PHYSICAL ACTIVITY LEVEL AND THE RISK OF SUBJECTIVE HEALTH COMPLAINTS IN FEMALE UNIVERSITY STUDENTS

NORHANIS FARINA BINTI ABDUL RAZAK

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PHYSICAL ACTIVITY LEVEL AND THE RISK OF SUBJECTIVE HEALTH COMPLAINTS IN FEMALE UNIVERSITY STUDENTS

by

NORHANIS FARINA BINTI ABDUL RAZAK

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CERTIFICATE

This study is to certify that the thesis entitled “PHYSICAL ACTIVITY LEVEL AND THE RISK OF SUBJECTIVE HEALTH COMPLAINTS IN FEMALE UNIVERSITY STUDENTS” is the bona fide record of research work done by Ms “NORHANIS FARINA BINTI ABDUL RAZAK” during the period from March 2021 to July 2021 under my supervision. I have read this dissertation and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis to be submitted in partial fulfilment for the degree of Bachelor of Health Science (Honours) (Exercise and Sports Science).

Main supervisor,

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Dr. Marilyn Ong Li Yin

Lecturer

School of Health Sciences

Universiti Sains Malaysia

Health Campus

16150 Kubang Kerian

Kelantan, Malaysia

Date: 10 July 2021

DECLARATION

I hereby declare that this dissertation is the result of my own investigation, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Sains Malaysia or at any other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research, and promotional purposes.

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NORHANIS FARINA BINTI ABDUL RAZAK

Date: 10 July 2021

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TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

LIST OF ABBREVIATIONS

ASSO-PIQ	Adolescents and Surveillance System for The Obesity Prevention-Personal Information Questionnaire
GPAQ	Global Physical Activity Questionnaire
METS	Metabolic equivalent
PA	Physical activity
SHC	Subjective health complaints
USM	Universiti Sains Malaysia
WHO	World Health Organization

LIST OF APPENDICES

TAHAP AKTIVITI FIZIKAL DAN RISIKO ADUAN KESIHATAN SUBJEKTIF PARA PELAJAR PEREMPUAN UNIVERSITI

ABSTRAK

Sebilangan besar kajian yang dilakukan mengenai aktiviti fizikal (AF) tidak menumpukan pada hubungannya dengan aduan kesihatan subjektif (AKS) pada populasi pelajar perempuan universiti. Dalam kajian ini, objektifnya adalah untuk mengkaji hubungan antara tahap aktiviti fizikal yang dilaporkan sendiri dan aduan kesihatan subjektif pada pelajar perempuan universiti. Kajian ini adalah kajian keratan rentas yang melibatkan 205 pelajar perempuan berumur antara 18-29 tahun dari tiga kampus Universiti Sains Malaysia: Kampus Induk di Pulau Pinang, Kampus Kesihatan di Kelantan, dan Kampus Kejuruteraan di Nibong Tebal. Tahap AF yang dilaporkan sendiri dinilai menggunakan Soal Selidik Aktiviti Fizikal Global (SSAFG) versi 2 dan AKS dikumpulkan menggunakan Soal Selidik Maklumat Peribadi - Remaja dan Sistem Pengawasan untuk Pencegahan Obesiti (SSMP - SPPO) yang diubah suai untuk menilai jumlah skor lapan gejala biasa dalam enam bulan terakhir, yang terdiri daripada sakit kepala, sakit perut, sakit belakang, merasa rendah, mudah marah atau marah, merasa gugup atau cemas, kesukaran tidur, dan pening. Model ciri demografi diuji untuk memeriksa faktor risiko AKS. Dengan menguji menggunakan korelasi Pearson, hasil menunjukkan bahawa tahap AF tidak dikaitkan dalam hubungan linear dengan AKS pada pelajar. Walau bagaimanapun, rekreasi sederhana dan tingkah laku tidak aktif dikaitkan dalam hubungan linear dengan AKS pada pelajar. Bagi ciri demografi, status perkahwinan dan status pekerjaan dikaitkan dalam hubungan linear dengan AKS, di mana pelajar bujang dan pelajar yang menganggur menunjukkan jumlah skor AKS yang tinggi. Kesimpulannya, tahap AF tidak mempengaruhi AKS

pada pelajar. Sebaliknya, status perkahwinan dan pekerjaan adalah peramal AKS. Walau bagaimanapun, hubungan antara AF dan AKS kurang jelas, di mana kajian masa depan harus menyelidiki hubungan antara kedua-dua pemboleh ubah dalam populasi yang beragam dan ukuran sampel yang besar.

PHYSICAL ACTIVITY LEVEL AND THE RISK OF SUBJECTIVE HEALTH COMPLAINTS IN FEMALE UNIVERSITY STUDENTS

ABSTRACT

Most studies that were conducted about physical activity (PA) did not focus on its relationship with subjective health complaints (SHC) in the female university student population. In this study, the objective was to investigate the association between self-reported physical activity level and subjective health complaints in female university students. The present study is a cross-sectional study involving 205 female students aged between 18-29 years old from the three Universiti Sains Malaysia campuses: the Main Campus on the Island of Penang, the Health Campus in Kelantan, and the Engineering Campus in Nibong Tebal. The self-reported PA level was assessed using The Global Physical Activity Questionnaire (GPAQ) version 2 and the SHC was collected using a modified Adolescents and Surveillance System for The Obesity Prevention-Personal Information Questionnaire (ASSO-PIQ) that assessed the total score of eight common symptoms in the last six months, which consisted of headache, stomach-ache, backache, feeling low, feeling irritable or bad-tempered, feeling nervous or anxious, sleeping difficulties, and dizziness. A model of demographic characteristics was tested to examine risk factors for SHC. By testing using Pearson correlation, the results showed that the PA level was not associated in a linear relationship with SHC in students. However, moderate recreation and sedentary behaviour were associated in a linear relationship with SHC in students. As for demographic characteristics, marital status and employment status were associated in a linear relationship with SHC, whereby single students and unemployed students show a high total score of SHC. In conclusion, PA level does not influence SHC in

students. Instead, marital status and employment were predictors of SHC. However, associations between PA and SHC were less apparent, whereby future studies should investigate the relationship between both variables in a diverse population and large sample size.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Physical activity (PA) is defined as every bodily movement produced by skeletal muscles that needs energy expenditure, which refers to the entire movement involving leisure time, transportation to and from a place, or as part of one's employment (World Health Organization, 2020). Physical activity is vital since it has been shown to reduce depression, increase cognitive function, mood, self-esteem, and general mental health, short-and long-term memory, sleep, and the common feeling of a disease-free life (Sharma *et al.,* 2006). It has been related to a reduced threat of cancer all-cause death such as colon and breast cancers (Kyu *et al.,* 2016).

Each level of the PA promotes its own importance. According to the World Health Organization (2020), mutually moderate and vigorous intensity physical activity enhances healthiness. However, frequent physical activity of moderate intensity that entails activities such as walking, cycling, or playing sports has advantages for wellbeing. Performing regular exercise is better for sedentary or inactive people. Hence, they are encouraged to begin by walking, which is easily and safely done by most people. By doing regular and adequate levels of physical activity, it will enhance muscular and cardiorespiratory fitness as well as increase bone and functional health. It also lessens the threat of hypertension, coronary heart disease, stroke, diabetes, numerous categories of cancer and depression, followed by a decrease in the threat of falls, including hip or vertebral fractures, which are essential to energy stability and weight self-control.

Light physical activities are defined as activities that are classified as below 3 METS (metabolic equivalent), while moderate physical activities are defined as activities ranging between 3 to 6 METS, and vigorous physical activities are defined as activities that are classified as above 6 METS (Yang, 2019). The WHO (2020) suggests adolescents aged 5 to 17 years old perform a minimum of 60 minutes of moderate to vigorous physical activity three times per week, except for those who have specific medical conditions. Meanwhile, WHO suggests adults aged 18 years old and above perform a minimum of 150 minutes of moderate-intensity physical activity during the week or do a minimum of 75 minutes of vigorous-intensity physical activity during the week, or an equivalent mixture of moderate-and vigorous-intensity activity except for those with specific medical conditions. To enhance health and quality of life, the alteration of lifestyle through enhancing physical activity level may possibly be a cost-effective method (Sharma *et al.*, 2006).

Subjective health complaints (SHC) can be defined as any indication faced with or without a health analysis, and this signifies a change in the measures used to assess people's health outcomes (Marques *et al.*, 2019). SHC showed that subjective health instincts are linked with clinical health results (Cheng *et al.*, 2015). Furthermore, SHC is also related to low physical wellbeing and shows a hint of ailing mental health (Bianco *et al.*, 2019). According to a study by Chu *et al.*, (2015) among university students, a negative correlation was found between higher physical activity levels and psychological health complaints such as anxiety as well as depressive mood. As a public health concern, it is important to have a better understanding of the associated between physical activity level and subjective health complaints to enhance health status since they are linked together.

Gender differences have been found to influence exercise-induced physiological changes. Some women experience increased fatiguability at different menstrual phases, which may prevent them from performing physical activity (Pereira, Larson and Bemben, 2020). Overall, fatigue due to the menstrual cycle may cause a reduction in physical activity or not meeting the physical activity recommendation, which may subsequently lead to health complaints among women in the long run. Hence, it is important to investigate the association between physical activity and subjective health complaints among the female population to prevent health problems in the future.

According to Moen *et al.* (2013), female university students have a greater prevalence of musculoskeletal symptoms that consist of eight items, including headaches, neck pain, upper back pain, low back pain, arm pain, shoulder pain, migraines, as well as leg pain, as compared with male students, whereby headaches, neck pain, and arm pain are the most common complaints. Meanwhile, a previous study conducted by Eriksen *et al.* (1999) also shows that female workers had more complaints of musculoskeletal symptoms as compared with men. In addition, women also have a higher score in pseudoneurology (palpitation, heat flushes, sleep problems, tiredness, dizziness, anxiety and depression), gastrointestinal problems (heartburn, stomach discomfort, ulcer/non-ulcer dyspepsia, stomach pain, gas discomfort, diarrhoea and constipation) and allergies (asthma, breathing difficulties, eczema, allergy, and chest pain). This shows that females tend to develop subjective health complaints compared with men. Thus, it is important to investigate subjective health complaints among the female population to ensure gendered orientations towards research as well as to understand the gender differences in health impacts.

Self-report methods are a simple and direct way for health investigators to collect information on the physical activity levels of specific populations. These methods are reliable and valid, are a relatively straightforward and inexpensive way to manage, and are suitable for large population surveys. The global physical activity questionnaire (GPAQ) is a reliable and valid instrument for physical activity surveillance, created by the World Health Organization (WHO) to gather data on physical activity involvement and sedentary behaviour (WHO, 2005). Subjective health complaints (SHC) are an inventory developed by Norwegian researchers which measures the severity and period of subjective somatic and psychological complaints in musculoskeletal pain, pseudoneurology, gastrointestinal problems, allergy, and flu (Eriksen *et al.* 1999). SHC measurement is a systematic and reliable method for conducting in the general population.

Women's health is not only an important sign of their position and status, but also, as mothers and caregivers, their health mayaffect the health of the whole family and society. Therefore, it is very important for women to get good and perfect quality health care involving physical, mental, and emotional aspects. Health complaints in women show that women are also exposed to various exclusive health concerns. According to WHO (2015), women still face many health problems twenty years after countries signed pledges in the 1995 Beijing Declaration and Platform of Action. There are ten main issues regarding women's health. Amongst the health problems that women frequently encounter are cancer, reproductive health, maternal health, HIV, sexually transmitted infections, violence against women, mental health, noncommunicable diseases, being young, and getting older.

The life of a young adult, as defined by White and McManus (2015), spanning around ages 18 to 26, is a crucial phase of advancement, with long-lasting repercussions for an individual's economic safety, health, and well-being. With the advent of technologies and artificial intelligence (A.I.) which have taken over most physical work, young adults spend more time in an inactive state. Young adults show a poorer health profile than adolescents and adults in their late twenties and thirties.

There is a need to identify physical inactivity risk as early as possible to prevent non-communicable diseases (NCDs) in women. In June 2020, the female population recorded an increase in the labour force participation rate (Department of Statistics Malaysia, 2020). However, these statistics did not include homemakers, students, retired people, and those not looking for jobs. One of the key priorities of the 11th Malaysian Plan is to improve the female participation rate in the national workforce (EPU, 2020). Hence, it is imperative to investigate the physical activity and health status of women who are still studying at university. A study conducted among female university students will ensure gendered orientations towards research and understanding gender differences in research findings.

Moreover, according to the National Institute of Health Malaysia (2019) survey, women represented 28% of those who were least active physically compared to men, and 39% were students. According to the same survey, 27% of urban dwellers were discovered to be the least physically active as well. Therefore, the present study was carried out to determine the relationship between physical activity and subjective health complaints in the female university student population.

1.2 Problem Statement

Most studies that were conducted about physical activity did not focus on its relationship with subjective health complaints in the female university student population. There were a limited number of studies on the association between physical activity level and subjective health complaints among female university students in Malaysia. Therefore, the study was designed to determine the association between physical activity level and subjective health complaints among female university students in Malaysia. To date, there is no study on these subjective health complaints variables in Malaysian females aged between 18 to 40 years old. Thus, the present study will add to the limited body of research. Apart from that, women play a key role in the formation of future generations, and their contributions to the development of the nation and the country's economy are a national priority outlined in the 11th Malaysia Plan and the National Women's Policy and Action Plan.

Physical inactivity is one of the foremost risk factors for non-communicable diseases (NCDs) and mortality amongst women worldwide. Currently, NCDs trigger two out of three deaths, including women, each year, amounting to 18 million deaths each year, and this problem is estimated to rise significantly in the future (World Health Organization, 2016). According to the National Institute of Health Malaysia (2019), Malaysians have also been gaining more weight, with half of adults having abdominal obesity at 52.6%, greater than 48.6% in 2015. Obesity prevalence in adults soared from 17.7% in 2015 to 19.7% in 2019. There is a small increase in the overweight category from 30% in 2015 to 30.4% in 2019. This proves that obesity and abdominal obesity were discovered to be greatest among females at 54.7% and 64.8% respectively. This indicates half of Malaysian adults (50.1%) were overweight or obese as of 2019. Thus, it is very vital to carry out this study in the female population because

the importance of guaranteeing the good health of women is also part of Sustainable Development Goal (SDG) 3: Good Health and Well-being.

According to the same national survey, it also indicates that one in four adults aged 16 and above in Malaysia were not physically active. Around 28% of females and 39% of students belong to people who did less physical activity. This situation is worrying because physical inactivity is the 4th leading risk factor for global death. This data indicates that females and students have been noticed at a higher risk of health problems that may impair productivity due to inadequate physical activity practices. Hence, the present study was proposed to be conducted among female university students.

1.3 Objectives of the Study

1.3.1 General Objective

To examine the association between self-reported physical activity level and subjective health complaints in female university students.

1.3.2 Specific Objectives

1. To determine the prevalence (in percentage) and differences of self-reported physical activity levels in female university students.
2. To determine the prevalence (in percentage) and differences of subjective health complaints in female university students.
3. To determine the strength of the correlation between self-reported physical activity level and subjective health complaints in female university students.
4. To determine the relative risk between demographics (family type, marital status, level of study, employment, presence of chronic diseases, body weight, and participant family information including employment status) and subjective health complaints in female university students.

1.4 Hypotheses of the Study

1.4.1 Hypothesis 1

H_{O1}: There is no significant difference in self-reported physical activity level in female university students.

H_{A1}: There is a significant difference in self-reported physical activity level in female university students.

1.4.2 Hypothesis 2

H_{O2}: There is no significant difference in subjective health complaints in female university students.

H_{A2}: There is a significant difference in subjective health complaints in female university students.

1.4.3 Hypothesis 3

H_{O3}: There is no significant association of self-reported physical activity level on subjective health complaints in female university students.

H_{A3}: There is a significant association of self-reported physical activity level on subjective health complaints in female university students.

1.4.4 Hypothesis 4

H_{O4}: There is no significant risk between demographics and subjective health complaints in female university students.

H_{A4}: There is a significant risk between demographics and subjective health complaints in female university students.

1.5 Significance of the Study

Findings of the present study will add new scientific information on the association between physical activity level and subjective health complaints in female university student. The results of this investigation sought to fill a gap in the subjective health complaints among female university students in Malaysia. This study will assist in understanding the risk of having low physical activity level in relation to subjective health complaints in female university students. The findings can be used as guidelines for university student, especially for females to identify either their physical activity level is appropriate to reduce their health complaints. It is hoped that positive findings of this study can be used as a reference to improve physical activity participation of female university students for future advancement in this field.

CHAPTER 2

LITERATURE REVIEW

2.1 Physical Activity

According to Kent (2006), physical activity level (PAL) is defined as a daily physical activity which is the sum of the cost of all physical activities over a 24-hour period. PAL is equal to the total energy required over 24 h/BMR over 24 hours. PAL is a method for articulating an individual's everyday physical activity.

According to WHO (2020), physical activity is defined as every bodily movement produced by skeletal muscles that requires energy expenditure. Popular methods of being active involve walking, cycling, wheeling, sports, active recreation, and play, and can be done at any level of skill and for pleasure by everyone.

2.1.1 Prevalence of physical inactivity

According to Guthold *et al*. (2008), physical inactivity in Malaysia was the highest (16.5%) among the participating Western Pacific Region countries. In developing countries, physical inactivity is rising, and Malaysia is no exception. Overall, women have a greater risk for chronic diseases than men because of physical inactivity, most of which are in developing countries.

According to Ying *et al.* (2014), the prevalence of total physical inactivity amongst adults was 43.7%. The mean total physical activity level amongst adults was 894.2 METs-minutes/week. Females were more expected to be physically inactive compared with males. Women who are physically inactive were discovered to be housewives, widows, or divorcees, and individuals with no official education.

According to Thanamee *et al.* (2017), physical inactivity was more frequently discovered in women than in men in nearly all age groups. On average, women who were physically inactive expended 208.2 MET-minutes/week in total physical activity contrasted to men, who expended 132.8 MET-minutes/week. These rates were well lower than the 600 MET-minutes/week suggested by the World Health Organisation. Most physically inactive participants in the population have low levels of leisure-time physical activity (LTPA) due to minimal involvement or no intention of improving physical activity through leisure time.

According to Abdeta *et al.* (2018), most adults are at more risk of acquiring non-communicable diseases due to the elevated prevalence of physical inactivity that is 45%. The results showed that physical inactivity was greatest among females, age group 41 to 50 years old, illiterate, jobless, with monthly incomes of 3001 to 5000 ETB, and those who had no knowledge regarding physical activity guidelines and had NCDs.

2.1.2 Prevalence of physical activity among university student in Malaysia

According to a study by Rajappan *et al.* (2015) among university students at Asia Metropolitan University (AMU) in Malaysia, a greater percentage of males engaged in high physical activity levels, around 56%, compared with female students, about 24%. Notably, female students indicated a greater percentage of low physical activity levels. This illustrates that female students were discovered to have a low level of physical activity compared to male students.

According to a study conducted by Aini *et al.* (2018) among undergraduate students at Universiti Sultan Zainal Abidin (UniSZA) in Terengganu, Malaysia, 66.4% of the students were categorised as sedentary, after measurement of steps with pedometers. Male students recorded substantially more daily steps compared to female students. Meanwhile, students aged 18 to 20 years old had the maximum mean average

steps per day compared to older students aged 21 to 24 years old and above 25 years old. Pedometer measurements of physical activity level showed just 5.2% were categorised as active and highly active.

According to research done by Chung *et al.* (2018) among undergraduate students at Cyberjaya University College of Medical Sciences (CUCMS), female students have a greater occurrence of physical inactivity compared to male students. In the report, the percentage of female students in the group of health-enhancing physical activity (HEPA) is about 24.7% compared to the percentage of male students, which is around 51.7%. HEPA active students also performed well academically, where the probability of getting a great grade score was doubled compared to non-HEPA active. Male students have a greater likelihood of being HEPA active compared to female students. This study proves that there is a substantial relationship between physical activity level and academic achievement.

Moreover, Mohammed *et al.* (2014) have shown that the elevated prevalence of physical inactivity in university students at University Putra Malaysia (UPM) was about 41.4%. Physical inactivity was noticeably greater among female students with minimal family income, mental health, and low self-efficacy for physical activity. This proved that there is a relationship between self–efficacy, mental health, and physical inactivity amongst university students.

2.1.3 Global Physical Activity Questionnaire (GPAQ)

The Global Physical Activity Questionnaire (GPAQ) was created by the World Health Organisation (WHO) in 2002 as a portion of the WHO STEPwise Approach to Chronic Disease Risk Factor Surveillance for PA inspection (WHO, 2005). According to the World Health Organization (2012), GPAQ was established by the WHO for the monitoring of physical activity in nations. It comprises 16 questions intended to

evaluate a person's level of physical activity in 3 domains, including work, transport, and leisure time, as well as sedentary behaviour. It also encompasses some elements of physical activity, such as intensity, duration, and frequency. The GPAQ algorithm is utilized to classify weekly physical activity levels into three groups, which are the highly active, moderately active, and inactive groups (Sitthipornvorakul *et al.*, 2014).

Previously, GPAQ was evaluated in terms of its validity and reliability in a nine-country study that was conducted by Bull et al. (2009). According to the World Health Organization (2020), GPAQ was intended to measure physical activity in distinct settings and cultures all over the world. More than 100 countries have used GPAQ to measure physical activity at work, in leisure time and for transportation purposes. It distinguishes between moderate and vigorous physical activity and requires an extra question concerning daily sedentary behaviour. Therefore, GPAQ has been proven to be valid and reliable in measuring an individual's physical activity level in the present study.

According to Shah *et al.* (2016), GPAQ has been utilized to measure physical activity levels in female students at residential colleges. The results show that out of 50 female students, 26% of female students had vigorous PA whereas 62% of female students had moderate PA. Next, 12% of female students have been discovered to have low PA due to their everyday routine and travel. Meanwhile, 10% of female students were overweight, and 48% of students were underweight.

2.1.4 Effect of low physical activity on health measurements

According to WHO (2020), one of the prominent risk factors for global death is inadequate physical activity. Physical inactivity is increasing, which causes NCDs, hence influencing overall health worldwide. The probability of mortality of people who

are inadequately active is between 20% and 30% compared to people who are adequately active.

According to El-Sobkey (2014), the inadequate physical activity level (PAL) of adults adversely affects their health-related quality of life and vice versa. Physical activity had a significant positive association with quality of life and physical functioning, role limitations triggered by physical health complications, vitality, and common health.

According to Kandola *et al.* (2020), greater depression amongst adolescents (18 years old) is related to a rise in sedentary behaviour at the ages of 12 years and 16 years old. Adolescents with relentlessly low levels of light activity have more significant depression than those with relentlessly high levels of light physical activity.

According to Brugnara *et al.* (2016), the progression of some chronic diseases, such as obesity, diabetes, and cardiovascular disease, is related to low physical activity (PA) or sedentary lifestyle. Sedentariness is one of the most significant risk factors for developing this chronic disease. Sedentary people likewise had greater BMI and obesity prevalence. Women have a greater prevalence of sedentariness than men (32.3%) due to the fact that women spend less time on physical exercise and have smaller energy expenditure on overall physical activities (MET-minutes/week).

According to Peters *et al.* (2001), the association between exercise intensity and gastrointestinal health in dose-effect due to recurring exercise periods at a low intensity may have protective effects on the gastrointestinal tract. There is robust data that shows physical activity decreases the chance of developing colon cancer by up to 50%. The risk of developing enteritis, gastrointestinal haemorrhage, and diverticulosis may decrease by doing low-to-moderate exercise. Meanwhile, Simrén (2002) also showed that light to moderate intensity exercises play a protective role against colon cancer and

diverticular disease in the same way as other diseases like cholelithiasis and constipation. Constipation has been proven to be linked to inactivity.

According to Aktürk *et al.* (2019), high school students have an elevated prevalence of musculoskeletal disorders (MSDs) in one or other body parts, and many of them comprise girls. The mean weekly energy consumption as related to the physical activity of adolescents showed low levels of activity. There is a substantial association between low physical activity and back pain.

According to Silverberg and Greenland (2015), a low level of physical activity has a substantially increased risk of developing eczema in adults. Adults who previously had a history of eczema had smaller odds and a lower occurrence of vigorous activity. There is a relationship between eczema and greater odds of obesity and hypertension, prediabetes, diabetes, and high cholesterol. This shows that low physical activity can increase the risk of developing diseases in adults.

2.2 Subjective Health Complaint

According to Moen *et al.* (2013), SHC was assessed using the SHC Inventory, which was executed by Eriksen *et al.* (1999) and was established from the original Ursin health inventory. It comprises 29 items regarding subjective somatic and psychological complaints faced throughout the last 30 days and applies a four-point scale (0 = no complaints, 1 = some, 2 = much, 3 = severe complaints). This SHC version encompasses five subscales that were created by factor evaluation. These are musculoskeletal symptoms, pseudoneurological symptoms, gastrointestinal symptoms, allergies, and flu. According to Eriksen *et al.* (1999), the SHC inventory is a systematic, easy-going, and dependable approach to total subjective health complaints.

According to Marques *et al.* (2019), adolescents who participate in physical activity daily and spend less time on screen-based sedentary behaviours, do not drink alcohol, and do not smoke tobacco have a greater likelihood of not getting subjective health complaints. The consistency of healthy life in decreasing whole health complaints showed that the mixture of numerous healthy behaviours might be a composite gauge of healthy life. This shows that adolescents who have a healthy behaviour and lifestyle have lower subjective health complaints alongside fewer multiple health complaints.

According to Bianco *et al.* (2019), gender disparity is an important factor in the dissemination of subjective health complaints amongst adolescents. Variance in gender also affects the relationship between two variables that could play a vital role in affecting the subjective health complaints among urban adolescents. In particular, the study shows that the two factors, smoking and alcohol consumption, were noticeably related to the adolescents' subjective health complaints. This may possibly affect their present quality of life and lead to a larger problem of chronic diseases in the future.

According to Moen *et al.* (2013), gender differences were found in subjective health indicators and psychosocial work strain amongst university personnel. It was reported that females have a greater prevalence of musculoskeletal symptoms than males. This is due to a relationship between musculoskeletal symptoms and work strain for both genders under 40 years of age and among men over 40 years of age. Nevertheless, the cause of this gender disparity is unspecified.

To summarise, findings in previous studies show an association between physical activity level and subjective health complaints. Individuals with low physical activity level have a higher possibility of having subjective health complaints. Furthermore, subjective health complaints are also associated with physical wellbeing

and are a pointer of mental ill-health. Women are reported to be at a higher risk of presenting with subjective health complaints compared to men due to increasing demands or pressures at work, educational and economic status, in addition to continued responsibility at home. Therefore, this study was proposed to determine the association between physical activity level and subjective health complaints in female university students aged between 18 and 40 years old. To our knowledge, there is no study on these subjective health complaints variables in the proposed cohort of university students in Malaysia. Hence, there is a need to identify physical inactivity risk as early as possible to prevent health risks. Thus, the present study's findings will add to the limited body of research and new scientific information on the association between physical activity level and subjective health complaints in female university students.

CHAPTER 3

METHODOLOGY

3.1 Study Design

This was a cross-sectional study conducted among female university students from Universiti Sains Malaysia. The Global Physical Activity Questionnaire (GPAQ) and Subjective Health Complaints Questionnaire (SHC) have been administered to the participants for data collection online. The duration of time to complete the questionnaires was approximately 15 mins.

3.2 Participants and Selection Criteria

All the participants were recruited from among Universiti Sains Malaysia's (USM) diploma, undergraduate, and postgraduate (Masters, Doctor of Philosophy (PhD) and Master of Medicine (MMeD) female students. The inclusion criteria for recruitment were female university students aged between 18 and 40 years old. The exclusion criteria were participants who were male, had any acute or chronic diseases, and were under the age of 18 years old or over the age of 40 years old. Participants who met the inclusion criteria and agreed to join this study were given participation consent forms to sign.

3.3 Sample Size Calculation

The sample size of the present study calculated by G*Power software (version 3.1.9.6) was based on the positive effect of physical activity workload and subjective health complaints measured (β=0.247) in women from a study by Ree *et al.*, (2014), which demonstrated a significant direct effect of 0.173 (70 %) and an indirect effect of 0.074 (30%). The indirect effect was significant (95 % CI, 0.01–0.03). The squared multiple correlations (R^2) for subjective health complaints were 0.177. Hence, the power

of this studied was calculated as set at 95% of confidence interval (CI), 80% power and alpha 0.05 to yield a sample size of 39 participants. The output of the sample size calculation is shown in Figure 3.1.

t tests - Linear multiple regression: Fixed model, single regression coefficient		
Analysis:	A priori: Compute required sample size	
Input:	Tail(s)	= Two
	Effect size f^2	= 0.2150668
	α err prob	= 0.05
	Power (1-β err prob)	= 0.80
	Number of predictors	= 1
Output:	Noncentrality parameter δ	= 2.8961363
	Critical t	= 2.0261925
	Df	= 37
	Total sample size	= 39
	Actual power	= 0.8051799

Figure 3.1 Sample size calculation output from G*Power software version 3.1.9.6.

3.4 Participant Recruitment and Location of Data Collection

A total of 205 female university students with an age range between 18 to 49 years old have been recruited from the three USM campuses: the Main Campus on the island of Penang, the Health Campus in Kelantan, and the Engineering Campus in Nibong Tebal. Participation in this study was on a voluntary basis. Participants who met the inclusion criteria and agreed to join this study have been given participation consent forms to sign. Participants had the right to withdraw themselves during the study whenever they wanted, and their decision was accepted with no bias. Data has been collected using an online survey form, advertised on social media platforms (Facebook and Instagram) and messaging apps (WhatsApp, Telegram and Messenger). All the data collected during this study was strictly confidential. Participants would not be asked to provide information that reveals their identity. To avoid duplication and to allow for feedback, the participants would only provide their email addresses.

3.5 Material/ Instrument/ Equipment

3.5.1 Physical Activity Level

In this study, the physical activity level among the participants was gauged by applying the GPAQ version 2. The GPAQ was created by the World Health Organisation (WHO) in 2002 as a surveillance of physical activity levels in countries (WHO, 2005). The GPAQ version 2 encompasses 16 questions that analyse the level of physical activity of an individual in 3 domains: activity at work, travel to and from places, recreational activities, and sedentary behaviour (WHO, 2012).

Previously, GPAQ was proven as a validated approach for assessing the physical activity level of a population in nine countries (Bull *et al.,* 2009). Currently, GPAQ has been applied in around 50 developing countries as an instrument to collect data for assessing physical activity among the population (Armstrong & Bull, 2006). GPAQ version 2 was an appropriate physical activity surveillance method that has been used in developing countries. Globally, GPAQ has been applied in over 100 countries, and it is valid and reliable as well as flexible to integrate cultural and other disparities (WHO, 2005).

To answer the GPAQ questions, the participants recall activities performed in a typical week, such as activities for work, during transport, and leisure time. The Malay (Soo *et al.*, 2015) and English versions (WHO, 2012) of the GPAQ were used in this study. Then, the total physical activity was calculated as METS (Metabolic Equivalents) to express the intensity of physical activities, in which a 4.0 MET value was applied to the time spent on moderate activities, while an 8.0 MET value was applied to the time spent on vigorous activities in the work and recreation domain. In the transport domain, a 4.0 MET value was applied to activities such as cycling and walking. Participants who meet WHO recommendations on physical activity for health were defined as having total

physical activity MET minutes/week at least 600 MET-minutes of an equivalent combination of moderate-and vigorous-intensity physical activity, while those who did not meet WHO recommendations were achieving less than 600 MET-minutes weekly.

3.5.2 Subjective Health Complaints (SHC)

A modified Adolescents and Surveillance System for The Obesity Prevention-Personal Information Questionnaire (ASSO-PIQ) (APPENDIX C and D) has been used to measure the demographics and subjective health complaints (SHC) among the participants in the present study. This questionnaire is commonly used in previous studies and was conducted among adolescents by Bianco *et al*. (2019) to show that SHC is approved in the ASSO Project to measure SHC among respondents. The questionnaire consists of four sections and a total of 42 items. Section A comprises 6 items regarding participants, which involve socio-demographic characteristics, gender, and age. Section B contains 20 items on the family affluence scale, parents' education, and occupation, as well as anthropometric and medical items (weight status and presence of diagnosed diseases). Meanwhile, Section C comprises 6 items about neonatal assessment, whereas Section D includes 10 items regarding the clinical assessment of SHC, such as feeling sick, headache, stomachache, backache, low mood, irritability or bad temper, nervousness or anxiety, difficulties sleeping, and dizziness.

In this study, only sections A, B and D were used. Section A of this questionnaire has been modified to include several aspects appropriate to the study requirements, which include ethnicity, family type, marital status, level of study, employment, presence of chronic diseases, height (m), weight (kg), body mass index (BMI) ($kg/m^{2)}$, and current residential status and participant family information.

The SHC in Section D was assessed via eight items, in which each item measured the frequency of eight common symptoms in the last 6 months. The common symptoms comprise headaches, stomach-aches, backaches, feeling low, feeling irritable or bad-tempered, feeling nervous or anxious, sleeping difficulties, and dizziness. For each SHC, the participants have the preference to answer the questions by selecting one of the subsequent five frequency classifications (rarely or never, almost once a month, almost once a week, more than once a week and almost every day). The rating of complaints was as follows: 0-rarely or never, 1-almost once a month, 2-almost once a week, 3-more than once a week and 5-almost every day. However, the calculation of the total score was appraised seven out of eight items due to the sleeping difficulties being disregarded, corresponding to the outcomes of the validation research implemented by Ravens-Sieberer *et al.* (2008).

Previously, SHC had been validated and utilised in previous studies conducted by Haugland and Wold (2001). Then, SHC was approved in the ASSO Project study implemented by Bianco *et al.* (2019), as well as in the ASSO toolkit. The sum score of the eight items of the SHC was discovered to have an ICC of 0.79 for the total sample, 0.76 for boys, and 0.81 for girls. The corresponding values for an expanded eleven-item version were 0.75, 0.77, and 0.83, respectively (Haugland & Wold, 2001). The same study also assessed the stability of single items on the symptom checklist for the total sample. All items were discovered to have sufficient ICC in the range of 0.61–0.75. The Malay and English versions of the ASSO-Personal Information Questionnaire (ASSO-PIQ) were used in this study. The duration of time to complete the modified ASSQ-PIQ and SHC by respondents was 10 min via Google online form.

3.6 Data Collection

Figure 3.2 shows the flow chart of the study procedures. Participants were briefed on the study procedures online. Those who met the inclusion and exclusion criteria and agreed to join this study voluntarily were required to sign an informed consent form (Appendix H and Appendix I).

Subsequently, the questionnaires (GPAQ and ASSO-PIQ-SHC) were distributed to all participants in both Malay and English versions, using a Google online form to avoid any physical contact between participants and researchers during the COVID-19 pandemic. Participants completed the GPAQ and modified ASSO-PIQ-SHC surveys during the second semester of their academic school year. The participants answered the questionnaire at their time and location of convenience.