

Physical Inactivity and Its Associated Factors among University Students

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Abstract: Physical inactivity has been associated with increasing prevalence and mortality of cardiovascular and other diseases. The purpose of this study is to identify if there is an association between, self-efficacy, mental health, and physical inactivity among university students. The study comprises of 202 males and 692 females age group 18-25 years drawn from seven faculties selected using a table of random numbers. Questionnaires were used for the data collection. The findings revealed that the prevalence of physical inactivity among the respondents was 41.4%. Using a univariate analysis, the study showed that there was an association between gender (female), low family income, low self-efficacy, respondents with mental health probable cases and physical inactivity ($p < 0.05$). Using a multivariate analysis, physical inactivity was higher among females (OR = 3.72, 95% CI = 2.399-5.788), low family income (OR = 4.51, 95% CI = 3.266 – 6.241), respondents with mental health probable cases (OR = 1.58, 95% CI = 1.136- 2.206) and low self-efficacy for physical activity (OR = 1.86, 95% CI = 1.350 - 2.578). Conclusively there is no significant decrease in physical inactivity among university students when compared with previous studies in this population, it is therefore recommended that counselling on mental health, physical activity awareness among new university students should be encouraged.

Keyword: Exercise, Mental Health, Self-Efficacy, Physical Inactivity, University students

I. Introduction

World Health Organization (WHO) defines physical activity as “any bodily movement produced by skeletal muscles that requires energy expenditure” The term physical activity and exercise are inter-related but not the same, exercise is part of physical activity that is design, organised and is done continuously in such a way that the objective is to achieve physical fitness. Exercise as well as other activities which involve bodily movement and are done as routine activities such as playing, walking, active transportation, house errands and recreational activities are all part of physical activity [1].

The global records on physical inactivity indicates that it causes about 1.9 million preventable deaths per annum [2], increases the risk of all-cause mortality by 20-30% [3], and a major risk factor in increasing the level of obesity. It is documented to account for 22% of ischemic heart disease, 11% of ischemic stroke, 14% of diabetes, 16% of colon cancer and 10% of breast cancer worldwide [3].

According to United States Department of Health and Human Services (USDHHS), regular physical activity is associated with increase health benefit and decrease risk of all case mortality, it improves aerobic capacity, muscle strength, body agility, coordination and metabolic functioning [4]. Physically active individual have reduced risk of developing cardiovascular disease and ischemic stroke [5], non-insulin dependent type (2) diabetes mellitus [6], colon cancer [7] and osteoporosis [8]. Physical activity is associated with higher level of self-esteem and lower level of anxiety and stress [9].

The surgeon's General Reports on physical activity and health stated that increase levels of regular physical activity are associated with lower death rates [4]. According to a study published in the British scientific journal “The Lancet, 2012”, the population attributable fractions, calculated with adjusted relative risk of WHO region and country all cause mortality associate with physical inactivity for coronary heart disease, type 2 diabetes, breast cancer, colon cancer and all-cause mortality related with physical inactivity in Malaysia are, 10.2% (9% CI 3.8, 16.9), 12.6% (9% CI 6.3, 19.6), 17.1% (9% CI 8.0, 26.6), 18.2% (9% CI 10.2, 26.5) and 16.4% (9% CI 13.0, 19.7) respectively and the estimated gain in life expectancy in years if physical inactivity is eliminated is 1.35 (1.06 to 1.65) [10].

Based on four different studies among adult Malaysians, the National Health and Morbidity Survey II, 1996 [11] showed that only 11% (16.2% males and 7.7% females) of Malaysian adults surveyed engage in regular and adequate exercise, but this finding is limited to exercise alone not on physical activity levels. The other study is by National Health and Morbidity Survey III in 2006 [12] using International Physical Activity Questionnaire (IPAQ) as an assessment tool, it showed that 43.7% of adults Malaysians (aged 20-24 years) surveyed were physically inactive, with 33.5% men and 50.5% women considered as inactive. World Health Survey, 2003[13] done in Malaysia reported a much lesser prevalence of physical inactivity of 19.6% using (IPAQ) also to evaluate the physical activity level [13]. The survey further showed that prevalence of physical inactivity among women was 23.2% and 16.0% among men. The third study is Malaysian Non Communicable Disease Surveillance-1(MyNCDS-1) also uses the same questionnaire and reported an increase prevalence of physical inactivity of 60.1%, with 65.1% for women and 55.4% for men [14].

There is evidence that young people in many developed nations do not participate in regular physical activity of the type and amount required for good health and about 62.5% of reduction in physical activity behaviour has been recorded between high school and college [15]. There is evidence that a larger proportion of students transiting to university engage in low levels of physical activity, with about one-third of previously active students becoming inactive during the transition [16].

In a study among first year university student in New Zealand (age 18 years +) showed a significant decline in weekly reported minutes of physical activity for time spent doing vigorous physical activity (Mean \pm SD= 206.2 \pm 192.2, t score 4.43, p<0.001) and moderate physical activity (Mean \pm SD= 133.5 \pm 124.3, t score 3.78, p<0.001) [16]. According to WHO NCD country profiles, (2011), globally the prevalence of physical inactivity is on the rise in many countries including Malaysia. Based on the 2008 estimated prevalence, it showed that about 60.5% of adult Malaysian aged 15 years and above are physically inactive, with male 56.0% and females 65.0%, thus enlisting Malaysia among the top ten physically inactive nations in Asian region [17]. In 2014 meeting of the World leaders to assess the effort made so far in combating NCDs from 2011, the 2014 NCD country profiles showed not enough progress across all the countries. A target of 10% reduction in prevalence of insufficient physical activity is among the 9 targets set for year 2025 [18].

The university environment is a setting with much greater advantages and easier opportunities towards improving physical activity among students. However in university, unlike in primary and secondary schools, the absence of proper structure on physical education, health promotion and awareness activities, making the students most often to neglect the opportunities of utilizing the available facilities effectively. Studies relating mental health and physical inactivity among university students in Malaysia are limited. Findings may also help update records in undergraduate prospectus as in relates to physical activity. It can also be use to reflect prevalence of age group 18-25 in the general population since a public university is a composition of the general public in terms of race and gender.

According to WHO (2011) all cause mortality list, physical inactivity is number four and 1.9 million people die annually due to physical inactivity. Physical activity has been shown to have numerous beneficial effect on protection against increased cardiovascular related diseases, offers protection from hypertension by lowering both high systolic and diastolic blood pressure [19]. Physical activity also plays an important role in weight control and weight reduction [2].

This study among others, aims to identify whether university students have the habit of personal physical activity which is a prescription to cardiovascular related disease, hypertension and weight control and weight reduction among other things. The habit of regular physical activity starts mostly during transition from childhood to adulthood [20], and research have indicated that physical activities decline consistently during this period of transition to adolescent years [21, 22]. During adolescences [23] and in the transition to university, and specifically during the duration of study at university, the disregard to healthy lifestyle is on the increase and the decrease in the practice of moderate to vigorous physical activity is prevalent [16]. The general objective of this paper is to determine the prevalence of physical inactivity among first year undergraduate students of the Universiti Putra Malaysia and the specific objectives of this paper is to determine the association between mental health status, self-efficacy of physical activity and physical inactivity.

II. Literature

2.1 Worldwide Prevalence of physical inactivity

Globally 31.1% (95% CI 30.9-31.2) of adults aged 15 and above were considered insufficiently active. The prevalence was higher in women (34%) than in men (28%). In all WHO regions, men were more active than women, Americans (50% women and 40% Men) and the Eastern Mediterranean (50% women and 36% men) regions have the highest prevalence of insufficient physical activity while South East Asia have the lowest percentage (19% women and 15% Men) [24].

According to World Health Report [2], about 3% of disease burden globally in developed countries and more than 20% of cardiovascular disease and 10% of strokes were as a result of physical inactivity [2], this

places physical inactivity among the list of 10 leading causes of mortality and disabilities in the developed world. In another report by WHO, about 2 million death per year are as a result of physical inactivity [25], this and many other findings classifies physical inactivity among the biggest public health problems of the 21st century [26].

According to another study comprising of over 300,000 participants age 15 and above, the crude worldwide prevalence of physical inactivity was 21.4% (95% CI 18.4-24.3 95% CI). The study also indicate that insufficient physical activity is higher among women (Mean of 23.7%, 95% CI 20.4-27.1) than men (mean of 18.9%, 95% CI 16.2-21.7). The study further showed that less developed countries have lower prevalence of physical inactivity (18.7%), insufficient physical activity is more prevalent among developed countries (27.8%). The study concluded that insufficient physical activity is more prevalent among wealthier and urban nations, the prevalence increases according to level of income, higher income countries had more than twice the prevalence compare with low income countries for both sex, with 41% of men and 48% of women being insufficiently physically active in high income countries were as 18% of men and 21% of women are insufficiently active in low income countries [27].

2.2 Prevalence of physical inactivity among Malaysians

In a technology driven modern Malaysia, many activities that requires routine physical activities were reduced, travel and movement were replaced by other means (Buses and Trains), and majority of Malaysians do not meet the recommendation of adequate and regular physical activity [28].

According to WHO Global health observatory [24], the age standardizes estimate of prevalence of physical inactivity among Malaysians aged 15 and above is Male 57.3% (54.3-60.4) and females 65.6% (63.1-67.9) and age standardizes estimate for both sex is 61.4% (59.5-63.3), while the crude estimate for same age group is male 56% (52.9-59.0) and females 65% (62.6-67.4) and Crude estimate for both sex is 60.5% (58.5-62.4).

According to a WHO study published in the British Scientific Journal Lancet 2012, Malaysia is among the top 10 physically inactive countries in south East Asia, with about 61.4 % of Malaysians age 15 and above was considered inactive. National health and morbidity survey 2006 showed that the prevalence of physical inactivity among Malaysian adults was 43.7% (95% CI, 42.9-44.5). In another study among adult Malaysians 18-59 years, the prevalence of physical inactivity among Malaysian men was found to be 37% [28].

2.3 Prevalence of physical inactivity among university students

University environment or college is a period of great change for young adults. Coming with new independence makes a high school student to take decisions and choices which previously was not made by him or her, among other decisions is how the student can incorporate physical activity[30]. Studies have shown that the rate of physical activity decreases from high school years to college years. A cohort study by [16] investigating vigorous physical activity during transition from high school to university among 145 Canadian university undergraduates, showed that 66.2% of the student were active during the last two months of their high school but this declines to 44% in their first two months in university.

A study in America among college students 18-24 years of age shows that only 35% of the females and 39% of the male students made the CDC-ACSM guidelines for moderate physical activity (Arriaza et al., 1998), the guideline states that “every US adult should accumulate 30 minutes or more of moderate intensity activity on most, preferably all days of the week” [31]. In comparing physical activity pattern amongst American college students of age group 18-25 years, Asian (n=874), Africans (n=332), white (n=1101) and Hispanic (n=529), the study showed that about 46.7% of them didn’t engage in vigorous physical activity and 16.7% were physically inactive [32].

In a study comparing factors associated with physical inactivity among East Asia college students, using stratified random sampling with sample size of 12,137, the result showed 7.2% physically inactive student for Singapore, 8.0% for Malaysia, 13.5% for Taiwan, 16.8% for Hong Kong and 28.5% for South Korea [33]. In a cross-sectional study among 174 undergraduates students (male= 40.2% and females = 59.8%) of UPM age 18-24 using pedometer to assess level of physical activity , the study showed that less than 15% of the student were categorised as sedentary with females twice as sedentary than the males[34].

III. Methodology

3.1 Study Location

The study was conducted in University Putra Malaysia (UPM), formally named as Universiti Pertanian Malaysia or Agricultural University of Malaysia. UPM is established in 4 October 1971. It is renamed Universiti Putra Malaysia on 26 July 1997. UPM is one of the universities in Selangor State in the district of Petaling close to the capital city of Kuala Lumpur (19Klm), offering both undergraduate and postgraduate courses. There are 16 faculties, 8 centres, 6 institutes, and 2 schools [35].

3.2 Study Design

A cross-sectional study was done in 2013 to determine the factors associated with physical inactivity among first year undergraduate students of UPM. Data collection was carried out from 4th October 2013 to 15th November 2013 in seven selected faculties. Only full time registered Malaysians in serdang campus were included in this study. Out of the 1607 registered first year undergraduate students from 7 selected faculties, eighty eight (88) were international students (non-Malaysians) hence excluded from the study, 384 were part time students (excluded). A total of 1135 eligible students were approached, however 198 refused to participate and 937 returned questionnaire. Fourty three of the 937 who returned the questionnaire did not answer the question on IPAQ completely (dropped), giving a total of 894 students involved in the final data analyses. The total response rate for this study is 78.8%.

3.3 Sample size estimation

The sample size estimation for this study was calculated using the formula for hypothesis testing for two proportions[36].

$$N = \frac{[Z_{1-\alpha}\sqrt{2\bar{P}(1-\bar{P})} + Z_{1-\beta}\sqrt{p_1(1-p_1) + p_2(1-p_2)}]^2}{(P_1 - P_2)^2}$$
$$\bar{P} = \frac{P_1 + P_2}{2}$$

Minimum sample size per group $n = 166$

After appropriate calculations and adjustments, the sample size for the study was found to $n = 844$, seven faculties were selected using random number table to serve as clusters for this study

3.4 Variables

There is only one dependent variable which was Physical inactivity and according to American Heart Association, it is the term use to identify people or person who did not get the recommended level of physical activity of 30–60 minutes of regular exercise 3-4 times per week to promote cardiovascular fitness (American Heart Association) or daily expenditure of 150 kilocalories in moderate or in vigorous activities that is required to achieve good health [4].The independent variables in this study are socio-demographic factors (age, gender, ethnicity and family income), mental health status, self-efficacy of physical activity.

3.5 Study Instrument and Data collection

In this study data was collected using validated self-administered questionnaires on socio-demographic information, IPAQ [37, 38], Malaysian mental health screening instrument [39] and physical activity self-efficacy scale [40, 41, 42, and 43].The questionnaires are pilot tested with a small sample of respondents to find out how well the questionnaire works, whether there are areas of confusion, and if the questionnaire could be read more smoothly.

The questionnaire was tested and administered face-to-face among 82 first year medical students of UPM 2012/2013 session, representing 10% of the sample size and of similar characteristics but did not receive the final version of the questionnaire. It was administered twice with an interval of ten (10) days between the first and second administration. Prior to the test, consent was obtained from the students and purpose of the research was explained at the same time anonymity was reassured. After the first test the students were told that they would be administered another questionnaire after a ten days and it was not disclosed to them that they would take the same questionnaire, this is done to minimise bias and recall effects among the students.

In the retest session, the same questionnaire was administered including all socio-demographic part even though most of these variables were considered constant for each student. No drop out was observed, as the questionnaire was retested immediately after lecture period and the cooperation among the respondents was good.Each questionnaire has a provision of matric number as such easy to identify and avoid confusion during data entry and analysis. Both sessions were recorded without reference to each other. Data was entered into statistical software using IBM-SPSS (statistical package for social sciences version 21) [45]. Test –retest reliability of categorical data for each question was assessed using the kappa agreement (k) because the responses were in nominal scale and the results were interpreted using [46] k value interpretation scale. Intra – class correlation coefficient (ICC) was used for test-retest reliability of continuous variables, and two – way mixed effect model was used for the analysis since it involves only one ratter. The values of ICC was interpreted similar to k , intra-class correlation coefficient can take on any value from 0 to 1, where higher value means higher agreement. However, there aren't any fixed ranges of the values that represent excellent

agreement, good agreement, weak agreement, and so on. The interpretation of the values depends on the situations and can be very subjective. In some cases, more than 0.9 will be required for a good agreement and 0.5 may be regarded as a mild or weak agreement[46, 47]. There was no any significant difference across the analysis, the value of k for the categorical variables ranges from 0.416 (moderate agreement) to 0.916 (near perfect agreement) and 1.00 for constant variables (socio-demographic variables)

3.6 Data analysis

The data was analysed using descriptive, bivariate and multivariate data analysis using IBM-SPSS version 21(SPSS Inc. Chicago, IL, USA). The descriptive analyses used frequency and percentage for qualitative variables and measure of central tendency and dispersion for quantitative variables. All quantitative variables were categorized for bivariate analysis. Chi-square test and a pair wise comparison (when applicable) were done to determine the association between the categorical variables. Level of significance was set at $\alpha=0.05$. If $P < 0.05$ simple logistic regression was used to identify the crudes odds ratio and their 95% CI for significant variables, and all variable that are significant were entered into multiple logistic regression using both forward and backward likelihood ratio test (Forward LR and Backward LR methods) to determine the preliminary model.

3.7 Ethical consideration

Ethical approval prior to this study was obtained from ethics committee for Research Involving Human of UPM (office of the vice chancellor research and innovations), approval was also obtained from Deans of selected faculties and participants were assured of the confidentiality of information and have signed the consent form before completing the questionnaire.

IV. Results

4.1 Characteristics of Respondents

TABLE 4.1 shows the distribution of respondents by their socio-demographic characteristics. The results indicated that the majority of the respondents were females (77.4%). Ages of participants' ranges from 18 to 25 with mean age \pm SD of 19.46 ± 0.971 , and the median age of 19 years and the IQR of 1. Most (71.4%) of the respondents are within the age group of < 20 .

Malays constitute the major (78.3%) ethnic group among the respondents followed by Chinese (12.8%), other tribes (6.2%) and the least is India (2.8%). The family income ranges from Minimum RM500 to Maximum RM16000 with median family income of RM 2500.00 and IQR of 3800.00. The family income was then classified in to two groups using the median family income (RM 2500.00). Low family income are those respondents whose family income is less than or equal to the median (≤ 2500) and constitute 51.5% (n= 391), high family income are those respondents whose family income is above the median (> 2500) and constitute 48.5% (n=368).

Socio demographic variable	Median	IQR	n	%
Gender (n=894)				
Male			202	22.6 ^d
Female			692	77.4 ^d
Age (n=879)^a				
< 20 years			628	71.4 ^d
≥ 20 years			251	28.6 ^d
Ethnicity (n=880)^b				
Malay			700	79.5 ^d
Chinese			114	13.0 ^d
Others			41	4.7 ^d
India			25	2.8 ^d
Family income (n=759)^c				
\leq RM 2500	2500	3800	391	51.5 ^d
$>$ RM 2500			368	48.5 ^d

Note (a) = 15 missing for age
 (b) = 14 missing for ethnicity
 (c) = 135 missing for Family income
 (d) = Valid percent

4.2 Prevalence of physical inactivity

TABLE 4.2 shows the distribution of respondents by Physical activities. The result showed the sum total of physical activities and the MET of each class of activity as well as the frequency and percentage of respondents according to the different physical activity levels, the respondents were then classified in to three categories as having ‘Low’, ‘Moderate’ or ‘high level of physical activity. From table 4.2, it can be seen that the prevalence of physical inactivity is 41.4% (proportion of respondents that are of the low physical activity level), 58.3% are of moderate level and only 0.3% are of the high physical activity level. It can also be said that 41.4% of the respondents are those whose physical activity levels is below 600 Met-minutes/week. Those respondents whose activity is equal to or above 600met-minutes/week (moderate and high) added up to 58.6% and could be referred to as physically active.

Table 4.2 Distribution Of Respondents By Physical Activities (N=894)

Physical Activities (Min/week)	Median	IQR	n	%
Vigorous	20.00	60.00		
Moderate	40.00	80.00		
Walking	90.00	60.00		
MET				
Vigorous	160.00	480.00		
Moderate	160.00	320.00		
Walking	297.00	198.00		
Level of physical activity				
Low			370	41.4
Moderate			438	58.3
High			86	0.3

4.3 Mental health status

TABLE 4.5 shows student responses to the Malaysian Mental Health Screening Instrument (SSKM-20). The total score ranged between 0 to 44 with the median and IQR, from the table it can be seen that majority of the respondents 60.7% (n=543) are of good mental health, they don’t have any probable cases of psychiatric or any mental related problems (total score <14). It was also found that 39.3% (n=351) of the respondents have indications or probable cases of mental health and related problems (total score ≥ 14).

Table 4.5 Malaysian Mental Health Screening Instrument (SSKM-20) (N=894)

Statement	n (%)	Median	IQR
Mental health cases		13	10
No	543 (60.7%)		
Yes	351 (39.3%)		

4.4 Distribution of respondent’s Physical activity Self-efficacy

The minimum score for physical activity self- efficacy is 8 while the maximum score is 31. The median score (22) was used to classify the respondents into two groups, those with high self-efficacy 53.1% (scores ≥ 22) and those with low self-efficacy 46.9% (scores < 22) as shown in Fig 4.1

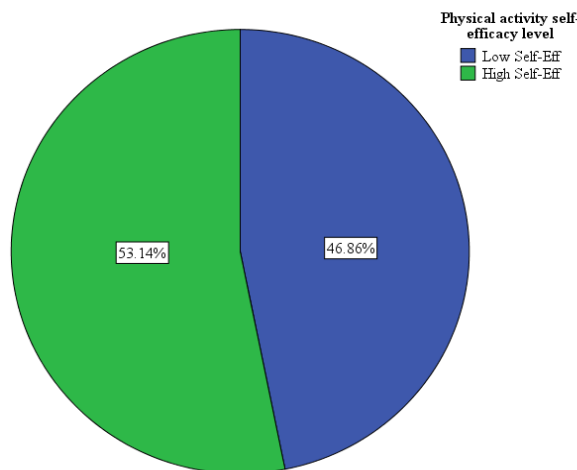


Fig 4.1 physical activity self efficacy levels (n=892)

4.5 Association between socio-demographic variables and Physical inactivity

TABLE 4.14 shows the association between socio-demographic factors and level of physical activities, the result indicates that the prevalence of physical inactivity is significantly higher in females (48%) than in males (18.8%), (χ^2 54.825, $p < 0.001$). Most of the respondents male (81.2%) and female (52.0%) are in the moderate and high physical activity levels (active) and almost twice as many as female respondents (48.0%) in low physical activity levels when compared to their male counterparts (18.8%). There is no significant association between the age groups of the respondents and levels of physical activity. In analysing physical activity levels with ethnicity, all other languages (Chinese, Indian and others) were merged as Non-Malay (n=194), this is because they comprise only a smaller proportions of the total respondents. The result showed that there was no association between physical activity levels and ethnicity.

Table 4.4 Association Between Socio-Demographic Factors And Level Of Physical Activities

Socio-demographic variables	Physical activity levels		χ^2	p
	Low(Inactive) n (%)	Moderate/High (Active) n (%)		
Sex			54.82	<0.001
Males	38 (18.8)	164 (81.2)		
Females	332 (48.0)	360 (52.0)		
Age group			0.004	0.951
<20	325 (41.6%)	457 (58.4%)		
≥20	40 (41.2%)	57 (58.8%)		
Ethnicity			0.602	0.438
Malay	285 (40.7)	415 (59.3)		
Non-Malay	85 (43.8)	109 (56.2)		
Family income			97.81	<0.001
≤ 2500 RM	245 (62.7)	146 (37.3)		
> 2500 RM	99 (26.9)	269 (73.1)		

4.6 Association between mental health status and physical inactivity

TABLE 4.16 shows association between mental health status and level of physical activities, the result indicates that the prevalence of physical inactivity is significantly higher among those who have probable mental health problems or psychiatric cases (48.1%) than those who have no mental health problems (37.0%), (χ^2 =10.890, $p < 0.001$).

Table 4.5 Association Between Mental Health Status And Levels Of Physical Activities

Variable	Physical activity levels		χ^2	p
	Low(Inactive) N (%)	Moderate/High(Active) N (%)		
Mental health problem			10.890	0.001
No	201 (37.0%)	342 (63.0%)		
Yes	169 (48.1%)	182 (51.9%)		

4.7 Association between self-efficacy and physical inactivity

TABLE 4.17 shows association between self-efficacy and level of physical activities, the findings revealed that there is a positive association between self-efficacy and levels of physical activities $p < 0.001$, the prevalence of physical inactivity is significantly higher among those with low self-efficacy (50.7%) compared with those with high self-efficacy (33.3%), (χ^2 = 27.654, $p < 0.001$).

Table 4.6 Association Between Self-Efficacy And Level Of Physical Activities

Variable	Physical activity levels		χ^2	p
	Low(Inactive) N (%)	Moderate/High(Active) N (%)		
Self-efficacy			27.654	<0.001
Low	212 (50.7)	206 (49.3)		
High	158 (33.3)	316 (66.7)		

4.8 Multivariate logistic

Multivariate logistic regression was performed to assess how well the impacts of the independent variables on physical inactivity are, the process contains inclusion of all independent variables which have been

previously shown to be significant both in bivariate chi square and in simple logistic regression analysis. Using enter method at the beginning, block (0) of the analysis has correctly classified 54.6% of the cases with $p < 0.01$ when no independent variable was used. When the model containing all the predictors were included, it was also found to be statistically significant with chi-square value of 167.300, degree of freedom of 4 and $p < 0.001$, thus indicating that the model was able to significantly distinguish between respondents who are physically active and inactive. It has explained between 19.8% (Cox and Snell R square) and 26.5 (Nagelkerke R square) of the variance in the levels of physical activities and the prediction increases to 70.5%. The chi-square value for Hosmer Lemeshow test is 9.430 with significant level of 0.223 indicating that the model is worthwhile and fit ($P > 0.05$).

The sensitivity or percentage of those accurately identified as true positives with possible characteristics of being inactive is 66.3% and the specificity or percentage of those truly negatives, those correctly identified as physically active is 74.1% (correctly predicted not to be physically inactive). The positive predictive value is 68.1% while the negative predictive value is 72.5%.

A further multiple logistic regression using both backward and forward stepwise likelihood test ('backward-L-R' and 'forward-L-R') was carried out, after exclusion and control of probable confounders, both methods produced similar result of predictors that are significantly associated with physical inactivity (Gender, family income, mental health status, self-efficacy levels). The significant variables from 'backward-L-R and forward-L-R' were then entered into the final model using enter method. The variable that were preserved in the final model are gender, family income, self-efficacy, mental health status among others.

In this final model, as shown in TABLE 4.7 the odds of becoming physically inactive is 3.7 times higher in females than in males (OR = 3.72, 95% CI = 2.399-5.788, $p < 0.001$). The odds of being physically inactive is 4.5 times higher among those with low family income (Family income \leq 2500 RM) when compared with those with high family income of $>$ 2500.00 RM (OR = 4.51, 95% CI = 3.266 – 6.241, $p < 0.001$). Respondents who have mental health probable cases are 1.5 times likely to become physically inactive when compared with those who do not have mental health probable cases (OR = 1.58, 95% CI = 1.136- 2.206, $p < 0.01$). The risk of being physically inactive is 1.8 times higher among those with low self-efficacy when compared to those with high self-efficacy (OR = 1.86, 95% CI = 1.350 -2.578, $p < 0.001$).

Table 4.7 Multiple Logistic Regression Of Predictors Of Physical Inactivity

Variables	B	SE	Wald	AOR	95% CI	P
Socio-demography						
Sex						
Males	1					
Females	1.314	0.224	34.347	3.723	2.399–5.778	0.000**
Family income						
\leq 2500	1					
$>$ 2500	1.507	0.165	83.267	4.515	3.266–6.241	0.000**
Mental health problem						
No	1					
Yes	0.459	0.169	7.380	1.582	1.136 - 2.203	0.007*
Self-efficacy						
High self-efficacy	1					
Low self-efficacy	0.624	0.165	14.280	1.866	1.350 - 2.578	0.000**

**Sig $p < 0.001$, *Sig $p < 0.01$

V. Discussion

5.1 Gender

Several studies on physical activity levels among adolescence have shown the difference between genders, with males being more active than females[48, 49]women are shown to be less active than men at all ages [50,51]. It has also been shown that female adolescence were 15 to 20 times less active than male adolescents [52]. A review of 51 cross-sectional studies by [53] also showed that gender (Males) were positively associated with physical activity. The prevalence of physical inactivity in this study was higher among females (48%) when compared with their male counterparts (18.8%) this findings is in line with several studies [54, 55, 56]. The odds in gender in this study can also be compared to findings by [57] which reveals that female adolescents were twice (45.1%) in low physical activity category when compared to males (22.1%).

5.2 Family Income

The high prevalence of physical inactivity among those with family income of $RM \leq 2500$ can be compared with other studies which also shows low family income to be inversely associated with physical activity among Malaysian adults [58]. People with low income have also been shown to suffer excessively from

physical inactivity related problems, twice as many low-income participants in a survey (31%) and 15% moderate income respondent's indicate safety as obstacles to physical inactivity as low income groups are more likely to indicate lack of sidewalks than high income groups [59].

5.3 Mental health

From the frequency distribution, majority of the respondents 60.7% (n=543) are of good mental health, they don't have any probable cases of psychiatric or any mental related problems while 39.3% (n=351) of the respondents have indications or probable cases of mental health and related problems. This is comparable with study in Malaysia even though using different assessment tool, the study also found that majority of Malaysian undergraduates (65.6% of respondents) are of good mental health while 34.4% of respondents of Malaysian undergraduates tend to have indication of mental health problems [60].

The proportion of respondents having indications for probable mental health problems in this study is comparable to the study by [61] in which the researchers found that 41.9% of medical students at a local university in Malaysia had emotional disorders. This study can further be compared with findings by [62] (even though lower) in which the researchers found that a total of 46.2% of medical students at a private medical school in Ipoh, Perak, Malaysia had emotional disorders.

The prevalence of physical inactivity among those with probable cases of mental health problems can be compared with a cross-sectional study by [63] which showed that engaging in physical education was inversely related with feeling sad (OR= 0.8, 95% CI 0.68 – 0.94) and doing more physical activity in a week was associated with a lower risk of considering suicide (OR= 0.72, 95% CI 0.65 – 0.79).

5.4 Self-Efficacy

The expectations or believe in the potentials or capabilities of individual to perform a task have been documented earlier to influence the task the individual wishes to undertake. Individual efficacy to do a task has been shown to be significant predictor of exercise and other health outcomes [64]. In this study the odds of being physically inactive is almost twice among those with low self-efficacy when compared with those with high self-efficacy (OR= 1.86, 95% CI=1.350 - 2.578, $p < 0.001$), this can be compared with study by [65] among Malaysian undergraduates university students, which reveals that self-efficacy was among the best predictors of physical activity ($B = 0.304$, $F(2, 1349) = 78.445$, $p = 0.00001$).

Previous research by [54,55] have all confirmed that self-efficacy was essential predictor of physical activity. Other studies by [66, 67, 68] have also shown that a moderate correlation exist between self-efficacy and participation in physical activity among youths as well as older population. Another study also revealed that between 3% to 25% of variance in physical activity is contributed by self-efficacy [58]. Self efficacy has also been shown to be positively associated with physical activity ($p = 0.02$) in a study comparing the correlates of physical activity among white and African American girls [69]. Self efficacy along with gender and age has also been shown to explain about 13% of overall physical activities among students (6% of adjusted variance in vigorous physical activities in physical education classes, 8% in other physical activities within the school and 15% in outside school physical activities) [70].

VI. Conclusion

The prevalence of physical inactivity found in this study is consistent with previous studies carried out in similar population, it therefore showed that there is no much reduction in the prevalence and this indicates that physical inactivity among this population has not been controlled, hence should not be overlooked in designing public health interventions.

6.1 Limitations

The study design was cross sectional, hence the relationships established between the predictors and outcome cannot be assured perfectly. The use of self report is easy to administer and cost effective but has limiting factor of recall bias and estimation error [71]. Also a limiting factor is the fact that some of the assessment tools were used in this population for the first time, while some are validated in recent time, others were validated long time ago.

6.2 Recommendations

Insufficient prevalence of physical activity among the female respondents is identified to be higher than the male respondent, it is therefore recommended that physical activity enlightenment campaign should be encouraged especially among the females. Just like observed in previous studies [72], Gender and family income are the only non-modifiable predictors of physical inactivity in this study were as the modifiable predictors are mental health status and self efficacy. Gender and family income were shown to be the strongest predictors of physical inactivity in this study. Increasing physical activity facilities, encouragement, peer support

and human resource within the university environment will improve physical activity opportunities and participation. The use of bicycle introduced in UPM within some colleges should be extended across the whole school. A one day in a week or month (NO BUS) with restriction of use of private vehicles by student on that particular day within the school should be assigned, so that students will be encouraged to use the bicycle or even walk. Significance and importance of physical activity should be re emphasized among the first year student curriculum.

It is also recommended that further studies should be carried out to find out more predictors of physical inactivity especially studies involving diet as well as using other objective measures to determine the physical inactivity levels among the undergraduates. While most student are not satisfied with their body images, it is a good chance to implement anti-obesity or exercise campaign among the undergraduates, the use of sport field and other physical activities facilities should be emphasized and encouraged.

Counselling of new student should involve experts in mental health management and student should be encouraged to develop high esteem and confidence in their day to day activities.

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