of students.

The simulacrum is presented in Figure 1. This shows the relationship between personal risk factors and physical activity. It also presents the effect of COVID-19 in physical activity.

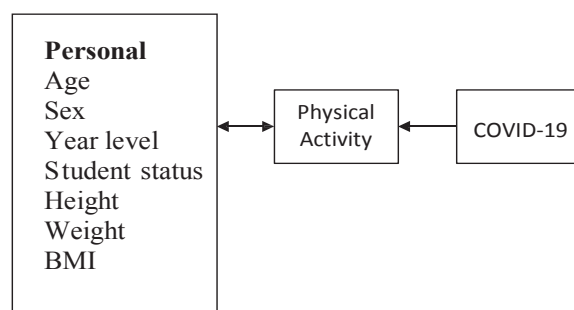


Figure 1. Research simulacrum of the study.

MATERIALS AND METHODS

Design

This study utilized a quantitative, correlational research design to determine the Physical Activity of FEU-NRMF students during COVID-19 Pandemic and whether it varies across age, sex, and year level. This design was based on Social Cognitive Theory, which emphasizes the social influence, external and internal social reinforcements considering a unique way in which a subject can obtain control while also assessing the social environment. Social Cognitive Theory adds a construct of self-efficacy that includes: Reciprocal Determinism, which refers to the dynamic, interactive interaction of people, environment, and actions/behavior; Behavioral Capability, which pertains to a subject that can carry out actions through basic knowledge and skills; Observational Learning or "modeling" behavior, which shows that the subject can spectate and examine the behavior of others and more importantly imitate those behaviors;

Reinforcements, which refers to an internal/external reaction to an individual's behavior that affects their probability to stop or continue a certain behavior; expectations, which pertains to the expected result of an individual's action and; self-efficacy, which refers to an individual's self-confidence on how to perform an action successfully.⁵⁴

Research Locale

This study was conducted at Far Eastern University-Nicanor Reyes Medical Foundation (FEU-NRMF). This site was chosen because of accessibility and availability of subjects.

Research Subjects

A total of 89 FEU-NRMF undergraduate students of the different schools were recruited to participate in this study. The participants from each school were: 8 from the School of Nutrition and Dietetics, 14 from the School of Medical Laboratory Sciences, 14 from the School of Nursing, 14 from the School of Physical Therapy, 13 from the School of Respiratory Therapy, 13 from the School of Pharmacy and 13 from the School of Radiologic Technology. This sample size was based on the statistics that 93.4% of Filipinos are not taking part in any PA, at a 95% confidence interval plus a 10% attrition rate using the Epi info formula EPI info™ software.⁵⁵

Inclusion

Included were students who 1) are 2nd or 3rd yr undergraduates, 2) are enrolled at FEU-NRMF during A.Y. '22-'23, 3) provided valid informed consent prior to the study.

Exclusion

Subjects who 1) refused to give informed consent, 2) took a leave of absence (LOA), 3) enrolled at the Medicine Program, or 4) is already a graduate were excluded from the study.

Research Instruments

The researchers distributed a questionnaire online via Google Forms to gather data from 2nd year and 3rd year BS undergraduate students who are enrolled in FEU-NRMF (A.Y. 2021-2022). The

evaluation tools used in this study were Personal Demographic Sheet (PDS), International Physical Activity Questionnaire-Long Form (IPAQ-LF), and Healthy Lifestyle Screening Tool (HLST).

Personal Demographic Sheet

PDS was distributed to the participants in order to gather confounding variables such as: age, sex, year level, college program, student status, height and weight. These characteristics of the participants are very important for this research's objective.

Healthy Lifestyle Screening Tool

HLST includes various aspects of lifestyle and assessment resulting in a score that indicates healthy or risky lifestyle behaviors needed for health promotion. However, the score used from this tool was not validated. HLST measures nine independent dimensions of a healthy lifestyle; however, it does not measure psychosocial characteristics. The validity of HLST was described based on the content validity and MIIC.⁵⁶ The HLST has an acceptable Cronbach's Alpha of 0.71 which is between the acceptable range of alpha (0.70 and 0.90). A standardized tool like HLST is open access and is free to use. High scores acquired in the HLST indicate a healthier lifestyle.

International Physical Activity Questionnaire - Long Form

The IPAQ is a 27-item self reported measure of PA for use with individual adult participants aged 15-69 years old.⁵⁷ There are two forms of output from scoring the IPAQ. Results can be reported in categories (low activity levels, moderate activity levels or high activity levels) or as a continuous variable (MET minutes a week). MET minutes represent the amount of energy expended carrying out PA. In a meta-analysis conducted, it revealed that assessment of moderate-to-vigorous PA (MVPA) is the most relevant PA level outcome while test-retest reliability was moderately high (rw = 0.74), moderate for the criterion (rw = 0.41), and moderately-high for concurrent validity (rw = 0.72). Reporting of methods and results of the studies was poor, with an overall moderate risk of bias with a total score of 1.43. IPAQ instruments are encouraged to be used for purposes such as research and monitoring. The amount of physical activity is categorized into:

- a. Low/inactive: does not meet criteria for categories 2 or 3
- b. Moderate: meets one of the following
 - i. 3 or more days with at least 20 minutes of vigorous activity
 - ii. 5 or more days with at least 30 minutes of moderate- intensity activity or walking
 - iii. 5 or more days of any combination of walking, moderate-intensity, or vigorous intensity activities with at least 600 MET- minutes/ week
- c. High: meets one of the following
 - i. 3 or more days of vigorous- intensity activity and at least 1500 MET-minutes/week
 - ii. 7 days of any combination of moderate- intensity or vigorous intensity activities with at least 3000 MET- minutes/week

Activities with METs between 3 and 6 are considered to be moderate-intensity while activities > 6 METs are vigorous-intensity.

Data Gathering Procedure

The researchers created the PDS, merge it with the IPAQ and HLST, and create an electronic form that served as the survey form. The study was reviewed for approval by the Institutional Ethics Review Center (IERC). Once cleared by the IERC, the researchers requested the approval from the deans of the different schools under FEU- NRMF for the implementation of the study to their respective students. Upon obtaining approval from the deans, the researchers disseminated the questionnaires through the Astra email addresses of the students. Informed consent was sent to every subject at the start of the study. After 1 week, the form closed and data gathered were analyzed. The list of participants was provided by the Data Privacy Officer (DPO).

The subjects were selected via purposive sampling, which involves personal judgment of the researchers that needs to be used to choose cases that helped the study meet its goals.⁵⁸ The researchers inquired about the list of enrolled undergraduate students in the A. Y. 2022-2023 from the Data Privacy Officer (DPO). Upon receipt, the researchers disseminated a two-part Informed Consent Form, containing an information sheet and a certificate of consent, via Astra email. Students who were willing to participate read and accomplished the form, before answering the survey questionnaire.

Ethical Considerations

The researchers requested the Institutional Ethics Review Center of FEU-NRMF to evaluate the ethical standards that should be considered in completing this study.

1. **Conflict of Interest**
The researchers of the study had no conflict of interest to disclose and do not face any competing obligations.
2. **Vulnerability**
Although participants of the study are not categorized under the vulnerable group which consists of children, pregnant women, mentally disabled persons, economically and educationally disadvantaged, some might have felt discomfort in answering the questions.
3. **Anticipated Risks and Discomforts**
Participants might have been uncomfortable sharing their information to the researchers and tended to give mistaken information. The researchers did not disclose any information to those not involved in the study.
4. **Expected Benefits to the Subject, et al.**
This study will help participants and further studies to understand the PA level of the students during the COVID-19.
5. **Sharing of Results**
A copy of the participant's response in the Google Forms was sent through a private email once he is done answering.
6. **Assurance of Confidentiality & Anonymity**
The researchers informed the participants that all of their responses will be kept confidential. Since this study required them to answer questionnaires online consent form was provided before proceeding with the interview. The researchers assigned unique codes, in place of their name, to maintain confidentiality. All of their responses were also kept confidential and used solely for the purpose of this study. The gathered data were kept for 1 year, after which all electronic data will be permanently deleted from every database and storage device, and any physical copies will be shredded.

7. Community Considerations

The students will benefit by giving more importance to physical activity, which can contribute not only to a healthy lifestyle but also to their academic performance. The educators may utilize the study for promoting positive behavior of students towards physical activity at school and at home. Educators can be aware of the extent of influence they should provide to their students. The school administrators may benefit from this study to understand the decline of physical activities of students and how they can implement a more effective program to encourage an active lifestyle at home and within the school premises.

Data Analysis

Descriptive statistics like mean, median, mode, and standard deviation were used to summarize the subject's characteristics. Associational or correlational statistics like Chi square, SpearmanRho correlation were used to determine the relationship between confounding variables and physical activity were IBM® SPSS® Statistics 26 was used. The confidence level of this study is 95%.

RESULTS

There were one hundred and ninety-five (195) respondents during the study implementation and all consented to participate. They were given random numbers using the Excel application, and were arranged from lowest to highest. Those in the lowest of each program were selected for the study.

In the eighty-nine (89) respondents of the study, the majority of the respondents are females, 2nd year students, and regular in student status. The mean age of the participants is 20.82 ± 1.77 , height is 160.24 ± 8.67 in centimeters, weight is 63.15 ± 16.47 in kilograms, and BMI is 24.37 ± 5.17 . Lifestyle was assessed using the HLST 90.11 ± 13.88 , the total score of HLST is 148, the cut off score of the tool is 98. This reveals that the majority of the respondents fall below the cut-off score, which signifies a low healthy lifestyle. Physical activity of the respondents was assessed using IPAQ with most of the respondents having high PA.

The correlation between the Student Characteristics and Physical Activity is shown in table 2. Chi-square revealed a statistically significant association between PA and Sex ($p=.001$), and Student Status ($p=.000$).

Spearman correlation revealed a statistically low positive correlation between PA and height ($r=.231$, $p=.029$), and weight ($r=.213$, $p=.045$). All other characteristics show no significant association or correlation.

Table 1. Demographic characteristics of students. (N=89)

Age (mean $\pm$ SD)	20.82 $\pm$ 1.77
Sex (no. of female)	60
Year Level (no. of 2nd year)	49
Program	
Physical Therapy	14
Pharmacy	13
Respiratory Therapy	13
Nursing	14
Medical Laboratory Science	14
Nutrition and Dietetics	8
Radiologic Technology	13
Student Status (no. of regular students)	62
Height in cm (mean $\pm$ SD)	160.24 $\pm$ 8.67
Weight in kg (mean $\pm$ SD)	63.15 $\pm$ 16.47
BMI (mean $\pm$ SD)	24.37 $\pm$ 5.17
Lifestyle (HLST)* (mean $\pm$ SD)	90.11 $\pm$ 13.88
Physical Activity (IPAQ)**	
High	63
Moderate	7
Low	19

*-Healthy Lifestyle Screening Tool

**-International Physical Activity Questionnaire

Table 2. Correlation between student characteristics and physical activity

	r	p*
Age	.069	.523*
Sex		.001**
Year Level		.340**
Program		.905**
Student Status		.000**
Height	.231	.029*
Weight	.213	.045*
BMI	.198	.063*
Lifestyle	-.199	.062*

p value = <.05

*Spearman rho

**Chi-square

DISCUSSION

The result of this research is supported by a recent study which revealed that female university students had an increase in time spent on specific physical activities, such as strength exercise, HIIT, and mind-body activities, compared to males, who had a decrease in various aspects of PA, and an increase in sedentary time and leisure screen time during the pandemic.⁵⁹ Similarly, another study also found that women, in contrast to men, had a significant increase in the total minutes of PA per week during the COVID-19 lockdown compared to pre-pandemic.⁶⁰ Moreover, another study reported that a higher percentage of women increased their levels of PA during the outbreak.⁶¹ Contrary to these studies, it was revealed in a study conducted before the pandemic that male students of a Philippine university are more likely to engage in vigorous PA and have a longer duration and higher MET-min/week in moderate PA compared to female students.⁶²

Associations of height and PA are backed by a previous study which reported that taller individuals have a higher level of PA both before and during the COVID-19 outbreak, especially in urban areas.⁶³ Likewise, there is another study which stated that subjects who are $>170\text{cm}$ have increased physical fitness score than $\leq 170\text{ cm}$.⁶⁴ This is similar to a recent study which discussed that physical fitness was related to height and body weight in the different obesity age groups.⁶⁵

A study also backs the results by reporting that participants with a higher weight are significantly better in strength exercises, more intrinsically motivated, and less motivated to do strength exercises compared to aerobic exercises. Furthermore, heavier people enjoy strength exercises more than normal-weight people.⁶⁶ Strength training also has several advantages, including an increase in lean body mass, improvement in metabolic rate, increase in bone density, a reduction in the risk of injury, and the ability to replenish muscle tissue.⁶⁷ As opposed to these studies, a study discussing the role of PA for weight loss and weight maintenance proved that weight loss and fat mass reduction occurred with aerobic training to a more significant degree than with resistance training after the 8-month trial; adding resistance training did not enhance the change in total body mass compared to aerobic training alone.⁶⁸

The results were reinforced by a previous study, which revealed that students with more time in

studying also allot more time in performing physical activities, such as strength exercise, as compared to individuals with less time studying.⁶⁹ In contrast, most literature mentioned that individuals with full-time academic workload have less ability in committing to PA due to less leisure time and time to explore other interests outside the academy.⁷⁰ Another study states that barriers to PA such as increase in workload resulted in less PA.³³

CONCLUSION

In conclusion, the physical activity of college students during COVID-19 has been greatly affected. In particular, females were seen to be more engaged in physical activity by spending time performing strength exercise, HIIT, and mind-body exercise; as opposed to a study that occurred pre-pandemic that states that males are more likely to participate in PA. Taller individuals and increased body weight are also found to be more active in PA. They produce more energy most especially in strength exercises. The increase in BW is seen to be an increase in muscle mass. Full-time students were also seen to be more committed in PA. Despite most of their time being spent in studying, they also allot time for their PA. Most literature states the opposite of the findings of the study in which individuals with increased workload participate less in PA.

RECOMMENDATIONS

For future studies regarding the correlation between physical activity and attributes of students, the researchers recommend having an equal number of participants in both female and male sex to avoid gender bias. Aside from discussing the correlation of student attributes and PA, it is also recommended that comparison of the PA level of the college students pre-, during, and post pandemic should also be applied.

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