



UNIVERSITI PUTRA MALAYSIA

***FACTORS ASSOCIATED WITH LEVEL OF PHYSICAL ACTIVITY
DURING COVID-19 PANDEMIC AMONG STUDENTS IN UNIVERSITI
TEKNOLOGI MARA SHAH ALAM***

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FPSK3 2021 11**

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**BY
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A project submitted as a partial fulfillment of the requirement for the degree of
Bachelor of Science (Nutrition and Community Health) from the Faculty of Medicine
and Health Sciences, Universiti Putra Malaysia

Supervisor's Signature

The project entitled “Factors Associated with Level of Physical Activity During COVID-19 Pandemic among Students in Universiti Teknologi MARA Shah Alam” was prepared by Nur Suhaila binti Yusop and submitted to the Faculty of Medicine and Health Sciences as a partial fulfillment of the of the requirement for the degree of Bachelor of Science (Nutrition and Community Health) from the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

Received and examined by:

(Assoc. Prof. Dr Hazizi Abu Saad)

Date: 30 Sep 2021

ACKNOWLEDGEMENT

All praise is due to Allah, Lord of the worlds, the Almighty, whose Grace and Mercies have been with me throughout these four years of degree. Although, it has been tasking, His Mercies and Blessings on me ease the laborious task of completing this thesis. I am most indebted to my supervisor, Assoc. Prof. Dr Hazizi Abu Saad, who's inspired me to the successful completion of my work. I put on record and appreciate his detailed and insightful comments, useful suggestions and inspiring queries which have considerably improved this thesis. Despite his commitments, he sacrificed his time to guide me whenever requested.

I am also grateful to my friends, Nur Azznizza Mohd Abd Razak and Farah Raihana Ghazi whose always give support, and cooperation contributed to the outcome of this work. Not forgotten all my friends who always spread the positive vibes and keep me motivated whenever I feel down.

Lastly, my gratitude goes to my beloved parents, Mr. Yusop bin Abdurrahim and Madam Norfajariah binti Abdullah and siblings for their prayers, understanding and support while away.

Once again, we glorify Allah for encompassing His endless mercy throughout our life and enabling me to successfully complete this full thesis. He is the Entirely Merciful, the Especially Merciful.

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ABSTRACT

FACTORS ASSOCIATED WITH LEVEL OF PHYSICAL ACTIVITY DURING COVID-19 AMONG UNIVERSITY STUDENT IN UITM SHAH ALAM

Nur Suhaila Yusop

This cross-sectional study aimed to determine the factors associated with level of physical activity during COVID-19 among undergraduate students aged 18-26 years. A sample of 171 students from Universiti Teknologi Mara Shah Alam (n = 171; 37 males; 134 females) participated in this study. The respondents were selected by using a simple random sampling among students of the Faculty of Applied Sciences. A self-administered online questionnaire was used to gather information regarding their socio-demographic characteristics, social support, level of stress, anxiety, and depression, home safety, sedentary lifestyle, and physical activity level. The majority of respondents (61.4%) were classified as having a low physical activity, followed by vigorous (28.7%) and moderate physical activity (9.9%). The findings of Pearson Correlation showed that there was a significant relationship between family support and physical activity level ($r = 0.247, p = 0.001$). However, there were no significant relationships between friend support ($r = 0.147, p = 0.055$), stress ($r = -0.36, p = 0.641$), anxiety ($r = -0.49, p = 0.527$), depression ($r = -0.023, p = 0.767$), home environment ($r = 0.010, p = 0.899$) and sedentary lifestyle ($r = 0.082, p = 0.283$) with physical activity levels. This study showed that family played an important role and associated with physical activity level during this COVID-19 pandemic. More research needs to be conducted among students during this pandemic to gain a more reliable data on factors associated with physical activity level.

ABSTRAK

FAKTOR YANG BERKAITAN DENGAN TAHAP AKTIVITI FIZIKAL SEMASA COVID-19 DALAM KALANGAN PELAJAR UNIVERSITI DI UITM SHAH ALAM

Nur Suhaila Yusop

Kajian keratan rentas ini bertujuan untuk mengenal pasti faktor yang berkaitan dengan tahap aktiviti fizikal semasa pandemik COVID-19 dalam kalangan pelajar sarjana berusia 18-26 tahun. Sejumlah 171 pelajar dari Universiti Teknologi Mara Shah Alam ($n = 171$; 37 lelaki; 134 perempuan) telah mengambil bahagian dalam kajian ini. Responden dipilih dengan menggunakan persampelan secara rawak dalam kalangan pelajar Fakulti Sains Gunaan. Soal selidik dalam talian yang dikendalikan sendiri digunakan untuk mengumpulkan maklumat mengenai ciri sosio-demografi sokongan sosial, tahap tekanan, kegelisahan, kemurungan, keselamatan rumah, gaya hidup tidak aktif dan tahap aktiviti fizikal. Majoriti responden (61.4%) diklasifikasikan mempunyai aktiviti fizikal yang rendah, diikuti oleh aktiviti fizikal yang kuat (28.7%) dan sederhana (9.9%). Penemuan Korelasi Pearson menunjukkan bahawa terdapat hubungan yang signifikan antara sokongan keluarga dan tahap aktiviti fizikal ($r = 0.247$, $p = 0.001$). Walaubagaimanapun, kajian ini menunjukkan tiada hubungan yang signifikan antara sokongan rakan, tekanan ($r = -0.36$, $p = 0.641$), kegelisahan ($r = -0.49$, $p = 0.527$), kemurungan ($r = -0.023$, $p = 0.767$), persekitaran rumah ($r = 0.010$, $p = 0.899$) dan gaya hidup tidak aktif ($r = 0.082$, $p = 0.283$) dengan tahap aktiviti fizikal. Kajian ini menunjukkan bahawa keluarga memainkan peranan penting dan sokongan keluarga sangat berkaitan dengan tahap aktiviti fizikal semasa pandemik COVID-19 ini. Lebih banyak penyelidikan yang perlu dilakukan dalam kalangan pelajar universiti semasa wabak ini untuk mendapatkan data yang lebih dipercayai mengenai faktor yang berkaitan dengan tahap aktiviti fizikal.

CHAPTER 1

INTRODUCTION

1.1 Background

Cardiovascular disease, diabetes, and some cancers can be prevented and reduced by increasing physical activity. It can also improve musculoskeletal and mental health. In certain countries, less and less physical activity is happening. Globally, 23% of adults and 81% of school-going adolescents are not sufficiently involved in physical activity (WHO, 2018).

The prevalence of physical inactivity is increasing in many countries, including Malaysia, according to WHO NCD country profiles (2018). A study in 2014 found that only 56.2% to 64.3% of Malaysian adults were physically active (Leong et al., 2014). In the latest National and Health Morbidity Survey in 2019, 1 in 4 adults in Malaysia is not physically active (IPH, 2020). In 2016, the prevalence of insufficient physical activity among Malaysian adults aged 18 years old and above was 38.75% (WHO, 2016). These statistics showed that physical inactivity should be considered as one of the public health concerns in Malaysia.

According to World Health Organization 2020 guidelines on physical activity and sedentary behavior, it is recommended that for adults aged 18 to 64 years, approximately 150 to 300 minutes per week of moderate-intensity physical activity, or approximately 75-150 minutes per week of vigorous-intensity physical activity, or an equivalent combination of moderate-intensity and vigorous-intensity activity should be practiced (WHO,2020). Adults should increase their moderate-intensity physical activity to 300 minutes or do more than 150 minutes of vigorous-intensity aerobic physical activity for extra well-being benefits (WHO, 2020).

This study mainly focused to university students because it was generally agreed that university environment is a setting with much more important benefits and easier opportunities for students to improve physical activity. However, the lack of proper structure in physical education, health promotion, and awareness activities in universities, unlike in primary and secondary schools, makes students most often neglect the possibilities of using the available facilities effectively (Goje, Salmiah, Ahmad & Jusoff, 2014).

A cross-sectional study among students at the Silesian Medical University in Poland reported that the recommended level of physical activity is not met by medical students. Most of these students were classified as having a moderate level of physical activity (Dabrowska-Galas, Plinta, Dabrowska & Skryzpulec-Plinta, 2012). A different study showed that the physical activity level of students was found to be satisfactory, although the percentage of low physical activity levels was

found to be higher in female students. (Roshini, Karthikeyan & Lola, 2015). Next, University students have more significant opportunities for establishing health-promoting behaviors. On the other hand, students also may adopt sedentary lifestyles with the abandonment of routines (Yeong Ja & Yeong Mi, 2019).

The outbreak of COVID-19 disease was declared as a global health emergency by the World Health Organization (WHO) on 30th January 2020, and a global pandemic was announced on 11th March 2020. Lockdowns of home detention and social distancing have been implemented to reduce overwhelming health services due to the overrising number of reported cases (Jiang et al., 2020). Thus, this new norm may give the possibility of increasing the prevalence of low level of physical activity, especially among university students.

Most university students do not have physical classes during this pandemic as they used an online platform instead. This new norm has changed their daily activity they used to be as a university student before the pandemic hit the world. Besides, this new norm may give culture shock, and to be more worsen, it could make someone be stress or anxious or depressed. The presence of stress, anxiety, and depression may affect their level of physical activity. For the first three months of home confinement, no one can go out from home at all. This norm may become one reason students cannot do physical activity as they do not have accessibility to the gymnasium or any sports center.

1.2 Problem Statement

Physical activity is characterized as any real development created by skeletal muscle that results in energy expenditure. Physical activity has been used to quantify and describe physical activity according to its type, frequency, duration, and intensity. In order to avoid and minimize mortality from cardiovascular disease, diabetes, and certain cancers and to improve musculoskeletal and mental health, physical activity is considered a significant modifiable factor (WHO, 2014).

University and college years represent an important opportunity for students to learn about healthy lifestyles and enhance nutritional awareness (Maryam & Farouk, 2016). A study conducted in 2018 among Unisza students showed that most of the students (65%) recorded less than the average steps count per day, which was sedentary, where only 1% of the subject was classified as highly active (Yusoff et al., 2018). Another study conducted among health sciences students at Universiti Sains Malaysia showed the average duration of physical activity was 57.34 min per week (Garry et al., 2019). It does not meet the recommendation by

World Health Organization. These results have shown that physical inactivity is a public health concern for adults, especially university students in Malaysia.

Physical activity level also may be affected by psychosocial factors such as social support and mental health problems. Social support is essentially coming from family and friends. Based on prior study, families and friends who were not interested in being active represented a barrier to physical activity (Gómez-López, Gallegos & Extremera, 2010). Support from family members and partners, friend support appears to play an important role in involvement in physical activity (Cerin, Leslie, Sugiyama & Owen, 2010). Participants have frequently neglected physical exercise because families were uninterested in being healthy (Anjali & Manisha, 2018). Initially, lack of social support has high possibility to affect the prevalence of physical inactivity among participants in this study based on previous studies.

Other factor that will be identified through this study is psychosocial factor that includes level or the presence of stress, anxiety, and depression. A study in 2018 states that, in students, academic tasks, social pressure, relationships generated stress and anxiety that affected their attitudes in physical activity (Anjali & Manisha, 2018). Recent study conducted during the quarantine because of COVID-19 Pandemic showed that anxiety, stress, and depression are prevalent worldwide. The results showed that participants aged 18–24, females, and non-marital relationships experienced stress, anxiety, and depression while students mostly experienced anxiety and depression (Syed Mustafa et al., 2020). This proved that the current uncertainty surrounding had triggered mental health problems includes anxiety and depression in certain groups which affect their level of physical activity.

While individual factors are significant, social and community or environmental variables often influence physical activity. Personal barriers and environmental barriers were selected as the highest barriers by the participants which 52% and 37% respectively. Safety, lack of suitable settings/programs, access-related issues, dogs, disrespectful comments, and much more were most of the environmental barriers. Some even indicated there were no parks available in the areas (Anjali & Manisha, 2018). Neighborhoods with higher perceived walkability, active transport facilities, and park and playground access are often associated with more active residents (Gerald et al., 2018). This study will identify how the environmental factor affect the physical activity level among university students especially during this pandemic.

There are few studies conducted in Malaysia during pandemic on current physical activity level among students and there were inconsistent findings before this pandemic. Recent study conducted among students in Universiti Malaysia Sarawak (UNIMAS) showed that majority of the students were active (74.1%), and only a small percentage of the students were less active (25.9%) (Stephan et al., 2021). Other recent findings revealed that 79.6% of Malaysians were physically active during the confinement (Tan, Tan & Tan, 2021).

Somehow these recent studies were contrast with studies before pandemic, for instance Yusoff et al., (2018) found that majority students in Universiti Sultan Zainal Abidin (UniZA), 65% did not meet the recommended physical activity level. In addition, other study conducted among students in Universiti Sains Malaysia by Garry et al. (2019) showed that the average duration of physical activity level was only 57.34 mins per week.

Vigorous physical activity and walking were significantly decreased after the

COVID-19 outbreak. In contrast, both times spent on sedentary activity and sleep durations increased significantly (Chen et al., 2020). Some researchers thought that inactivity and a rise in sedentary behaviors would be triggered by lockdown and that steps would have to be taken to avoid these consequences. People changed their habits during the lockdown, with an increase in sitting time due to people spending more time at home, and the amount of time spent on physical activity was also decreased (Cristina et al., 2020). Lifestyle factor will be one of factors that will be identified in this study as pandemic has changed the lifestyle by increasing the sedentary behavior while decrease in physical activity.

Approximately 50,266 033 confirmed 2019 coronavirus disease (COVID-19) cases caused by the latest 2019 coronavirus (SARS-CoV-2) have been recorded worldwide, including an estimated 1,254 567 deaths in approximately 219 countries (WHO, 2020). The government of Malaysia has decided to implement Control Movement Order, Recovery phase of Malaysia's COVID-19 Movement Control Order (RMCO), Targeted Enhanced Movement Control Order (TEMCO) throughout this year. This implementation has built a new norm to the community as well as individual lifestyle. Through this period, all Malaysian were ordered to stay at home. Thus, this might affect their level of physical activity, especially among university students who used to stay at college during the semester. During these almost eight months of the control has been implemented, and it has affected the students as they need to use an online platform to have classes from home instead of physical classes. This situation may increase the sedentary life and decrease the level of students' daily physical activity. Therefore, by studying this, the researcher will identify the level of physical activity among university students during this new norm. Currently, no study conducted on the level of physical

activity among university students during the COVID-19 pandemic. The present study will contribute by adding new knowledge of the associated factors that may affect the level of physical activity among university students during the COVID-19 Pandemic.

As being physically active helps maintain a healthy life, it is essential to know whether their physical activity level is at an adequate level or not during this new norm or new lifestyle. As most of the time, the student stays at home rather than being outdoors. Appropriate and effective intervention programs can be conducted by the university or health professionals. Therefore, this study aims to determine the association between socio-demographic factors, psychosocial factors, and environmental factors with physical activities during the Covid-19 pandemic among students in UiTM Shah Alam. The followings research questions are to be answered in this study:

1. What is the prevalence physical inactivity among university students during the Covid-19 pandemic?
2. What are the associations between socio-demographic factors, psychosocial factors, environmental factors, and sedentary life with the level of physical activities during the Covid-19 pandemic among university student

1.3 Significance of the study

Some studies were conducted to determine the factors associated with the level of physical activity among university students in Malaysia but not during this COVID-19 pandemic. This cross-sectional study's significance is to provide a new data for public health maker on physical activity level among university students during this COVID-19 pandemic. Thus, by using this data an appropriate health intervention can be developed and implemented by university or government to increase the physical activity level among students during this uncertainty surrounding.

1.4 Research Objectives

1.4.1 General Objective

To identify factors that affect level of physical activities during Covid-19 pandemic among students in UiTM Shah Alam.

1.4.2 Specific Objectives

- i. To determine the socio-demographic factors (gender, age, ethnicity, parents' level of education, and parents' monthly income) among UiTM Shah Alam students with physical activity level.
- ii. To determine the psychosocial factors (peer influence, level of stress,

anxiety, and depression) among students in UiTM Shah Alam with physical activity level.

iii. To determine the environmental factors (safety, accessibility to recreational park) among students in UiTM Shah Alam with physical activity level.

iv. To determine the sedentary lifestyle among students in UiTM Shah Alam with physical activity level.

v. To determine the association between socio-demographic factors, psychosocial factors, environmental factors, and sedentary lifestyle with the level of physical activities during the COVID-19 pandemic among students in UiTM Shah Alam

1.5 Research Hypothesis

There are significant associations between socio-demographic factors, psychosocial factors, environmental factors, and sedentary lifestyle among UiTM Shah Alam students.

1.6 Research Framework

As demonstrated in Figure 1, sociodemographic factors, psychosocial factors, environmental factors, and lifestyle factors are the independent variables. Simultaneously, the level of physical activity during the Covid-19 pandemic among students is the dependent variable in this study.

Low activity was also related to female sex, older age, lower education and wealth, and depression (Brendon et al., 2017). A study found that levels of physical

activity differed by sex, with males showing a higher percentage of physical activity than females. (Hazizi, Pei Kit, Rosita & Huei Phing, 2020; Yusoff et al., 2018; Maryam & Farouk, 2016). Another study indicates that there is a link between the degree of physical activity and ethnicity, where the Malay ethnic group was substantially more involved ($p < 0.5$) than the Indian or Chinese subjects (Yusoff et al., 2018). However, a study showed no association between physical activity and ethnicity (Dan, Mohd Nasir & Zalilah, 2011).

In 17 of the 38 countries involved, a global study found a strong positive correlation between low physical activity and anxiety (Brendon et al., 2017). On the other hand, a study conducted in 2011 shows a positive and moderate linear relationship between peer influence and physical activity (Dan, Mohd Nasir & Zalilah, 2011). Findings in 2014 suggest weak to moderate inverse associations between sedentary behavior and physical activity (Maedeh, Natalie, Stuart & Stacy, 2014).

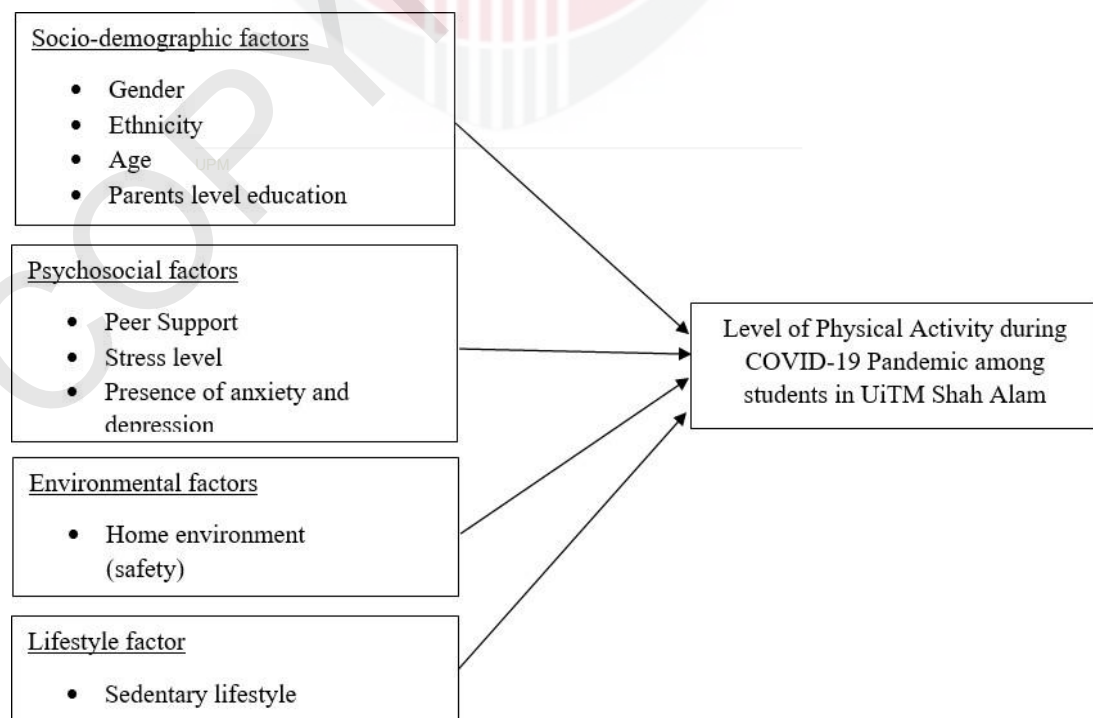


Figure 1.1 : Research framework of this study

CHAPTER 2

LITERATURE REVIEW

2.1 Level of Physical Activity

Physical activity is defined by the World Health Organization as any body movement produced by skeletal muscles that requires energy expenditure and helps to improve the mental and physical health of people. In worldwide, approximately 1 in 4 adults did not meet the recommended levels of physical activity while more than 80% adolescent is experiencing insufficient physical activity (WHO, 2020). The fourth leading risk factor for global mortality has been found to be physical inactivity (WHO, 2019). Data from National Health and Morbidity Survey (2019) showed that 1 in 4 Malaysian adults aged above 16 years old are not physically active. It also ranked that the highest population of being not physically active is elderly aged 75 years and above (59%) followed by students (39%) (NHMS, 2019). A few studies have been done in some public universities in Malaysia to estimate the students' level of physical activity by using different tools and measurements which showing inconsistent results. A study conducted in Universiti Sultan Zainal Abidin (UniSZA) showed that approximately 66.3% of the respondents were recorded as sedentary as average steps count per day is less than 5000 steps (Yusoff et al.,

2018). While a study conducted in Universiti of Malaya among medical students shown that majority of the respondents which is 76% were physically active (Maryam & Farouk, 2016). Similarly, a study conducted at a private university showed that the level of physical activity among university students was found to be satisfactory (Roshini, Karthikeyan & Lola, 2015).

There are few studies conducted in Malaysia during pandemic on current physical activity level among students and there were inconsistent findings before this pandemic. Recent study conducted among students in Universiti Malaysia Sarawak (UNIMAS) showed that majority of the students were active (74.1%), and only a small percentage of the students were less active (25.9%) (Stephan et al., 2021). Other recent findings revealed that 79.6% of Malaysians were physically active during the confinement (Tan, Tan & Tan, 2021). According to a study conducted by Anuar et al. (2021), the majority of university students were moderately active in terms of sport or physical engagement, by about half of them being active and the other half being less active or inactive. Other research conducted in Universiti Islam Antarabangsa Sultan Abdul Halim Mua'dzam Shah (UniSHAMS) demonstrated that the prevalence of inadequate physical activity performed by students was 54.6% (n=172) while those who practice adequate physical activity are 45.4% (n=143) only (Radzak et al., 2020).

2.2 Association of Sociodemographic factors with Level of Physical Activity

2.2.1 Gender

Most research conducted worldwide have shown that gender is correlated with the level of physical activity in which men are more physically active than women. Research conducted in Universiti Putra Malaysia indicates a positive correlation, since this prevalence of physical inactivity is substantially higher in females (48%) than in males ($p < 0.001$) (18.8%) (Goje, Salmiah, Ahmad Azuairi & Jusoff, 2014). Similarly, a study conducted at a private university in Malaysia also found that male students are more physically active than female students, as the ratio of male and female participants' low physical activity was 14% and 30% respectively (Roshini, Karthikeyan & Lola, 2015). Studies that conducted in other countries also shown the same findings, such as a study in Saudi Arabia, males were more likely to engage in physical activity ($p = 0.001$) than females (Khalid et al., 2018). This is aligned with study in United States found that physically active men reported more minutes of daily activity than females of all ages (Sarah et al., 2018). A recent study conducted in Spain during this pandemic showed that, there were no changes in physical activity for men compared to before pandemic (Cristina et al., 2020). This show that men and women may have different motivations, and the environment may have a greater influence on one gender than the other

2.2.2 Ethnicity

Based on the result of a study conducted in 2019 among non-academic staffs in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, approximately 63 (52.5%) of Malays ethnicity is in a good level of physical activity and 5 (4.2%) of non-Malay ethnicity is in a good level of physical activity (Leong, Nur Izzah, Suriani, Navin & Ching, 2019). However, a study in 2014 showed that there was no association between physical activity levels and ethnicity (Goje, Salmiah, Ahmad Azuairi & Jusoff, 2014). In other country such as United States, they found significant association between ethnicity and physical activity levels which, white people engaged higher physical activity compared to black people (Sarah et al., 2018).

2.3 Association of Psychosocial Factors with Level of Physical Activity

2.3.1 Depression, Anxiety and Stress

Mental health has always been an issue to adults especially among university students as they need to cope with their assignments and online classes at the same time. People's physical activities and habits have been severely restricted because of the coronavirus pandemic. Longer stays at home might cause feelings of fear, panic, worry, and depression, which can lead to a decrease in physical activity (Camacho, Merellano, Trape & Brazo, 2020). A study before pandemic shows that 2.3% of Malaysian adults are suffering depression which equivalent to half a million people (NHMS, 2019). However, there is no association between stress ($p = 0.720$), anxiety ($p = 0.292$) and depression ($p = 0.828$) with the level of physical activity based on a study carried out by Leong, Nur Izzah, Suriani, Navin & Ching (2019). This is opposed to a previous large-scale study where they found associations between level of physical activity and the presence of mental health such as depression, anxiety, and stress (Strohle, 2009). Study conducted among Korean University found that the higher time of sedentary behavior results in significantly increased of stress, anxiety, and depression (Eunmi & Yujeong, 2019). Other study conducted in Spain also found that physically inactive was negatively associated with mental health (Maria et al., 2021). In addition, recent study conducted during pandemic in Australia showed that negative changes in health behaviors are associated with increased psychological distress among Australian adults during the COVID-19 pandemic (Robert et al., 2020). While in Italy, a

significant positive correlation was found between total physical activity and status of psychological well-being ($r = 0.07541$, $p = 0.0002$) which the lower status of psychological well-being results in reduction of physical activity level (Grazia et al., 2020) Most of studies conducted before pandemic shows that stress, anxiety, and depression somehow affected one's physical activity level.

2.3.2 Peer Influence

Peer influence is always being related as one of motivations to perceive physical activity. This has been proved by a study conducted in 2011 among adolescence in Kuantan, Malaysia showed that peer influence and family influence are positively associated ($p < 0.001$) with level of physical activity (Dan, Mohd Nasir & Zalilah, 2011). However, a study conducted in 2019 among non-academician staff showed that there were no significant association between peer influence ($p = 0.105$), family influence ($p = 0.604$) and physical activity level (Leong, Nur Izzah, Suriani, Navin & Ching, 2019).

2.4 Association of Environmental Factors with Level of Physical Activity

2.4.1 Home safety, access to recreational park and equipment

Physical inactivity may be linked to perceived crime safety and accessibility to recreational park and equipment. In worldwide, a limited number of studies have recently examined the association between home safety and physical activity in Malaysia. Research among African-American girls has determined that there were no association between perceptions of neighborhood safety, access to facilities for physical activity, and the home environment (Sarah et al., 2012). Similarly, Americans who perceived their neighborhood as less than extremely safe were more than twice as likely to have no leisure time physical activity, and those who considered it to be not at all safe were nearly three times as likely to have no leisure time physical activity (Morbidity Mortality Weekly Report, 2005). A study conducted among obese African American women in 2010 found that lack of accessible facilities and not aware of fitness center in the area were among the major environmental barriers to do physical activity (James at al., 2010). Other study conducted in 2013 also showed that there were significant associations ($p < 0.05$) access to sport-related facilities (Rochelle et al., 2013).

2.5 Association of Lifestyle Factors with Level of Physical Activity

2.5.1 Sedentary lifestyle

People have increased their unhealthy habits during this COVID-19 pandemic, such as a sedentary lifestyle, with most people adhering to social distance through working or studying from home or, in other situations, self-isolating under strict quarantine. New research during this pandemic indicates that physical activity has been dramatically decreased, with a large rise in sedentary activities among young adults (Chen et al., 2020). A study in 2017 stated that higher sitting time was associated with greater inactivity and was adversely associated with mental health (Paivarinne et al., 2017). However, a study in 2019 concluded that there is no relation between the level of physical activity and sedentary behaviors, socio-demographic variables, self-esteem, and self-efficacy of physical activity among adolescents was hypothesized in this study (Leong, Nor Afiah & Salmiah, 2019).

CHAPTER 3

METHODOLOGY

3.1 Study Design

This was a cross-sectional research aimed at determining the associations among students at Universiti Teknologi Mara Shah Alam, Selangor during the COVID-19 pandemic.

3.2 Study Location

This study was conducted in Universiti Teknologi Mara (UiTM) Shah Alam located in Selangor. This study aims to determine the level of physical activity among UiTM Shah Alam undergraduate students during pandemic Covid-19. UiTM Shah Alam is one of the public universities that only accepts Bumiputera, and it was established in November 1956. UiTM Shah Alam provides variety programs for both undergraduate and postgraduate student. There are 24 faculties which are Applied Sciences, Civil Engineering, Computer and Mathematical Sciences, Dentistry, Electrical Engineering, Health Sciences, Mechanical

Engineering, Medicine, Pharmacy, Plantation and Agrotechnology, Sports Science and Recreation, Architecture, Planning and Surveying, Administrative Science and Policy Studies, Art and Design, Communication and Media Studies, Education, Film, Theatre and Animation, Law, Music, Accountancy, Business Management, Hotel and Tourism Management and Information Management. This study has involved students from Faculty of Applied Sciences which consists of 23 programs for both undergraduate and postgraduate.



3.3 Sample Size Determination

Sample size of this study was calculated based on the formula designed by

Hulley & et al. (2013) as shown below:

$$N = \left| \frac{(Z_{\alpha} + Z_{\beta})^2}{c} \right| + 3$$

$$c = 0.5 * \ln \left[\frac{(1+r)}{(1-r)} \right] \text{ where}$$

The standard normal deviate for $\alpha = Z_{\alpha} = 1.96$

The standard normal deviate for $\beta = Z_{\beta} = 0.84$

The expected correlation coefficient = r

Table 3.1: Sample size calculation for each independent variable based on the previous studies investigating the factors associated with level of physical activity.

Independent variables	Correlation, r	Sample size, n
Peer influence (Dan et al., 2011)	r = 0.468	$C = 0.5 * \ln [(1 + (0.468)) / (1 - (0.468))]$ = 0.51 $N = [(1.96 + 0.84) / (0.51)]^2 + 3$ = 33
Education level (Hsu, Hsu & Lin, 2016)	r = 0.72	$C = 0.5 * \ln [(1 + (0.72)) / (1 - (0.72))]$ = 0.907 $N = [(1.96 + 0.84) / (0.907)]^2 + 3$ = 13

Home environment (Sallis JF et al., 2009)	$r = 0.27$	$C = 0.5 * \ln [(1 + [0.27]) / (1 - [0.27])]$ $= 0.28$ $N = [(1.96 + 0.84) / (0.28)]^2 + 3$ $= \mathbf{103}$
Socio-demographic factors: high economic status (Lampert et al., 2013)	$r=0.84$	$C = 0.5 * \ln [(1 + [0.84]) / (1 - [0.84])]$ $= 1.22$ $N = [(1.96 + 0.84) / (1.22)]^2 + 3$ $= \mathbf{8}$
Sedentary time (Bonomi et al., 2012)	$r=-0.87$	$C = 0.5 * \ln [(1 + [-0.87]) / (1 - [-0.87])]$ $= -1.33$ $N = [(1.96 + 0.84) / (-1.33)]^2 + 3$ $= \mathbf{7}$

The highest number of sample size was selected as the final sample size of this study.

Table 3.2: Additional Adjustment in Computing Sample Size

Criteria	Adjustment	Sample size, n
	*Design Effect	
Adjust for the estimated sample effect	*DEFF = 1.3 (Low) $n = 103 \times 1.3 =$ 133.9	133.9
Adjust for the expected proportion response rate	response rate = 0.80 (Aday & Cornelius, 2006)	167.375
Adjust for the expected proportion eligible	% Eligible = 0.90	185.97 ≈ 186

After consideration of design effect, response rate and proportion of eligibility, the final **186** respondents were needed in this study.

3.4 Respondents

The target population of this study was the students of Faculty of Applied Sciences. The undergraduate students have been selected based on the inclusion and exclusion criteria as stated in Table 3.3.

Table 3.3: Inclusion and Exclusion Criteria of Participants

Inclusion Criteria	Exclusion Criteria
Malaysian Undergraduate students of Faculty of Applied Sciences	Students who have physical disabilities, mental or chronic diseases

3.5 Sampling Design

The sampling design is shown in Figure 3.1. Simple random sampling method was used in this study. This method was used as it is for generalizing a big population. Faculty of Applied Science is chosen for this study. All 3147 students in the Faculty of Applied Science could participate in this survey, and 186 respondents who meet the inclusion requirements have been included. Each of students were assigned a number (based on list from dean of faculty), after which approximately 190 of those numbers were chosen at random using computer generated. The chosen students were given link of questionnaire through email or whatsapp. In the case that any students fail to participate, 190 students have been chosen instead of the initial 186. At the end, in total only 171 students were included in this study.

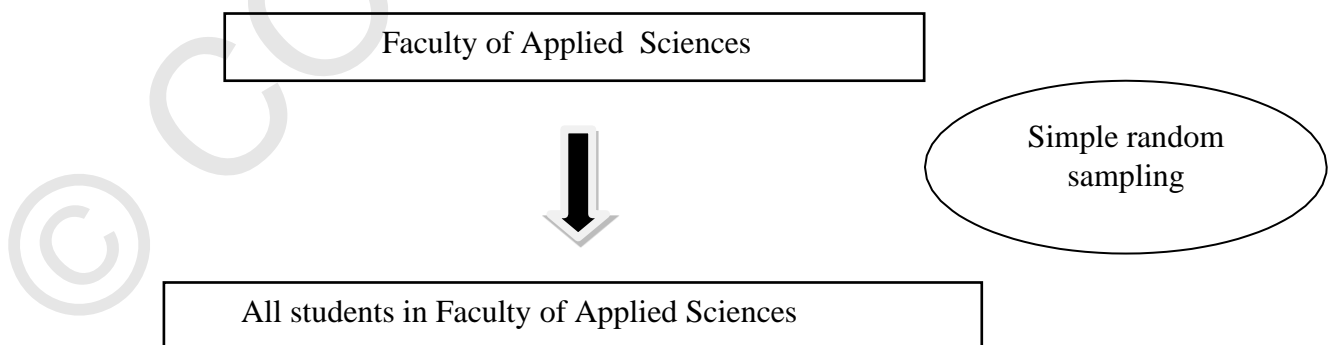


Figure 3.1: Simple random sampling method was used among students of Faculty of Applied Sciences

3.6 Study Instruments

Self-administered online questionnaires in English language were used in this study. The questionnaire consists of socio-demographic background, psychosocial factors, environmental factors and sedentary lifestyle. Socio-demographic form, Physical Activity Neighborhood Environment Survey (PANES), Social Support and Exercise Survey (SSES), Global Physical Activity Questionnaire (GPAQ), Depression Anxiety Stress Scale (DASS) and Adults' Past Day Recall of Sedentary Time (PAST) were used and has been distributed through online platform.

3.6.1 Online questionnaires

3.6.1.1 Socio-demographic questions

Respondents need to fill up their personal information such as age, gender, ethnicity, program enrolled, year of study, parent level education and household income.

3.6.1.2 Psychosocial Factors Social Support and Exercise Survey (SESS)

SESS has 13 items which each item will be answered as 'none', 'rarely', 'a few times', 'often', 'very often' and 'does not apply' for both family and friends (Minton & Jeniffer, 2008). A study conducted on characteristic of exercise behavior among college students, showed the reliability was high for family SESS (0.86) and friends SSE (0.90) (Wallace et al., 2000).

3.6.1.3 Environmental Factors Physical Activity Neighborhood Environment Survey (PANES)

Whereas for environmental factors, Physical Activity Neighborhood Environment Survey (PANES) questionnaire has been used. PANES consist of 7 items which most of its participants need to choose 'strongly disagree', 'somewhat disagree', 'somewhat agree', 'strongly agree', 'don't know/not sure'. Higher number indicating greater environmental support (Sallis et al., 2009). The reliability of this PANES has been tested where it showed an acceptable reliability and therefore can be used in future studies (Alexander et al., 2006). As compared to multi-item subscales from another validated and widely used built environment measure, dichotomized PANES items showed fair-to-substantial reliability (0.35 to 0.70) and adequate validity (0.31 to 0.81) (Sallis et al., 2009).

3.6.1.4 Level of Physical Activity Global Physical Activity Questionnaire (GPAQ)

Global Physical Activity Questionnaire (GPAQ) was created by WHO to determine physical activity monitoring worldwide, the It collects data on involvement in physical activity in three environments (or domains) and sedentary behavior, comprising 16 questions (P1-P16) (WHO, 2005). The fields include work practices, travel to and from locations, and leisure activities. It has been tested in large-scale population-based studies of the general adult population. METs (metabolic equivalents) are frequently used to convey physical activity intensity and are also used to analyze GPAQ results. MET is the ratio of the working metabolic rate of an individual proportional to the metabolic rate at rest. The energy cost of sitting quietly is described as one MET and equates to a caloric consumption of 1 kcal/kg/hour. Existing rules have been adopted for the analysis of GPAQ data. It is estimated that, compared to sitting quietly, the caloric intake of an individual is four times as high when he is moderately active and eight times as high when he is vigorously active. Therefore, when calculating a person's overall energy expenditure using GPAQ data, 4 METs get assigned to the time spent in moderate activities, and 8 METs to the time spent in vigorous activities. The following MET values are used for calculating the total energy expenditure of an individual using GPAQ data:

Table 3.4: METs values with different domain

Domain	MET value
Work	<ul style="list-style-type: none">• Moderate MET value = 4.0• Vigorous MET value = 8.0
Transport	Cycling and walking MET value = 4.0
Recreation	<ul style="list-style-type: none">• Moderate MET value = 4.0• Vigorous MET value = 8.0

Formula for total energy expenditure in METs:

METs (intensity) x mins (duration) x times per day (frequency)

WHO suggests that adults should do at least 150 to 300 minutes of moderate-intensity physical activity or 75 to 150 minutes of vigorous-intensity physical activity or an equal combination of moderate-intensity and vigorous-intensity physical activity for at least 600 MET-minutes during a week, including work activity, during transport and leisure time. A study found a moderate correlation between the GPAQ and the accelerometer for moderate vigorous physical activity (MVPA) minutes per day ($r = 0.52$, $p = 0.12$) but a weak association with sedentary behavior ($r = 0.024$, $p = 0.916$) (Cleland et al., 2014). This study also concluded that GPAQ is a valid measure of Moderate Vigorous Physical Activity and change in Moderate Vigorous Physical Activity, but it is a less valid measure of current levels and change in Sedentary Behavior, according to levels of agreement with objective measures. As a result, the GPAQ tends to be a suitable metric for evaluating the efficacy of programs promoting Moderate Vigorous Physical Activity. Recently, a study conducted by Cornelia et al. (2020) used GPAQ to assess physical activity level among university students with a reliability, $r = 0.58$.

3.6.1.5 Depression, Anxiety and Stress factors: The Depression, Anxiety and Stress Scale

The Depression, Anxiety and Stress Scale was developed by researchers in University of New South Wales, Australia (Lovibond & Lovibond, 1995). DASS is a 21-item self-administered instrument aimed to measure the level of depression, anxiety and tension or stress of a person. The participants answered all 21 statements such as do not apply to me at all (0), Applied to me some degree, some time (1), Applied to me to a considerable degree, or a good part of time (2), Applied to me very much, most of the time (3). Then each score from the questionnaire has been added separately according to Depression, Anxiety and Stress. Then the scores were interpreted as follows:

	Depression (D)	Anxiety (A)	Stress (S)
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	>27	>19	>33

The validity and reliability of DASS-21 has been proven by Akin et al., (2007). DASS-21 is a well-known global screening tool that is both accurate and simple to use. In the normative analysis, the depression scale had a reliability rate of 0.91, the anxiety scale had a reliability rate of 0.84, and the stress scale had a reliability rate of 0.90 (Musa & Fadzil, 2007)

3.6.1.6 Sedentary lifestyle: The Adults' Past-Day Recall of Sedentary Time (PAST)

The Adults' Past-Day Recall of Sedentary Time (PAST) has been proved as a valid measurement for sedentary behavior among adult population includes university student (Clark et al., 2016). It consisted of 7-item questionnaire to recall sedentary behavior on the previous day. For this questionnaire, participants were asked about time spent for sitting or lying down during working hours, for transport, watching television, playing on a computer, internet, and electronic games, reading or any doing other hobbies. The total hours of sedentary time were added and compared to the standard cut-off point to assume the sedentary level of participants. A study showed that the cut-off point for sedentary time is approximately 7 to 8 hours per day (Deborah et al., 2016). The criteria's validity was demonstrated by a strong correlation with sit/lie time ($r = 0.57$), which is significant when compared to the correlations made by other questionnaires using device-based measurements (Clark et al., 2013). Sedentary behavior results in minimal changes in expenditure over resting metabolic rate, but less than light-intensity physical activity (1.0–1.5 metabolic equivalents (METs)) (Russell et al., 2011). This PAST questionnaire covered all spectrum of sedentary activities, while the GPAQ questionnaire only covered sitting time. These two questionnaires were assessing two different variables.

3.7 Study Approval

Ethics approval has been acquired from the Ethics Committee for Research Involving Human Subjects in Universiti Putra Malaysia (JKEUPM) with the reference no: JKEUPM-2021-055. Permission letter has been approved from the dean faculty of Faculty of Applied Sciences before online questionnaires being distributed to students.

3.8 Pretest

A pilot test was conducted early in February 2021 among 19 students in non-selected faculties in Universiti Teknologi Mara Shah Alam which these students were excluded in this study. This test was purposely to estimate the feasibility for the respondents to complete the questionnaire, risk, and performance of the questionnaire.

3.9 Data Collection

Data collection for this study was conducted early in March 2021 until the end of May 2021. The distribution of questionnaire and data were collected online. A brief written explanation regarding the aims of the study was given to the respondents before answering the questionnaire on the online form. Consent forms signed by participants were obtained prior to the data collection as an agreement to participate this study. Self-administered questionnaire regarding information on socio-demographic factors, psychosocial factors, environmental factors, and sedentary lifestyle through online were answered by participants through google form.

3.10 Statistical analysis

Statistical analysis was performed by using IBM SPSS Statistics 26 (IBM Corp., Armonk, NY). All the variables in the study were described in descriptive statistic in which categorical variables was expressed in the form of frequency and percentage, whereas the continuous variable was expressed in the form of mean and standard deviation. Pearson's correlation test was used to determine the association between two continuous variables between dependent variable and independent variables whereas Chi square test was used to determine the association between a continuous variable and a categorical variable. The level of significance was set at $p < 0.05$.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 GENERAL CHARACTERISTICS

4.1.1 Sociodemographic Factors

A total of 171 students from Faculty of Applied Sciences, Universiti Teknologi MARA Shah Alam, Selangor participated in this study (Table 4.1). The response rate for this study was 80% and there is no missing data. The mean \pm SD for age in female was 21.91 \pm 1.30 years while in male was 22.03 \pm 1.57 years. Whereas the total mean \pm SD for each gender was 21.94 \pm 1.36 years. In terms of ethnicity, Malay was the majority with a total of 144 participants (84.2%) which 116 participants (86.6%) was female, and 28(75.7%) participants were male, followed by Bumiputera Sabah and Sarawak with a total of 26 participants (15.2%); 17 male (12.7%), 9 female (24.3%) and others (Jawa) with only 1 participant (0.6%) from female.

Majority of participants' father had Bachelor for educational level (41.5%) which female 55(41%) and male 16 (43.2%). Followed by Diploma 46 (26.9%); female 37 (27.6%) and male 9 (24.3%). SPM with total 25 (14.6%); female 20 (14.9%) and male

5 (13.5%). For Master, a total of 19 (11.1%); female 15(11.2%) and male 4(10.8%). While PhD and others were same; 5(2.9%). Same as in father educational level, the majority for mother educational level was Bachelor with a total of 68 (39.8%); female 54 (40.3%) and male 14 (37.8%). Followed by SPM and Diploma, 41(24%) and 40 (23.4%) respectively.

Table 4.1 shows the overview for level of physical activity of participants according to gender. Female participants showed less engagement with physical activity which female (65.7%) was higher in low physical activity compared to male (45.9%). This finding was consistent with previous studies, that stated female students were less likely to participate in physical activity (Kay, Hayati & Minhat, 2017) and men had higher percentage of having good level of physical activity (70.0%) compared to women (47.1%) (Leong et al., 2019). Another study conducted at a private university in Malaysia also found that male students are more physically active than female students, as the ratio of male and female participants' low physical activity was 14% and 30% respectively (Roshini, Karthikeyan & Lola, 2015). In contrast, this finding was contradicted with recent study conducted during pandemic in United Kingdom that stated more women (17%) remaining active than men (15%) (Caroline et al., 2020).

Table 4.1: Sociodemographic background of the study respondents (n=171)

Variables	n (%) / Mean±SD		
	Female (n=134)	Male (n=37)	Total (n=171)
Age	21.91±1.30	22.03±1.57	21.94±1.36
Ethnicity			
Bumiputera Sabah & Sarawak	17 (12.7)	9 (24.3)	26 (15.2)
Malay	116 (86.6)	28 (75.7)	144 (84.2)
Others (Jawa)	1 (0.7)	0 (0)	1 (0.6)
Father Education Level			
PhD	3 (2.2)	2 (5.4)	5 (2.9)
Master	15 (11.2)	4 (10.8)	19 (11.1)
Bachelor	55 (41.0)	16 (43.2)	71 (41.5)
Diploma	37 (27.6)	9 (24.3)	46 (26.9)
SPM	20 (14.9)	5 (13.5)	25 (14.6)
Other	4 (3.0)	1 (2.7)	5 (2.9)
Mother Education Level			
PhD	0 (0)	1 (2.7)	1(0.6)
Master	9(6.7)	3 (8.1)	12 (7.0)
Bachelor	54 (40.3)	14 (37.8)	68 (39.8)
Diploma	31 (23.1)	9 (24.3)	40 (23.4)
SPM	33 (24.6)	8 (21.6)	41 (24.0)
Other	7 (5.2)	2 (5.4)	9 (5.3)

4.1.2 Physical Activity Levels

Majority of female was in low physical activity level with a total of 88 participants (65.7%). Apart from that, result shows the total of female in vigorous level is more than moderate level, 33 (24.6%) and 13 (9.7%) respectively. The mean and SD in METs for physical activity level in female was 1035.67 ± 1880.185 . While among male, there was no big difference between low and vigorous level; 17 (45.9%) and 16 (43.2%) respectively. The mean and SD in METs for physical activity level in male was 1417.30 ± 1564.06 . Overall, majority of the participants was in low level of physical activity with a total of 105 (61.4%) participants. There were more participants in vigorous level than low level with 49 (28.7%) and 17 (9.9%) respectively. The mean and SD in METs for both gender is 1118.25 ± 1818.946 .

Table 4.2: Physical activity levels by gender

Physical Activity Level	n (%) / Mean \pm SD (minutes)		
	Female (n=134)	Male (n=37)	Total (n=171)
(mins)	1035.67 \pm 1880.185	1417.30 \pm 1564.06	1118.25 \pm 1818.946
Low	88 (65.7)	17 (45.9)	105 (61.4)
Moderate	13 (9.7)	4 (10.8)	17 (9.9)
Vigorous	33 (24.6)	16 (43.3)	49 (28.7)

4.1.3 Social support and Environmental factors

Table 4.3 shows the mean and SD for social support and environmental factors according to gender. For social support it was divided into two categories which were family and friends. There were only slight differences between family (24.09 ± 7.41) and friends in female (25.96 ± 8.70). While in male family support (22.57 ± 8.19) is much lower than friends support (25.05 ± 8.27). Overall, friends (25.77 ± 8.59) showed more support than family (23.76 ± 7.59). This finding was consistent with previous studies that stated female showed social support made a result of taking part in organized physical activities (Yvone, Samantha & Alisa, 2018). Other study determined that female students were more positively affected by parent and peer social support than male students (Ersin & Huseyin, 2019).

Physical Activity Neighborhood Environment Scale (PANES) was used to determine the ability of environment in supporting physical activity. It was shown that female (19.32 ± 3.56) was slightly higher than male (18.32 ± 3.12). This finding was supported by previous study that stated women has somewhat higher probabilities of meeting physical activity recommendations when they had a higher neighborhood safety while men did not (Jordan et al., 2015). Overall, the mean and SD was 19.11 ± 3.50 .

Table 4.3 : Table of social support and environmental factors (n =171)

Variables		Mean ± SD (marks)		
		Female n=134	Male n=37	Total n=171
Social support	Family	24.09±7.41	22.57±8.19	23.76±7.59
	Friends	25.96±8.70	25.05±8.27	25.77±8.59
Environment factor	Home safety	19.32±3.56	18.32±3.12	19.11±3.50

Social support range score

Possible min score = less than 24

Possible max score = more than 24

Environment factor range score

Possible min score = less than 20

Possible max score = more than 20

Table 4.4 shows the list domain of physical activity level. Global Physical Activity Questionnaire (GPAQ) was used to assess the physical activity level. There were three parts which are, activity work, travel to and from places and recreational activities. For vigorous activity at workplace, female (126.27 ± 778.15) shows higher mean and SD compared to male (38.92 ± 171.48). However, for moderate activity at workplace male (181.62 ± 672.679) shows higher than female (76.12 ± 363.39). Next for travel to and from places, mean and SD for female was 43.88 ± 233.39 whereas there was no data recorded for male. Lastly, for vigorous activity in recreational activities category male (771.89 ± 1082.42) showed higher mean and SD than female (521.19 ± 1024.82). Similarly for moderate activity male (424.86 ± 672.07) showed higher than female (268.21 ± 569.58).

Table 4.4 : GPAQ Questionnaire Domain

Domains	Mean \pm SD (minutes)		
	Female (n=134)	Male (n=37)	Total (n=171)
Activity at work			
Vigorous-intensity activity	126.27 \pm 778.15	38.92 \pm 171.48	107.37 \pm 693.89
Moderate-intensity activity,	76.12 \pm 363.39	181.62 \pm 672.679	98.95 \pm 448.70
Travel to and from places			
Walk or use a bicycle	43.88 \pm 233.39		34.39 \pm 207.22
Recreational activities			
Vigorous-intensity sports, fitness or recreational	521.19 \pm 1024.82	771.89 \pm 1082.42	575.44 \pm 1039.47
Moderate-intensity sports, fitness or recreational	268.21 \pm 569.58	424.86 \pm 672.07	302.11 \pm 594.68

4.1.4 Stress, anxiety, depression, and sedentary life

Table 4.5 shows the overview of stress, anxiety, depression, and lifestyle factor according to gender. It was shown that mean and SD for stress in female was 5.49 ± 3.02 where only 4 female participants (3%) experienced a mild stress while the other 130 female participants (97%) were in normal level of stress. All 37 (100%) male participants were in the normal level with a mean and SD, 6.84 ± 3.08 which is higher compared to female. Mean and SD for total was 6.02 ± 3.35 .

There were few levels for anxiety that found among participants, such as normal, mild, moderate, and severe. Majority of the participants were in normal level; 126 (73.7%) which 103 female (76.9%) and 23 male (62.2%). Followed by mild level with 33 participants (19.3%) which 10 participants (27%) were male, and 237 female participants were female (17.2%). Female was higher in moderate level compared to male which is 7 females to 4 males. One female participant showed severe level in anxiety. It was shown that, mean and SD for anxiety in total was 5.77 ± 3.02 . Male (6.78 ± 2.87) was higher compared to female (5.47 ± 3.44).

Same as anxiety, depression also showed four levels among participants such as, normal, mild, moderate, and severe. Mean and SD for depression was found higher in male (6.95 ± 3.67) compared to female (5.79 ± 3.40). Majority of the participants were in normal level; 147 (86%) which 122 (91%) were female and 25 (67.6%) were male. Followed by mild level; 19 (11.1%) which male 10 (27%) was higher than female 9

(6.7%). Moderate level was only four participants consisted of two females and two males. While it was only one female participant categorized in severe level.

Table 4.5: Table of stress, anxiety, depression, and lifestyle factor according to gender.

Variables	Female (n=134)	Male (n=37)	Total (n=171)
Stress, anxiety, and depression			
Stress	5.49±3.02	6.84±3.08	6.02±3.35
Normal	130 (97.0)	37 (100)	167 (97.7)
Mild	4 (3.0)		4 (2.3)
Anxiety	5.47±3.44	6.78±2.87	5.77±3.02
Normal	103 (76.9)	23 (62.2)	126 (73.7)
Mild	23 (17.2)	10 (27.0)	33 (19.3)
Moderate	7 (5.2)	4 (10.8)	11 (6.4)
Severe	1 (0.7)		1 (0.6)
Depression	5.79±3.40	6.95±3.67	5.79±3.53
Normal	122 (91.0)	25 (67.6)	147 (86.0)
Mild	9 (6.7)	10 (27.0)	19 (11.1)
Moderate	2 (1.5)	2 (5.4)	4 (2.3)
Severe	1 (0.7)		1 (0.6)
Lifestyle factor	11:87±3:43	11:99±3:65	12:00±3:33
Sedentary	119 (88.8)	34 (91.9)	153 (89.5)
Not sedentary	15 (11.2)	3 (8.1)	18 (10.5)

4.2 Association between socio-demographic factors with physical activity level (METs)

COVID-19 pandemic may have an impact on individual's life habit includes physical activity, smoking, alcohol consumption, and sleep. After the imposition of social isolation and physical distancing limitations in March 2020, the typical venues for physical activity, such as gyms and outdoor recreation facilities, were no longer available. Although some people have enough autonomy to regulate their physical activity and pursue alternate activities (e.g., online fitness classes, other home-based physical activities), others may reduce their physical activity due to a lack of social support or fears of contracting the virus in an outdoor environment (Geoffrey et al., 2020).

Previous study implies that isolation may cause a significant decline in physical activity (Tiago et al., 2020). Result from table 4.6 showed there was a low correlation, and it was not significant between age and physical activity level ($r = 0.021$, $p = 0.784$). This was contradicted with a recent study conducted among adults in United Kingdom during the COVID-19 pandemic showed a significant result, association between age and physical activity status (Lee et al., 2020).

In this study, finding shows there was no significant association between gender and physical activity level ($\chi^2 = 3.964$, $p = 0.460$). This was contradicted with previous study before the existence of COVID-19 that stated Malaysian women were less physically active compared to men (Tam et al., 2016). A study conducted at a private university in Malaysia also found that male students are more physically active

than female students, as the ratio of male and female participants' low physical activity was 14% and 30% respectively (Roshini, Karthikeyan & Lola, 2015). Other study also stated the prevalence of physical inactivity for women (50.5%) is higher than man (35.3%) (Chan et al., 2014). It was due to the student lifestyle, which included a rigorous study schedule during the day and time spent on self-study after classes (Kay, Hayati & Minhat, 2016).

In terms of ethnicity, there were only two groups that includes Malay and Bumiputera. Present study showed there was no significant association between ethnicity and physical activity level, ($\chi^2 = 3.359$, $p = 0.187$). However, a study found that there was significant positive relationship between Malay and total physical activity level, which indicated Malay tend to engage more in physical activity compared to other ethnicities (Tam et al., 2016). Another study also that stated there was a link between the degree of physical activity and ethnicity, where the Malay ethnic group was substantially more involved than the Indian or Chinese subjects (Yusoff et al., 2018).

For parents' education level, there were three groups that include PhD and Master, Bachelor and Diploma, SPM and other. There was limited study on parents' education level and physical activity level. This study was contradicted with previous study that showed there were significant negative relationship between education and total physical activity, ($r = -.135$, $p < .01$) (Tam et al., 2016) while this study found that there were no significant association for both father and mother education level, ($\chi^2 = 0.111$, $p = 0.946$) and ($\chi^2 = 0.822$, $p = 0.663$) respectively. Previous study found that

Malaysians with a higher level of education were much less likely to participate in any form of physical activity which was contrary with western developed countries (Tam et al., 2016). It also concluded that housewives and students, who supposedly have more free time, appear to be choosing not to be physically active.

Table 4.6: Association between age with physical activity level (METs)

Variables	r	p value
Age	0.021	0.784

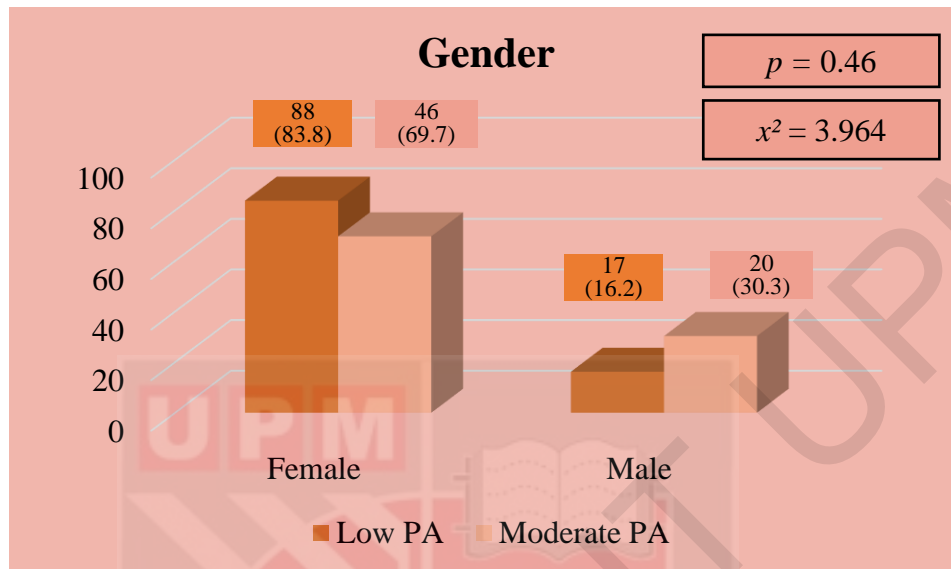


Figure 4.1 : Association between gender and physical activity by using Chi square test

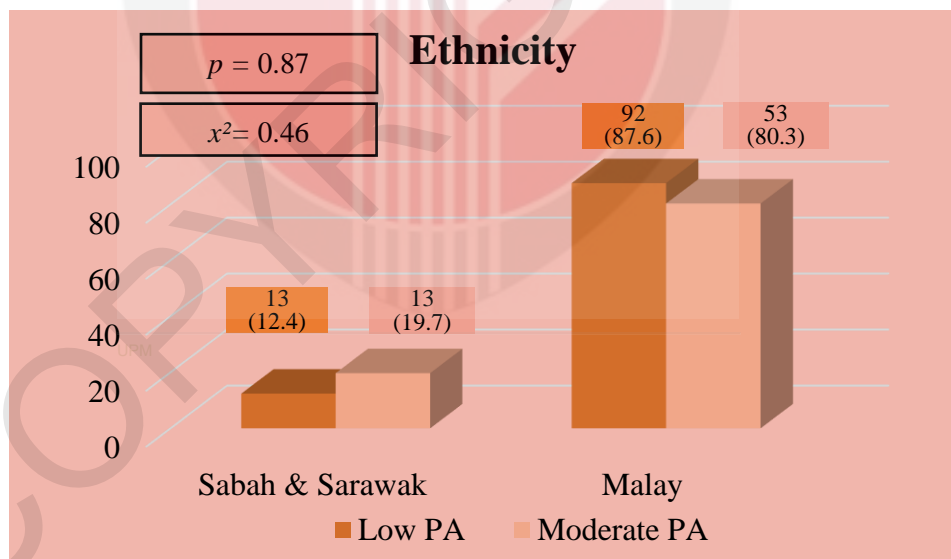


Figure 4.2: Association between ethnicity and physical activity by using Chi square test

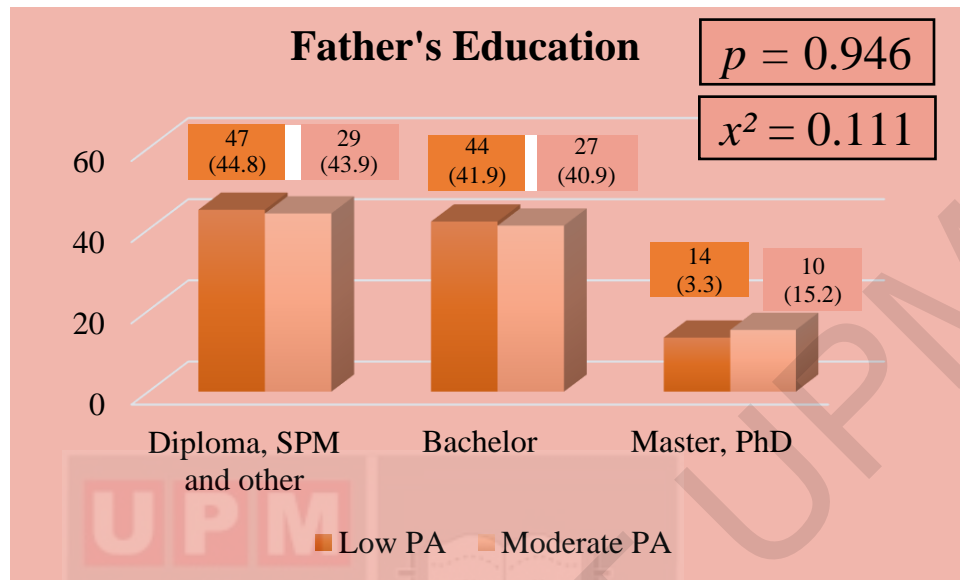


Figure 4.3 : Association between Father's education and physical activity by using Chi square test

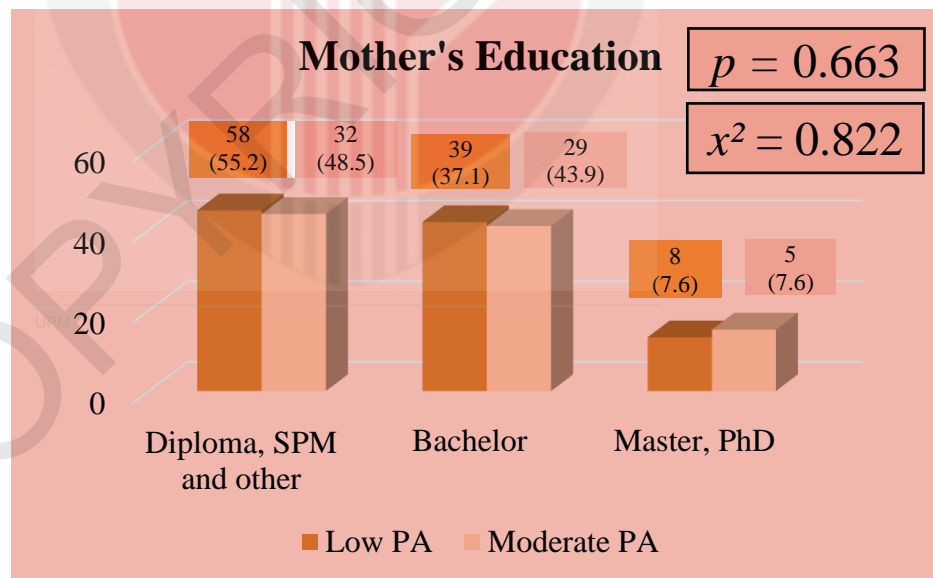


Figure 4.4 : Association between Mother's education and physical activity by using Chi square test

4.3 Association between psychosocial factors with physical activity level (METs)

Table 4.7 shows the association between, psychosocial factors (family support, friends support, stress, anxiety, depression) with physical activity level (METs). Social support is defined by the World Health Organization as both "emotional and practical support characterizing good social ties" and a "social determinant of health". There were two forms of social supports in this study which were family and friend support. Result showed that only family support was significant ($r = 0.247$, $p < 0.05$). While friends support was not significantly associated with physical activity level ($r = 0.147$, $p = 0.055$). Family social support could take the form of supervised activities, material resources, verbal encouragement, or information about the importance of physical activity (Galan et al., 2014). It also stated that family social support has a substantial impact on physical exercise participation (Chiu et al., 2016). During this pandemic, most of participants only spend time in home where they only could spend their time with family instead of their friends.

Short-term to medium-term lockdowns, voluntary home curfews, limits on group gatherings, cancellation of planned social and public events, closure of mass transit systems, and other travel restrictions have all been used globally to stop the spread of the COVID-19 virus. All this new norm has impacted emotionally to individuals which affected their participation in physical activity. Pearson Correlation test was used to determine the correlation of stress, anxiety, and depression with physical activity level. Based on the result, stress ($r = -0.36$, $p = 0.641$), anxiety ($r = -0.49$, $p = 0.527$), and

depression ($r = -0.023$, $p = 0.767$) were not significant associated with physical activity levels. These findings were contradicted with a recent study during COVID-19 pandemic, that stated there was a significant association ($p < 0.05$) between moderate-to-vigorous physical activity per day in hours and poor mental health (Louis et al., 2020). Previous study stated that persons who suffer from mental illnesses are less active than the public (Felipe et al., 2017). In addition, other study stated that relationship between physical activity and depression seems to be bidirectional where depressed people are typically less active (De Moor et al., 2006).

Table 4.7: Association between psychosocial factors with physical activity level (METs)

Variables	r	p value
Psychosocial		
Social support		
Family	0.247	0.001*
Friends	0.147	0.055
Stress	-0.36	0.641
Anxiety	-0.49	0.527
Depression	-0.023	0.767

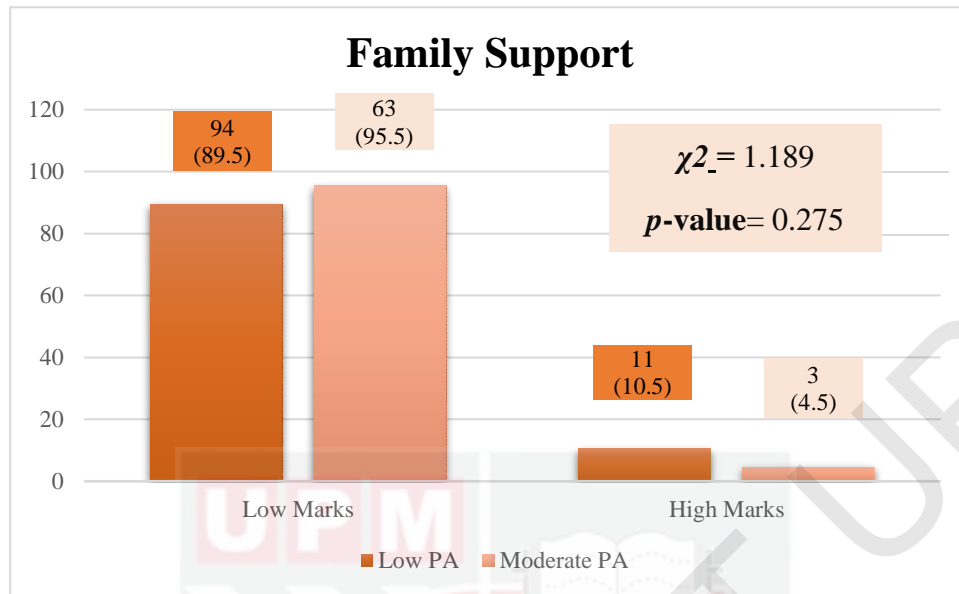


Figure 4.5 : Association between family support and physical activity using Chi square test

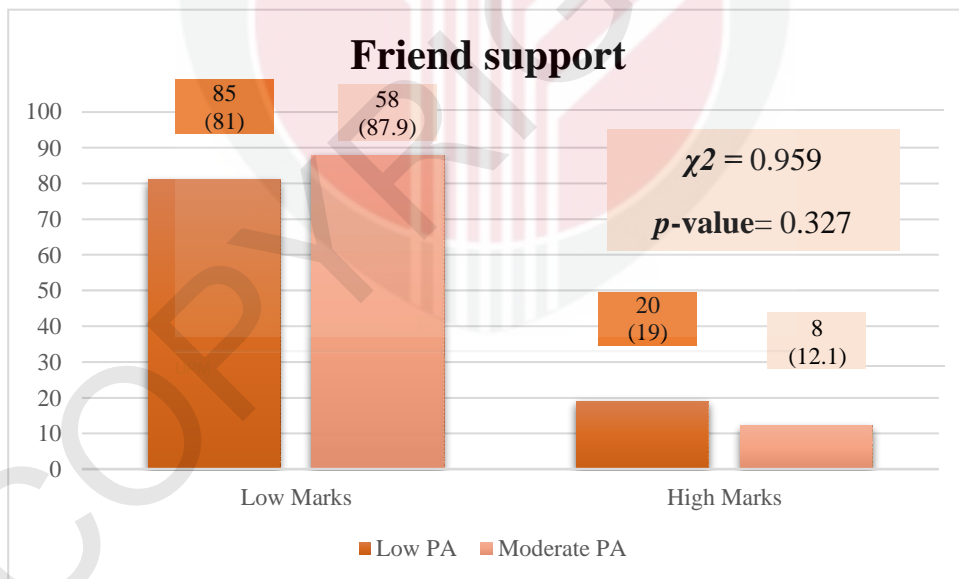


Figure 4.6 : Association between friends support and physical activity level using Chi square test

4.4 Association between environmental factors with physical activity level (METs)

For home environment, it has shown there was no significant association with physical activity level, ($r = 0.010$, $p = 0.899$). This was consistent with the previous study that stated students with low neighborhood safety tend to reduce their physical activity level by 21% compared to students with a secure neighborhood (Clare et al., 2017). Similarly, in other study showed that physical activity levels have been proven to be influenced by their neighborhood environment (Alexandra, 2019). In addition, study found that there was a significant association between built environment and physical activity among general adult populations (Ding et al., 2018)

Table 4.8: Association between home environment with physical activity level (METs)

Variables	r	p value
Environmental Home environment	0.010	0.899

4.5 Association between lifestyle factors with physical activity level (METs)

Sedentary or inactivity has been identified as one of the top risk factors for mortality, accounting for an estimated 6% of deaths worldwide (Yusoff et al., 2018). This study showed a positive correlation and not significant ($r = 0.082$, $p = 0.283$). This was contradicted with a recent study that showed the total time spent for sedentary during the waking day was significantly higher during COVID-19 than prior to the outbreak which reported that daily sitting time increased from 5 to 8 h (28.6%) per day during home confinement which led to decline in physical activity level.

Table 4.9: Association between sedentary lifestyle with physical activity level (METs)

Variables	r	p value
Lifestyle factor		
Sedentary lifestyle	0.082	0.283

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This cross-sectional study was conducted among 171 university students (78.4% male and 21.6% female) with a mean age of 22 years old from randomly selected students in Faculty of Applied Sciences, Universiti Teknologi Mara Shah Alam. Majority of the participants are Malay (84%) followed by Bumiputera Sabah & Sarawak (15%) and others (1%). Males had higher percentage on moderate (10.8%) and vigorous (43.3%) physical activity engagement compared to females (9.7%) and (24.6%) respectively. Males also showed higher mean \pm SD in METs (1417.30 \pm 1564.06) compared to females (1035.67 \pm 1880.185). The prevalence for low physical activity level among students UiTM Shah Alam was 61.4%.

For social support, female had higher score for social support in family (24.09 \pm 7.41) and friends (25.96 \pm 8.70) compared to male. This study only shows a significant association between family support ($r = 0.247$, $p = 0.001$) and physical activity level

only. This high probably because of the home quarantine during this pandemic. Due to this new norm, participants only gained social support from family as there was limited or no social interaction with friends.

Apart from that, Pearson's Correlation test showed that no significant associations were found between age, gender, ethnicity, parent's education level, stress, anxiety, and depression with physical activity level. This indicated that pandemic situation has made a massive contrast in findings compared to study before pandemic. In conclusion, family played a very important role to support participation of physical activity.

5.2 Strength and Limitations of Study

The strength of present study was provided a new data for public health maker about physical activity level among university students during COVID-19 pandemic. In addition, appropriate health interventions can be developed and implemented by university or government in order to increase the physical activity level among students. Next, to the best of our knowledge, this study is the first study conducted in Malaysia that measured the physical activity level among university students during COVID-19 pandemic.

However, there were few weaknesses identified when performing this research. First, this study is just limited to university students in UiTM Shah Alam thus, findings may not be able generalized and reflected to all undergraduate students in Malaysia. Other than that, the

respondent may have a biased recall as they might have forgotten the past physical activity practice, they performed to answer the questionnaire. On the other hand, the use of self-administered online questionnaire in this study might be contributed to potential bias as the instruments used had high risk of being of being under-reporting and over-reporting. The respondent also may have a biased recall as they might have forgotten the past physical activity, they performed to answer the questionnaire. The authors have also not looked into the respondents' screen/sitting times and other activities that might affect the physical activity level. Hence, the answers obtained might not be accurately described.

5.3 Recommendations

It is recommended for future research to include more students from different universities all over Malaysia include in Borneo to generalize the findings on physical activity level during this pandemic for all undergraduate students in Malaysia.

As the target group was undergraduate students, universities should be responsible implementing online health programs or competition during this pandemic to encourage students to stay active. In addition, to be more effective those health programs should involve family participation as present study stated that there was significant association between family support and physical activity level

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APPENDICES

Appendix A

Ref. no: UPM/TNCPI/RMC/JKEUPM/1.4.18.2 (JKEUPM)

Date: 23 March 2021

Dear Prof./Dr./Mr./Ms.,

APPLICATION FOR JKEUPM ETHICAL CLEARANCE: APPROVED

With reference to the above, I am pleased to inform you that your application for ethical clearance for the research project entitled '**Factors Associated with Level of Physical Activity During COVID-19 Pandemic among Students in Universiti Teknologi MARA Shah Alam**' has been approved.

Please note that the official letter of approval will be issued as soon as possible. However, the ethical clearance is considered effective from the date of this email, and you may now proceed with your research.

Kindly remind the ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.

Researchers should also complete a Study Final Report upon study completion. The form can be obtained from the Ethics Committee for Research Involving Human Subjects (JKEUPM) website (<http://www.tncpi.upm.edu.my/faildokumen>).

If you have any enquiries, please contact Ms. Nurulhasanah Ishak (03-97691605) or Ms. Nor Ellia Abd Ajis (03-97691244).

Note: Please use this reference number for any transaction:- **JKEUPM-2021-055**

Thank you.

Yours faithfully,

Prof. Dr. Zamberi Sekawi
Chair

Ethics Committee for Research Involving Human Subjects
Universiti Putra Malaysia

CONSENT

I hereby voluntarily agree to take part in the research stated above (questionnaire-based). I have* been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

- Agree
- Disagree

I *wish / do not wish* to know the results related to my participation in the research *

- wish
- do not wish

PART 1

SOCIO-DEMOGRAPHIC

Please answer each question as accurately as possible by filling in the space provided.

Age:

Ethnicity:

Gender:



Physical Activity Neighborhood Environment Survey (PANES)

Think about the different facilities in and around your neighborhood by this we mean the area

ALL around your home that you could walk to in 10-15 minutes.

1. What is the main type of housing in your neighborhood?

	Detached single-family housing
	Townhouses, row houses, apartments, or condos of 2-3 stories
	Mix of single-family residences and townhouses, row houses, apartments or condos
	Apartments or condos of 4-12 stories
	Apartments or condos of more than 12 stories
	Don't know/Not sure

The next items are statements about your neighborhood related to walking and bicycling

2. Many shops, stores, markets or other places to buy things I need are within easy walking distance of my home. Would you say that you...

	Strongly disagree
	Somewhat disagree
	Somewhat agree
	Strongly agree

	Don't know/ Not sure
--	----------------------

3. It is within a 10-15 minutes' walk to a transit stop (such as bus, train, trolley, or tram) from my home. Would you say that you

	Strongly disagree
	Somewhat disagree
	Somewhat agree
	Strongly agree
	Don't know/ Not sure

4. There are sidewalks on most of the streets in my neighborhood. Would you say that you...

	Strongly disagree
	Somewhat disagree
	Somewhat agree
	Strongly agree
	Does not apply to my neighborhood
	Don't know/ Not sure

5. There are facilities to bicycle in or near my neighborhood, such as special lanes, separate paths or trails, shared use paths for cycles and pedestrians. Would you say that you...

	Strongly disagree
	Somewhat disagree
	Somewhat agree
	Strongly agree
	Does not apply to my neighborhood
	Don't know/ Not sure

6. My neighborhood has several free or low cost recreation facilities, such as parks, walking trails, bike paths, recreation centers, playgrounds, public swimming pools, etc. Would you say that you...

	Strongly agree
	Don't know/ Not sure
	Strongly disagree

7. The crime rate in my neighborhood makes it unsafe to go on walks at night. Would you say that you...

	Strongly disagree
	Somewhat disagree

	Somewhat agree
	Strongly agree
	Don't know/ Not sure



SOCIAL SUPPORT AND EXERCISE SURVEY

Please write one number from the following rating scale in each space:

none	rarely	<u>A few times</u>	Often	Very often	Does not apply
1	2	3	4	5	6

During the past three months, my family (or members of my household) or friends:

	Family	Friends
11. Exercised with me.	11	11
12. Offered to exercise with me.	12	12
13. Gave me helpful reminders to exercise (“Are you going to exercise tonight”)	13	13
14. Gave me encouragement to stick with my exercise program.	14	14
15. Change their schedule so we could exercise together.	15	15
16. Discussed exercise with me.	16	16
17. Complained about the time I spend exercising.	17	17
18. Criticized me or made fun of me for exercising.	18	18
19. Gave me reward for exercising (bought me something or gave me something I like).	19	19
20. Planned for exercise on recreational outings.	20	20

21. Helped plan activities around my exercise.

21

21

22. Asked me for ideas on how they can get more exercise.

22

22

23. Talked about how much they like to exercise.

23

23



GLOBAL PHYSICAL ACTIVITY QUESTIONNAIRE (GPAQ)

Physical Activity

Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person.

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. *[Insert other examples if needed]*. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

Questions	Response	Code	
Activity at work			
1	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like <i>[carrying or lifting heavy loads, digging or construction work]</i> for at least 10 minutes continuously? <i>[INSERT EXAMPLES] (USE SHOWCARD)</i>	Yes 1 No 2 <i>If No, go to P 4</i>	P1
2	In a typical week, on how many days do you do vigorous- intensity activities as part of your work?	Number of days <input type="text"/>	P2
3	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours : minutes <input type="text"/> : <input type="text"/> hrs mins	P3 (a-b)
4	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking <i>[or carrying light loads]</i> for at least 10 minutes continuously? <i>[INSERT EXAMPLES] (USE SHOWCARD)</i>	Yes 1 No 2 <i>If No, go to P 7</i>	P4
5	In a typical week, on how many days do you do moderate- intensity activities as part of your work?	Number of days <input type="text"/>	P5
6	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes <input type="text"/> : <input type="text"/> hrs mins	P6 (a-b)
Travel to and from places			
<p>The next questions exclude the physical activities at work that you have already mentioned.</p> <p>Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship. <i>[insert other examples if needed]</i></p>			

7	Do you walk or use a bicycle (<i>pedal cycle</i>) for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 <i>If No, go to P 10</i>	P7
8	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days <input type="text"/>	P8
9	How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes <input type="text"/> : <input type="text"/> hrs mins	P9 (a-b)

Recreational activities

The next questions exclude the work and transport activities that you have already mentioned.

Now I would like to ask you about sports, fitness and recreational activities (*leisure*), [insert relevant terms].

10	Do you do any vigorous-intensity sports, fitness or recreational (<i>leisure</i>) activities that cause large increases in breathing or heart rate like [<i>running or football,</i>] for at least 10 minutes continuously? <i>[INSERT EXAMPLES] (USE SHOWCARD)</i>	Yes 1 No 2 <i>If No, go to P 13</i>	P10
11	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (<i>leisure</i>) activities?	Number of days <input type="text"/>	P11
12	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes <input type="text"/> : <input type="text"/> hrs mins	P12 (a-b)

Physical Activity (recreational activities) contd.

Questions	Response	Code	
13	Do you do any moderate-intensity sports, fitness or recreational (<i>leisure</i>) activities that causes a small increase in breathing or heart rate such as brisk walking, (<i>cycling, swimming, volleyball</i>) for at least 10 minutes continuously? <i>[INSERT EXAMPLES] (USE SHOWCARD)</i>	Yes 1 No 2 <i>If No, go to P16</i>	P13
14	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (<i>leisure</i>) activities?	Number of days <input type="text"/>	P14
15	How much time do you spend doing moderate-intensity sports, fitness or recreational (<i>leisure</i>) activities on a typical day?	Hours : minutes <input type="text"/> : <input type="text"/> hrs mins	P15 (a-b)

DASS

Name:

Date:

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

- 0 Did not apply to me at all
- 1 Applied to me to some degree, or some of the time
- 2 Applied to me to a considerable degree, or a good part of time
- 3 Applied to me very much, or most of the time

1	I found myself getting upset by quite trivial things	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I just couldn't seem to get going	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I had a feeling of shakiness (eg, legs going to give way)	0	1	2	3
8	I found it difficult to relax	0	1	2	3
9	I found myself in situations that made me so anxious I was most relieved when they ended	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting upset rather easily	0	1	2	3
12	I felt that I was using a lot of nervous energy	0	1	2	3
13	I felt sad and depressed	0	1	2	3
14	I found myself getting impatient when I was delayed in any way(eg, elevators, traffic lights, being kept waiting)	0	1	2	3
15	I had a feeling of faintness	0	1	2	3
16	I felt that I had lost interest in just about everything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3

19	I perspired noticeably (eg, hands sweaty) in the absence of High temperatures or physical exertion	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life wasn't worthwhile	0	1	2	3



PAST-DAY ADULTS' SEDENTARY TIME (PAST) QUESTIONNAIRE

Section 2 Sedentary Time

Next I will ask you about particular activities you did yesterday while sitting down or lying down. Please note that this does not include sleeping, either in bed or if you fell asleep while doing another activity, for example watching television.

Interviewer: Record yesterday's date

Yesterday's date: _____

We are going to ask you about different times when you may be sitting or lying down: when working, travelling, watching TV, using the computer, and when doing other activities. For each of these, only count the time when this was your main activity. For example, if you watched TV and ate dinner at the same time, this might be TV or meal time, but not both. Your answers can be given in hours and minutes. Try to report only the time you spent sitting or lying down and not time you spent getting up for breaks (e.g. coffee, bathroom).

ST 1. The next question is about sitting for work. Did you work in a paid position yesterday?

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

Interviewer: if participant did not work yesterday, skip to ST 4. If they did work yesterday continue to ST 2.

Time spent for work

ST 2. How long **in total** did you spend at your workplace or working from home yesterday, including meal and snack breaks?

<input type="text"/>	<input type="text"/>	hours	<input type="text"/>	<input type="text"/>	minutes
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Sitting for work

ST 3. How long were you **sitting** at your workplace or working from home yesterday, including during meal and snack breaks?

<input type="text"/>	<input type="text"/>	hours	<input type="text"/>	<input type="text"/>	minutes
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*Interviewer: if the respondent has difficulty, you can reassure them that their best estimate will be OK.
**Interviewer Check: the time for ST3 cannot be longer than ST2. If ST3 is exactly the same as ST2 (they say they sat for the whole time at work) prompt 'So, can I confirm that you sat for the whole time at work without getting up?'*

Sitting for Transport

ST 4. Thinking again of yesterday, please estimate the **total** time that you spent **sitting** to travel from one place to another. Please include sitting and waiting for transport. Do **not** include any time you were standing up while travelling or waiting.

hours minutes

Interviewer clarification: transport includes public and private, waiting for any type of transport and travel to all locations. This would not include time spent travelling as part of work which was reported in ST3 e.g. taxi driver

Television Viewing

ST 5. Please estimate the **total time** you spent sitting or lying down to watch TV or DVDs or play games on the TV, such as play station yesterday? This includes if you watch TV in bed.

Remember, your answer can be given in hours and/or minutes.

hours minutes

Computer, Internet, Electronic Games

ST 6. Please estimate the total time yesterday that you spent sitting or lying down and using the computer. For example, include time spent playing games, internet activities.

hours minutes

Interviewer: if the respondent reported working include the prompt 'Do not include time spent doing paid work on the computer as this should have been included in the previous question about sitting for work.'

Reading

ST 7. Please estimate the total time yesterday that you spent sitting or lying down while reading during your leisure time. Include reading in bed but do not include time spent reading for paid work.

hours minutes

Hobbies

ST 8. Please estimate the total time yesterday that you spent sitting or lying down for hobbies. For example, doing art, craft or cross words.

hours minutes

Sitting/lying for other purposes

ST 9. We are interested in any other sitting or lying down that you may have done that you have not already told us. For example this could include socializing with friends or family including time on the telephone; eating meals; or listening to music.

Again thinking of yesterday, please estimate the **total time** that you spent sitting or lying down **NOT** including time that you have told us about in the previous answers.

hours minutes

FULL THESIS DRAFT 1

ORIGINALITY REPORT

22%	18%	12%	12%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	psasir.upm.edu.my Internet Source	3%
2	www.mdpi.com Internet Source	1%
3	Submitted to International Islamic University Malaysia Student Paper	1%
4	www.medicolegalupdate.org Internet Source	1%
5	www.foodandnutritionjournal.org Internet Source	1%
6	Submitted to Universiti Putra Malaysia Student Paper	<1%
7	Submitted to University of Teesside Student Paper	<1%