



**UNIVERSITI PUTRA MALAYSIA**

***FACTORS ASSOCIATED WITH PHYSICAL ACTIVITY LEVEL AMONG  
UNDERGRADUATES IN A PUBLIC UNIVERSITY, SELANGOR,  
MALAYSIA***

**ALHASSANY NOOR AHMED JAMEEL**

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By

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**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia in  
Fulfilment of the Requirements for the Degree of Master of Science**

**January 2020**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

## **FACTORS ASSOCIATED WITH PHYSICAL ACTIVITY LEVEL AMONG UNDERGRADUATES IN A PUBLIC UNIVERSITY, SELANGOR, MALAYSIA**

By

**ALHASSANY NOOR AHMED JAMEEL**

**January 2020**

**Chairman : Hazizi Abu Saad, PhD**  
**Faculty : Medicine and Health Sciences**

Steady increase in prevalence of physical inactivity is becoming a major health problem worldwide. The objective of this cross-sectional study was to determine the factors associated with physical activity among undergraduates in a public university in Selangor, Malaysia. A probability based on cluster sampling procedure was used in this study. The data collection was carried out from September 2018 to November 2018. Physical activity level was assessed using accelerometer, and Global Physical Activity Questionnaire (GPAQ). A set of questionnaires was used to determine socio-demographic characteristic (age, race, gender, educational level, income status, marital status, parent's job, parent's income, parent's education, and ethnic origin), and psychosocial factors (self-efficacy, social support and perceived benefit). Anthropometric measurement was conducted by measuring body weight, height, waist circumference of the respondents. Body weight was measured by using Omron Body Composition Analyzer, while height of the respondents was measured by using Seca Body meter. Dietary intake was assessed using 24 - hours diet recall for two days. A total of 261 bachelor's degree students (138 males, 123 females), 74.3% were in a range of (20-24 years) and 57.1% were Malay and 95.4% were single. Based on GPAQ the highest percentage of respondents (63.2%) were engaged in moderate physical activity, followed by 24.9% intense physical activity, then 11.9% low physical activity. Mean steps per day was  $7903 \pm 5370$  for men and  $7327 \pm 3438$  for women, mean PAL was  $1.36 \pm 0.18$  for males and  $1.4 \pm 0.18$  for females. Mean body mass index (BMI) was  $23.4 \pm 4.6$  kg/m<sup>2</sup>, mean total energy intake was lower ( $2325 \pm 384$  kcal for male), and higher ( $2228 \pm 385$  kcal for female) compared to the Recommended Nutrient Intake (RNI) for Malaysians. Mother allowance income ( $r=0.129$ ,  $p<0.05$ ), allowance income per month ( $r=0.184$ ,  $p<0.01$ ), friend support ( $r=0.131$ ,  $p<0.05$ ), self-efficacy ( $r=0.17$ ,  $p<0.01$ ), psychological outlook perceived benefit ( $r=0.170$ ,  $p<0.05$ ), social interaction PB ( $r=0.133$ ,  $p<0.05$ ), physical performance PB ( $r=0.170$ ,  $p<0.05$ ), and weight ( $r=0.132$ ,  $p<0.05$ ) showed a weak significant correlation with GPAQ. Physical activity by PAL were significantly correlated with age ( $r=-0.189$ ,  $p<0.01$ ), preventive health PB ( $r=0.133$ ,  $p<0.05$ ), and average energy expenditure ( $r=0.607$ ,  $p<0.01$ ). While physical activity based on steps per day showed a significant correlation with age ( $r=-0.170$ ,  $p<0.05$ ), mother's allowance

income ( $r=-0.194$ ,  $p<0.05$ ), family support ( $r=-0.182$ ,  $p<0.05$ ), energy expenditure ( $r=0.584$ ,  $p<0.01$ ), BMR ( $r=0.153$ ,  $p<0.05$ ), percentage of protein ( $r=-0.150$ ,  $p<0.05$ ), and height ( $r=0.152$ ,  $p<0.05$ ). Multivariate analysis in the present study revealed that the significant predictors of GPAQ were self-efficacy ( $t=1.97$ ,  $p=0.049$ ) and physical performance perceived benefit ( $t=3.08$ ,  $p=0.002$ ). The significant predictors with Physical activity based on accelerometer were age of the subject ( $t=-2.250$ ,  $p=0.026$ ) and preventive health perceived benefits ( $t=2.508$ ,  $p=0.013$ ). The significant predictors of physical activity according to the steps were age ( $t=-2.529$ ,  $p=0.01$ ), family support ( $t=-2.058$ ,  $p=0.04$ ), and mother's income per month ( $t=-2.155$ ,  $p=0.03$ ). In conclusion, based on the physical activity levels obtained using the accelerometer and steps/day, the majority of the respondents in our study were sedentary. However, the prevalence of sedentary lifestyles was lower when activity levels were assessed using self reported method (GPAQ). Based on multiple linear regression, the physical activity level is related to student's perceive benefits toward physical activity, individual's self-efficacy, family support, age and mother income.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

**FAKTOR-FAKTOR YANG BERKAITAN DENGAN AKTIVITI FIZIKAL  
DALAM KALANGAN MAHASISWA DI UNIVERSITI AWAM DI  
SELANGOR, MALAYSIA**

Oleh

**ALHASSANY NOOR AHMED JAMEEL**

**Januari 2020**

**Pengerusi : Hazizi Abu Saad, PhD**  
**Fakulti : Perubatan dan Sains Kesihatan**

Peningkatan prevalens sedentari secara berterusan menjadi masalah kesihatan utama di seluruh dunia. Objektif kajian keratan rentas ini adalah untuk mengenalpasti faktor yang berkaitan dengan aktiviti fizikal dalam kalangan mahasiswa di universiti awam di Selangor, Malaysia. Persampelan berdasarkan kebarangkalian melalui prosedur persampelan berkelompok telah digunakan dalam kajian ini. Pengumpulan data telah dijalankan dari September 2018 hingga November 2018. Tahap aktiviti fizikal dinilai menggunakan accelerometer, dan soal selidik aktiviti fizikal global (GPAQ). Satu set borang soal selidik telah digunakan untuk menentukan ciri sosioekonomi (umur, bangsa, jantina, tahap pendidikan, status pendapatan, status perkahwinan, pekerjaan ibu bapa, pendapatan ibu bapa, pendidikan ibu bapa, dan etnik) dan faktor psikososial (effikasi sendiri, sokongan sosial dan persepsi faedah). Pengukuran anthropometrik dilakukan dengan mengukur berat badan, ketinggian, dan lilitan pinggang responden. Berat badan diukur dengan menggunakan penganalisis komposisi tubuh Omron, manakala ketinggian responden diukur dengan menggunakan pengukur tinggi Seca. Pengambilan diet dinilai dengan menggunakan ingatan pengambilan diet 24-jam untuk 2 hari. Sejumlah 261 pelajar Ijazah Sarjana Muda (138 lelaki, 123 perempuan), 74.3% adalah dalam julat umur 20-24 tahun dan 57.1% adalah Melayu dan 95.4% adalah bujang. Berasaskan GPAQ peratus tertinggi (63.2%) responden dikelaskan dalam kategori aktiviti fizikal sederhana, diikuti dengan 24.9% aktiviti fizikal yang lasak, manakala 11.9% dalam kategori aktiviti fizikal yang rendah. Min langkah setiap hari adalah  $7903 \pm 5370$  untuk lelaki dan  $7327 \pm 3438$  untuk wanita, min PAL adalah  $1.36 \pm 0.18$  untuk lelaki dan  $1.4 \pm 0.18$  untuk wanita. Min indeks jisim tubuh (BMI) adalah  $23.4 \pm 4.6 \text{ kg/m}^2$ , min jumlah pengambilan tenaga adalah  $2325 \pm 384 \text{ kcal}$  untuk lelaki dan  $2228 \pm 385 \text{ kcal}$  untuk wanita, lebih rendah berbanding dengan pengambilan nutrien yang disyorkan (RNI) untuk rakyat Malaysia. Pendapatan ibu ( $r = 0.129, p < 0.05$ ), pendapatan isirumah sebulan ( $r = 0.184, p < 0.01$ ), sokongan rakan ( $r = 0.131, p < 0.05$ ), effikasi sendiri ( $r = 0.17, p < 0.01$ ), persepsi faedah aktiviti fizikal ( $r = 0.170, p < 0.05$ ), interaksi sosial PB ( $r = 0.133, p <$

0.05), prestasi fizikal PB ( $r = 0.170$ ,  $p < 0.05$ ), dan berat ( $r = 0.132$ ,  $p < 0.05$ ) menunjukkan korelasi yang signifikan dengan GPAQ. Aktiviti fizikal oleh PAL adalah berkorelasi dengan signifikan dengan umur ( $r = -0.189$ ,  $p < 0.01$ ), pencegahan kesihatan PB ( $r = 0.133$ ,  $p < 0.05$ ), dan purata penggunaan tenaga ( $r = 0.607$ ,  $p < 0.01$ ). Aktiviti fizikal berdasarkan langkah setiap hari menunjukkan korelasi yang signifikan dengan umur ( $r = -0.170$ ,  $p < 0.05$ ), pendapatan ibu ( $r = -0.194$ ,  $p < 0.05$ ), sokongan keluarga ( $r = -0.182$ ,  $p < 0.05$ ), penggunaan tenaga ( $r = 0.584$ ,  $p < 0.01$ ), BMR ( $r = 0.153$ ,  $p < 0.05$ ), peratusan pengambilan protein ( $r = -0.150$ ,  $p < 0.05$ ), dan ketinggian ( $r = 0.152$ ,  $p < 0.05$ ). Analisis multivariat dalam kajian ini menunjukkan bahawa peramal signifikan GPAQ adalah effikasi sendiri ( $t = 1.97$ ,  $p = 0.049$ ) dan faedah yang dilihat melalui prestasi fizikal ( $t = 3.08$ ,  $p = 0.002$ ). Peramal yang signifikan dengan aktiviti fizikal berdasarkan accelerometer adalah umur subjek ( $t = -2.250$ ,  $p = 0.026$ ) dan faedah pencegahan kesihatan yang dilihat ( $t = 2.508$ ,  $p = 0.013$ ). Peramal penting aktiviti fizikal berdasarkan jumlah langkah harian adalah umur ( $t = -2.529$ ,  $p = 0.01$ ), sokongan keluarga ( $t = -2.058$ ,  $p = 0.04$ ), dan pendapatan ibu setiap bulan ( $t = -2.155$ ,  $p = 0.03$ ). Kesimpulannya, berdasarkan tahap aktiviti fizikal yang diukur menggunakan accelerometer dan langkah/hari, majoriti responden dalam kajian ini adalah sedentari. Namun, prevalens rendah tahap aktiviti fizikal adalah lebih rendah apabila dinilai dengan menggunakan kaedah melaporkan sendiri (GPAQ). Berdasarkan ujian multivariat regresi linear, tahap aktiviti fizikal adalah berkaitan dengan persepsi faedah yang diperolehi daripada aktiviti fizikal, efikasi sendiri, sokongan keluarga, umur dan pendapatan ibu.

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**Hazizi Abu Saad, PhD**

Associate Professor  
Faculty of Medicine and Health Sciences  
Universiti Putra Malaysia  
(Chairman)

**Zalina Abu Zaid, PhD**

Senior Lecturer  
Faculty of Medicine and Health Sciences  
Universiti Putra Malaysia  
(Member)

---

**ZALILAH MOHD SHARIFF, PhD**

Professor and Dean  
School of Graduate Studies  
Universiti Putra Malaysia

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## TABLE OF CONTENTS

	<b>Page</b>
<b>ABSTRACT</b>	i
<b>ABSTRAK</b>	iii
<b>ACKNOWLEDGEMENTS</b>	v
<b>APPROVAL</b>	vi
<b>DECLARATION</b>	viii
<b>LIST OF TABLES</b>	xiv
<b>LIST OF ABBREVIATIONS</b>	xv
<b>CHAPTER</b>	
<b>1 INTRODUCTION</b>	<b>1</b>
1.1 Study Background	1
1.2 Problem Statement	2
1.3 Significance of the Study	4
1.4 Research Questions	5
1.5 General Objective	6
1.6 Specific Objectives	6
1.7 Research Hypothesis	6
1.8 Conceptual Framework	7
<b>2 LITERATURE REVIEW</b>	<b>10</b>
2.1 Introduction of Physical Activity	10
2.2 Prevalence of Physical Inactivity among the World	10
2.2.1 Among Adults Aged 18+ Years	10
2.2.2 Among Adolescents Aged 11–17 Years	11
2.3 Prevalence of Physical Inactivity in Malaysia	12
2.4 Prevalence of Physical Inactivity among University Students	12
2.5 Comparison Between Self-Reported Questionnaire, and Accelerometer	13
2.6 Factors Associated with Physical Activity	14
2.6.1 Socio-demographic Factors	14
2.6.2 Psychosocial Factors	16
2.6.3 Nutritional Status	19
<b>3 METHODOLOGY</b>	<b>21</b>
3.1 Research Design	21
3.2 Location of the Study	21
3.3 Study Respondents	21

3.4	Eligibility to Enter the Study	21
3.4.1	Inclusion Criteria	21
3.4.2	Exclusion Criteria	21
3.5	Sample Size Calculation	22
3.6	Sampling Procedure	23
3.6.1	Sampling Methods	24
3.7	Study Instrument	26
3.7.1	Section A: Socio-demographic Factors	26
3.7.2	Section B: Psychosocial Factors	26
3.7.3	Section C: Nutritional Status	27
3.7.4	Section D: Physical Activity Status	30
3.8	Normality Test	32
3.9	Data Collection	33
3.10	Data Analysis Tool	34
3.11	Ethics Approval	34
<b>4</b>	<b>RESULTS</b>	<b>35</b>
4.1	Response Rate	35
4.2	Descriptive of Socio-demographic Characteristic	35
4.3	Descriptive of Psychosocial Factors Toward Physical Activity	39
4.3.1	Self-efficacy for Physical Activity	39
4.3.2	Family and Friend's Support Toward Physical Activity	41
4.3.3	Perceived Benefit for Physical Activity	42
4.4	Nutritional Status	46
4.4.1	Anthropometric Measurement	46
4.4.2	Energy and Nutrient Intake	47
4.5	Assessment of Physical Activity	49
4.5.1	Description of Physical Activity based on GPAQ	49
4.5.2	Description of Physical Activity Level by Steps/Day and PAL	49
4.6	Distribution of the Respondents by Gender and Physical Activity Level as Assessed by GPAQ, Accelerometer, and Steps/Day	50
4.7	Association between the Respondent's Variables and Physical Activity	51
4.7.1	The Association between Socio-demographic Characteristic and Physical Activity level of the Respondents as Determined by GPAQ, PAL, and Steps/Day	51
4.7.2	Association between Psychosocial Factors and Physical Activity Level of the Respondents as Determined by GPAQ, PAL, and Steps/Day	52

4.7.3	Association between Nutritional Status and Physical Activity Level of the Respondents as determined by GPAQ, PAL, and steps/day	53
4.7.4	Association between the Individual Factors and the Physical Activity Levels (GPAQ)	54
4.7.5	Association between the Categorical Variables with Physical Activity from Steps/Day	56
4.7.6	Association between the Categorical Variables with Physical Activity Category Derived from Total Daily Energy Expenditure	57
4.8	Multiple Linear Regression for Physical Activity based on GPAQ	58
4.9	Multiple Linear Regression for Physical Activity based on Accelerometer (PAL)	60
4.10	Multiple Linear Regression for Physical Activity based on Steps/Day	60
<b>5</b>	<b>DISCUSSION</b>	<b>62</b>
5.1	Socio-demographic Characteristics	62
5.1.1	Age	62
5.1.2	Gender	62
5.1.3	Ethnic Group	63
5.1.4	Parent's Income	63
5.1.5	Parent's Education	64
5.2	Psychosocial Factors	65
5.2.1	Self-efficacy	65
5.2.2	Perceived Family Social Support	66
5.2.3	Perceived Friends Social Support	66
5.2.4	Perceived Benefit	67
5.3	Nutritional Status	68
5.3.1	Body Mass Index	68
5.3.2	Waist Circumference	69
5.3.3	Dietary Intake	70
5.4	Physical Activity of the Respondents	71
5.5	Factors Associated with Physical Activity	72
5.5.1	Socio-Demographic Factors and Physical Activity	72
5.5.2	Psychosocial Factors and Physical Activity	76
5.5.3	Nutritional Status and Physical Activity	79
	5.5.3.1 Body Mass Index and Physical Activity	79
	5.5.3.2 Waist Circumference and Physical Activity	80
	5.5.3.3 Dietary Intake and Physical Activity	80
5.6	Predictor of Physical Activity	81

<b>6</b>	<b>SUMMARY, CONCLUSION, LIMITATION AND RECOMMENDATIONS FOR FUTURE RESEARCH</b>	86
6.1	Summary and Conclusion	86
6.2	Limitation of the Study	87
6.3	Strength of the Study	88
6.4	Recommendation for Future Studies	89
	<b>REFERENCES</b>	90
	<b>APPENDICES</b>	109
	<b>BIODATA OF STUDENT</b>	123
	<b>PUBLICATION</b>	124



## LIST OF TABLES

<b>Table</b>	<b>Page</b>
3.1 International Diabetes Federative (IDF) cut-off Point for Waist Circumference Measurements	28
3.2 Classification of BMI (kg/m <sup>2</sup> )	28
3.3 MET Values of Each Domain (GPAQ Analysis Guide)	30
3.4 GPAQ Analysis Classification	31
3.5 Classification of Physical Activity Level Based on Steps Count	32
3.6 Classification of physical activity level according to PAL value	32
4.1 Distribution of Respondents by Sociodemographic Factors	36
4.2 Distribution of Respondents by Self-Efficacy Factors	40
4.3 Self-Efficacy Score among Study Respondents	41
4.4 Family and Friend's Support Toward Physical Activity	41
4.5 Distribution of Respondent's Perceived Benefit Toward Physical Activity	43
4.6 Distribution of the Respondents Perceived Benefit Category Toward Physical Activity	46
4.7 Distribution of the Respondents Based on Body Weight, Height, BMI, And Waist Circumference.	47
4.8 Distribution of Respondent by Energy and Nutrients Intake	48
4.9 Distribution of Respondents by Physical Activity Level using GPAQ	49
4.10 Classification of Physical Activity Levels by Steps/day and PAL Using Accelerometer	50
4.11 Distribution of the Respondents by Gender and Physical Activity Level as Assessed by GPAQ, Accelerometer, and Steps/Day	51
4.12 Correlation between Physical Activity and Sociodemographic Factors (Correlation Coefficient Sig. (2-tailed)	52
4.13 Correlation between Physical Activity and Psychosocial Factors (Correlation Coefficient Sig. (2-tailed)	53
4.14 Correlation between Physical Activity and Nutritional Status (Correlation Coefficient Sig. (2-tailed).	54
4.15 Association between the Individual Factors and the Physical Activity Levels Represented by (GPAQ) of the Respondents (N=261)	55
4.16 Describe the association between the categorical variables with PA Category from the Steps N=205	57
4.17 Describe the Association between Categorical Variables and Physical Activity Derived from TDEE	58
4.18 Multiple Linear Regression for physical activity based on GPAQ	59
4.19 Multiple Linear Regression for Physical Activity based on Accelerometer (PAL)	60
4.20 Multiple Linear Regression for Physical Activity Based on Steps per Day	61

## LIST OF ABBREVIATIONS

WHO	World Health Organization
MDG	Malaysian Dietary Intake
BMI	Body Mass Index
WC	Waist Circumferences
GPAQ	Global Physical Activity Questionnaire
BMR	Basal Metabolic Rate
PA	Physical Activity
TDEE	Total Daily Energy Expenditure
PASES	Physical Activity Self-Efficacy Scale
SGR	Surgeons General Report
SCT	Social Cognitive Theories
MLR	Multiple Linear Regression
RNI	Recommended Nutrient Intake
EI	Energy Intake
MVPA	Moderate Vigorous Physical Activity
MET	Metabolic Equivalent Tasks
DLW	Doubly Labeled Water
EE	Energy Expenditure
PB	Perceived Benefit
PAL	Physical Activity derived from Total Daily Energy Expenditure

## CHAPTER 1

### INTRODUCTION

#### 1.1 Study Background

Physical activity is characterized as “the bodily movement that is delivered by the contraction of skeletal muscle and that essentially increases the energy spending”. The term “physical activity” in this way incorporates the full scope of human movement ranging from exercise and competitive sports to activities or interests or hobbies that we are engaged with day-by-day living. On the other hand, “the state in which bodily movement is negligible and energy spending is estimated to be at the resting metabolic rate” is portrayed as the state of physical inactivity (World Health Organisation, 2010). The total energy spending is affected by the physical activity and the total energy spent during a fasting period or during the resting period in a neutrally temperate environment is referred to as “Basal Metabolic Rate (BMR)”. Dietary-initiated thermogenesis refers to the “thermic effect of food”. The totality of the BMR, energy expended in PA, and the thermic effect of food adds up to the total energy expenditure (Department of Health, 1991).

It has been estimated that physical inactivity accounts for about 3.2 million deaths globally, ranking as the fourth driving risk factor for global mortality. Of the expected 3.2 million deaths due to physical inactivity, 2.6 million deaths occur in the low-and middle-income nations. To contribute a gauge of the worldwide predominance of physical inactivity, researchers have produced evidence from multisite investigations and researches. From the pooled investigations of PA data in 76 nations, it seemed that one out of five grown-ups are physically inactive. In particular, the worldwide predominance of physical inactivity among grown-ups was 17% (WHO, 2010). A WHO survey clearly stated that, in 51 countries, 18% of the population is physically inactive. The level of physical inactivity was found to be the highest in Malaysia (16.5%) among the countries in the Western Pacific Region that participated in the survey. The level of physical inactivity is ascending in developing nations, and Malaysia is of no special case (Bauman et al., 2009). This suggests the need for continued efforts toward the promotion of PA in such nations. The Ministry of Health, Malaysia, has led the “Healthy Lifestyle Campaign” from early 1991 with the core theme of “Be Healthy forever”. The aim of the campaign was to accentuate four primary segments: “adhering to healthy eating, exercise, and physical activity, not smoking, and managing stress, to lead a healthy and wholesome lifestyle among Malaysians”. Likewise, “the Malaysian Dietary Guidelines (MDG)” has recommended a routine to promote PA. The PA comprised of gathering of at least 30 min of moderate intensity PA on a daily basis for at least five days each week (or even daily) (Tee, 2011).

Several studies on the use of an accelerometer for evaluating the level of PA have been reported in various developed nations (Slootmaker et al., 2009; Tudor-Locke et al., 2010); however, there is limited data on the use of this technique to evaluate the PA



level of the Malaysian population. Self-report strategy was implemented in most of the investigations that have surveyed PA in Malaysia and these investigations incorporate “the My-NCD Malaysia Surveillance 2005/2006, the National Health and Morbidity Survey III” (The Institute for Public Health, 2011).

Hazizi et al., (2012) used an accelerometer to evaluate the PA status among Malaysian government workers and found about 65% of the participants to be physically inactive while about 50.2% of them were obese or overweight. There were strong and negative relationships between PA level and BMI ( $r = -0.3530$ ,  $p < 0.050$ ), percentage body fat ( $r = -0.3940$ ,  $p < 0.050$ ), and waist circumference ( $r = -0.1980$ ,  $p < 0.050$ ). The chances of having a BMI  $\geq 25\text{kg/m}^2$  (OR= 2.80, 95 % CI 1.550 - 5.050), an unhealthy body fat level (OR= 3.01, 95 % CI 1.410 - 6.440), and a-risk classified waist circumference (OR= 1.79, 95% CI 1.01 - 3.20) is higher among inactive persons compared to the moderate to active persons. The male respondents exhibited a higher total daily energy spending compared to the females as recorded with measured by the accelerometer ( $P < 0.05$ ).

Physical activity has now been recognized as a vital piece of a healthy lifestyle, and recent scientific confirmation has connected consistent PA to an extensive variety of physical and psychological wellness benefits. The protective impacts of differing strength between PA and the risk for certain diseases (such as Type II diabetes mellitus, coronary heart disease, hypertension, colon tumor, and osteoporosis) have been demonstrated previously (WHO, 2010). Even though researches have recognized a positive relationship between expanded levels of PA and better mental well-being, lower levels of anxiety, and less depression, there is still a genuine absence of hard proof in psychological well-being to help the proportional relationship as has been set up amongst exercise and physical wellbeing. In the meantime, it has been estimated among health professionals and the public in general that, as a rule, the psychosocial advantages of PA for mental health or wellness may exceed the physical advantages.

## **1.2 Problem Statement**

Physical activity is a perplexing behavior that is affected by a many external and internal component, for example, psychological-cognitive, socio-cultural and social environment encompassing the individual. The understanding on how the elements influences the behavioral change is vital in developing educational programs and intercession strategies that will enhance to escalate the levels of physical activity in young adult.

To date, except for Japan, there is still a lack of published research of measuring physical activity level by using objective measurement in Asian countries including Malaysia. So that, measuring the physical activity level with a greater accuracy and precisely by using accelerometer, offer a potential answer to overcome the limitation of self-reported technique.

There are many determinants of PA and among these determinates, the most documented is the relationship with biological and demographic variables. Age and gender are certainly the most stable demographic correlates of PA behavior among adults (Trost et al., 2002). Numerous studies have reported men to generally have a tendency to be more active than ladies (Scheerder et al., 2002; Sjöström et al., 2006; Santos et al., 2008). The probability of being inactive augmented with increasing of age (Muntner et al., 2005; Sjöström et al., 2006).

Furthermore, Sallis & Saelens, (2000) discovered that physical activity reductions arise earlier in females, for the most part for energetic activities. Based on the sample of Scotland' adults likewise acknowledged that sporting and team activities are seldom attempted throughout the later adult life stage, particularly among women and individuals from disadvantage conditions (Hunt et al., 2001). Discoveries of both cross-sectional (Leslie et al., 2001) and longitudinal data (Calfas et al., 2000) demonstrated a steady decrease in the physical activity amid the youthful adulthood, that could be explained by changes in needs (specifically new time requirements as an outcome of entering the workforce or beginning a family). The increased demand on time and the emergence of environmental obstructions identified with convenience, accessibility and cost were also the added explanation. Few investigations found that married individuals are more active than single individuals are (Lee & Bhargava, 2004), while others reported none (Booth et al., 2000; Brownson et al., 2000).

Overweight likewise also emerged as a stable factor, with negative effect on physical activity in the grown-ups (Oppert et al., 2006; Chen & Mao, 2006). However, in Mota (2009) the relationship between day-by-day physical activity and Body Mass Index (BMI) was not strong, but rather there is a trend for overweight subjects to be less engaged with the different activities and exercises. Past exercise conduct, dietary propensities, smoking status and decisional balance were the main behavioral qualities and aptitudes inspected in the new investigations among adults (grown-ups).

As per De Bourdeaudhuij et al., (2005), “self-efficacy which is the belief of an individual in his/her personal capability to be physically active on a daily basis, coupled with perceived benefits (such as health, appearance, social, competition and pleasure) and obstructions (such as lack of interest/time, health-related problems, and psychological problems)” showed the strongest correlation with PA behavior among Portuguese and Belgian adults.

A study among Indian women showed social support to have a direct correlation with PA as it was observed that women with high PA social support were approximately twice active compared to those with low PA social support (Mathews et al., 2016). These gadgets are compact in size and shape, as well as it can store data for numerous days, and are progressively reasonable and dependable. Many research studies demonstrate that the most grounded factors related with PA among adults are family influences, physical education/school sports participation, parental PA status for boys, parental education/support, goal orientation/motivation, friend support, self-efficacy, gender, and attitude.

The lifestyle of college students sticks to unhealthy dietary plans and physical inactivity. The variables, for example, social cultural environment, socio-economic status, socio-demographic, intake of nutrients and dietary habits, knowledge, active recreation, smoking habits, anxiety and depression can affect the student's behavior. Deciding the relation of intrapersonal, social environmental, nutritional status with physical action level among the college understudies by utilizing accelerometer was the goal of the research. Thus, Understanding the corresponds factors that are related with physical activity (PA) in youth is expected to better advise the improvement of compelling intercession approaches endeavoring to halt the obesity epidemic, and accelerometer, which measure movement intensity, offer a potential answer for issues with self-reported data.

Students in university environment are a set of students who came from a previous controlled school and homes to a less controlled and structured university environment and campus. These change in environment, in addition to time constrain due to course workload with high expectation on academic performance their ability to do physical activity regularly. A study by Ebben & Brudzynski, (2008) among 1044 participants average age  $20.5 \pm 5.77$  years also reported that a reason for lack of exercise among college students in tertiary institution is “no time”, “laziness”, “other priorities”, “lack of motivation”, “tiredness”, and” more school workload”.

To date, most research on the correlates of physical activity has concentrated on high-salary, western nations. The past investigation established that, levels of physical activity were inferior for those with higher educational levels and superior emotional state of internal control. This study, thus, concentrates completely on physical activity as the major area of interest. It gives significantly more in-depth investigations and understandings of the associates of physical activity by the use of accelerometer, and in addition to it, this study shed lights in its relationship to numerous demographics, psychosocial variables and nutritional status. Since Malaysia is a multicultural country with extensive segments of the population with different mixed culture majorly as Malay, Chinese, and Indian, we felt it imperative to observe better, how such social elements relate with physical activities, or the lack thereof.

### **1.3 Significance of the Study**

Physical activity is an imperative part in preventing diseases. Thus, there are developing number of studies investigating the components that influence the physical activity in developed nations. These investigations found that health factors and socio-demographic such as, salary, age, gender, educational qualification, marital status, ethnicity, and self-perceived health status could influence a person's choice to take an interest as well as participation in physical activity. In spite a superior knowledge and understanding of the components related with involvement in physical activity is essential, there is just a single nationwide study concentrating on this topic in Malaysia (Cheah & Poh, 2014). Yet, the investigation did not consider the impact of health on participation in physical activity and did not evaluate the popularity of physical activities among the respondents.

Thus, the objective of the current study is also to decide the correlates related with the physical activity level utilizing the accelerometer.

Briefly, the contribution of the present investigation to the literature and society are significant in the four ways. Firstly, in addition to socio-demographic variables, the present study comprises numerous significant variables like psychosocial and nutritional status. Secondly, accelerometer, which measure the movement intensity offer a potential answer for issue of self- reported data. Thirdly, the concentration of the present examination is on a multiethnic developing nation, Malaysia, where physically inactive adults (grown-ups) are extremely prevalent and only couple of studies exist. Finally, the fourth, the discoveries of the present investigation can provide the government with pattern data and information for strategy as well as policy creation and development.

The outcomes of this investigation could assist in the set up a national polices, plan and program to promote physical activity with a specific end goal to help youngsters to change unhealthy lifestyle habits and increment physical activity and along these lines enhance their health. Most importantly, understanding the connection between the physical activity and associated variable that can enhance policy to improve the health of young adult, and understanding the associates of physical activity and inactive practices in youth will bolster the advancement of successful intercessions that can promote a physically dynamic and active way of lifestyle and prevent inactive way of lifestyle. Globally in 2016, 23% of men and 32% of women aged 18+ years were insufficiently physically active. So that, investigating the factors that influence the youthful adults could limit the consequence of future epidemics of inactivity and contribute to active global of prevention of non-communicable diseases. Physical activity and fitness should stay on top the priority of any country. It was found that physical activity decreases from high school to the college, and most of the college students claim a reduce in physical activity after their graduation. An investigation survey into physical activity index among Malaysian youth showed that at the age of 21, they are more active from the rest of the ages; but, at the age of 22 and older, these young people reduce physical activities (Salamudin & Harun, 2013).

#### **1.4 Research Questions**

1. What are the socio-demographic characteristic (age, race, gender, educational level, income status, marital status, parent's job, parent's income, parent's education, and ethnic), psychosocial factors (self-efficacy, social support, and perceived benefit) and nutritional status (height, weight, BMI, waist circumference and dietary intake), and physical activity among undergraduates in a public university in Selangor, Malaysia?
2. What are the relationship between demographic, psychosocial and nutritional status associated with physical activity among undergraduates in a public university in Selangor, Malaysia?

3. What are the main predictors for physical activity among undergraduates in a public university in Selangor, Malaysia?

## **1.5 General Objective**

To determine the factors associated with physical activity among undergraduates in a public university in Selangor Malaysia.

## **1.6 Specific Objectives**

The specific objectives of this study are as below:

- 1 To determine the socio- demographic (age, race, gender, educational level, income status, marital status, parent's job, parent's income, parent's education, and ethnic), psychosocial factors (self –efficacy, social support and perceived benefit) and nutritional status (BMI, waist circumference, dietary intake and weight and height) among undergraduates in a public university in Selangor, Malaysia.
- 2 To determine the physical activity level using Global physical activity questionnaire (GPAQ) and accelerometer among undergraduates in a public university in Selangor, Malaysia.
- 3 To determine the relationship between demographic, psychosocial and nutritional status associated with physical among undergraduates in a public university in Selangor, Malaysia.
- 4 To determine the most important predictors for physical activity among undergraduates in a public university in Selangor, Malaysia.

## **1.7 Research Hypothesis**

1. There is significant association between socio-demographic factors (age, gender, educational level, income status, parent's job, parent's income, parent's education and ethnicity) and level of physical activity among undergraduates in a public university in Selangor, Malaysia.
2. There is significant association between psychosocial variable (self- efficacy, social support, perceived benefit) and level of physical activity among undergraduates in a public university in Selangor, Malaysia.
3. There is significant association between nutritional status (dietary intake, body fat percentage, weight and height, BMI, waist circumference) and the level of

physical activity among undergraduates in a public university in Selangor, Malaysia.

4. There is a significant predictor for physical activity level among undergraduates in a public university in Selangor, Malaysia.

## 1.8 Conceptual Framework

In view of 68 examines reviewed by (Gonçalves et al., 2017) into correlates from low-income and middle-income nations, the most frequently reported classifications of correlated revealed are demographic and biological classifications, among which race, age, education level, socioeconomic status, marital status, gender and ethnic origin are the most reliable and consistent. Among all the determinants of PA, its correlation with biological and demographic factors are the most documented. Age and gender are no doubt the most consistent and reliable demographic correlates of PA behavior in adults (Troost et al., 2002). As observed in high-income nations, male, youthful, and wealthy groups are more dynamic and active than others. These examinations demonstrated that there is a positive relationship between socioeconomic status and PA in low and middle-income nations and the relationship is inverse and inconsistent in comparison to high-income nations. Many investigations have incorporated the intrapersonal correlates of PA which exploits the advantage of “psychological, cognitive, and emotional drives” on the determinants of PA. Among these correlates are “confidence, perceived competence, perceived physical appearance/body image, attitudes, achievement orientation, intention, general barriers, knowledge of exercise/health, stage of change, self-efficacy, enjoy exercise, stress, self-esteem and depression” (Troost et al., 2002). The factors in this study are derived from theoretical models, for example, “Theory of Reasoned Action and Planned Behavior (Fishbein & Ajzen, 2011), the Health Belief Model (Becker & Maiman, 1975), and Trans hypothetical Model” (Prochaska et al., 2015).

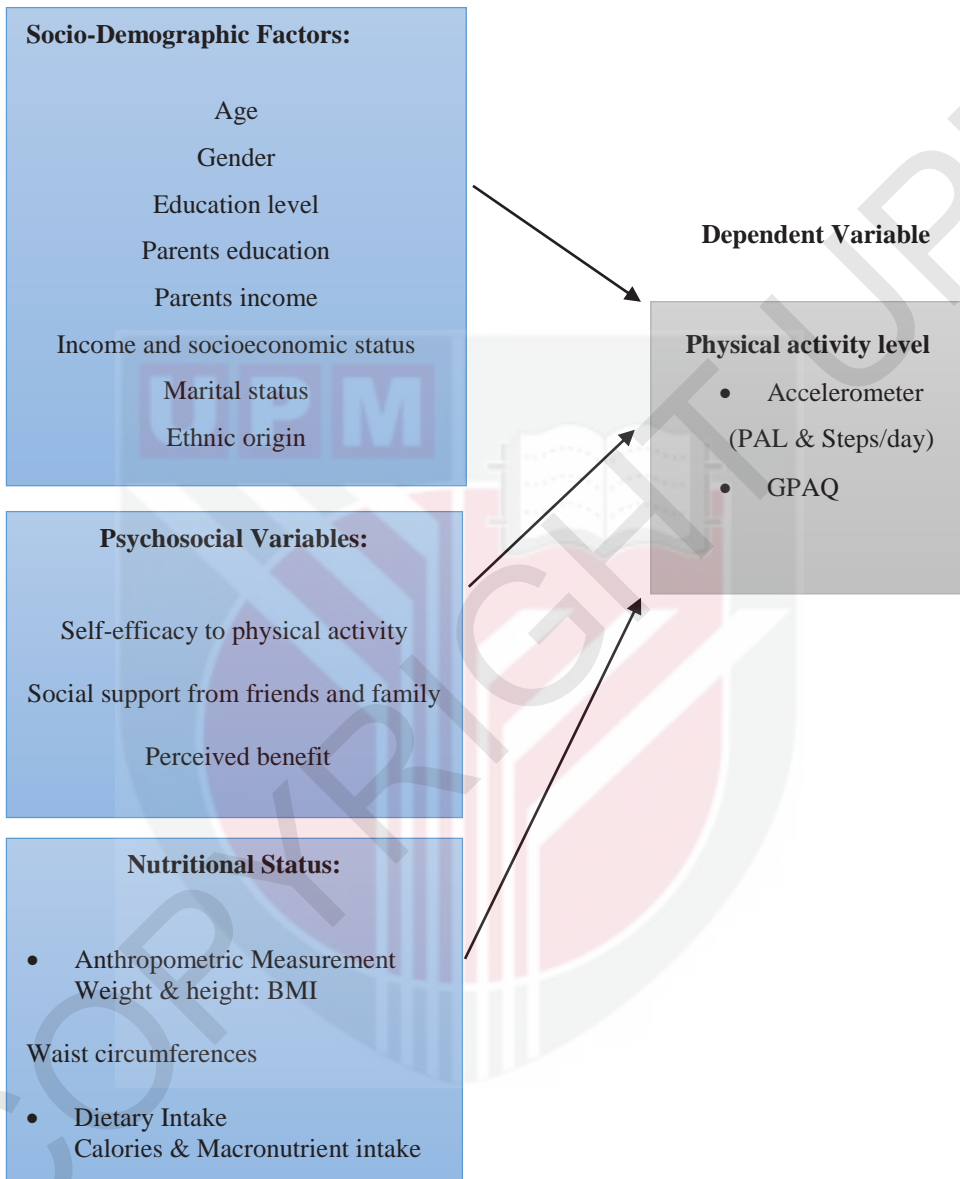
As discussed earlier, De Bourdeaudhuij et al., (2005) observed that “self-efficacy which is the belief of an individual in his/her personal capability to be physically active on a daily basis, coupled with perceived benefits (such as health, appearance, social, competition and pleasure) and obstructions (such as lack of interest/time, health-related problems, and psychological problems)” showed the strongest correlation with PA behavior among Portuguese and Belgian adults. Several studies have reported a positive correlation between PA behavior and social support from friends, peers, and family in organized settings (Mathews et al., 2016). The influence of social support on PA could be direct (such as group exercise or taking care of kids for a partner to exercise) or indirect (such as inspiring a relative or friend to be more active) (Sallis et al., 1987).

Weight, height, BMI, waist circumference, and dietary intake are inserted in the nutritious status. Weight status is often a predictor of PA level. Studies have shown that overweight persons are often less active compared to normal-weight persons. The question then is, does weight increase contribute to inactivity or does inactivity contribute to weight gain? Weight control through dieting is also believed to be positively related to willingness to participate in both moderate and high-intensity PA (De Bourdeaudhuij et al., 2005). An adjusted BMI is calculated as the amended weight

(kg) over the corrected height squared ( $m^2$ ). As indicated by the “International Classification of Adult Weight to Height Status (i.e., underweight overweight and obese)”, BMI esteems were arranged into four classifications for people 20 years old or older. The method suggested by Cole and associates was utilized to arrange the classification (Cole & Lobstein, 2012). The classification are as follows: “underweight ( $BMI \leq 18.5 \text{ kg/m}^2$ ), typical weight (BMI in the vicinity of 18.5 and 24.9  $\text{kg/m}^2$ ), overweight (BMI in-between 25 and 29.9  $\text{kg/m}^2$ ), and fat ( $\geq 30 \text{ kg/m}^2$ ), (WHO, 2000)”. This nourishment transition seems to affect university students the most. It has been reported that students from the developed nations who leave their parents’ home to live and study abroad or elsewhere often encounter various health-related behavioral changes, including the appropriation of unhealthy dietary behaviors (Wengreen & Moncur, 2009). Generally, these behaviors are due to the extreme changes in resources availability, continuous eating of unhealthy foods; resulting in higher consumption of fast foods, high caloric snacks, and lower eating of fruits and vegetables (i.e., replacing nutrient-dense foods with energy-dense foods (Bernstein et al., 2012). Along with this, skipping dinners may likewise turn out to be frequent (Yong Kang Cheah & Poh, 2014).

Khong Chiu et al., (2016) studied young Malaysians and concluded that they have several motives and barriers for participation in PA. As per the study, the common motives for taking part in PA included “to improve physical fitness, to improve health, to reduce stresses, for leisure time purpose, and to adopt an active lifestyle, while the top five barriers for not taking part in PA are not having enough time, not interested, weather condition, health reasons, and lack of facilities”. Thus, the concerned authority must consider this diversity and come up with practical strategies towards addressing these common barriers to participation in PA. They should use the findings to establish a sporting situation which will encourage participation in PA and reduce the existing factors that prevents young Malaysians to participate in PA. Furthermore, the major contribution of participation in PA is not just the frequency or awareness of taking part in such activities, it also covers the associated benefits and satisfaction to PA. Thus, the outcome of this study will help leisure practitioners in designing, planning, and offering services that promote participation in PA and fulfil leisure satisfaction and psychological wellness of young Malaysians.

## Independent Variables



**Figure 1.1: The Conceptual Framework**



## REFERENCES

- (US, N. C. for H. S. (2012). *Health, United States, 2011: With special feature on socioeconomic status and health*.
- (WHO), W. H. O. (2004). Global strategy on diet, physical activity and health: World Health Assembly 57.17. *Geneva, Switzerland*.
- Abdalla, S. M., & Mohamed, E. Y. (2010). obesity Among Medical Students of the national ribat university, Khartoum 2008. *Sudan J Pub Heal*, 5(2), 16–19.
- Abdullah, M. F., Nazarudin, M. N., Rosli Saadan, W. A. M. W., Pa, & Razak, M. R. A. (2018). Benefits and Barriers of Physical Activities among Technical University Students. *Journal of Advanced Research in Social and Behavioural Sciences*, 13(1), 1–8. Retrieved from [http://www.akademiabaru.com/doc/ARSBSV13\\_N1\\_P1\\_8.pdf](http://www.akademiabaru.com/doc/ARSBSV13_N1_P1_8.pdf)
- Adegoke, B. O. A., & Oyeyemi, A. L. (2011). Physical inactivity in Nigerian young adults: prevalence and socio-demographic correlates. *Journal of Physical Activity and Health*, 8(8), 1135–1142.
- Aihara, A. (2009). PARADOXES OF HIGHER EDUCATION REFORMS: IMPLICATIONS ON THE MALAYSIAN MIDDLE CLASS. *International Journal of Asia-Pacific Studies*, 5(1).
- Al-Isa, A. N., Campbell, J., Desapriya, E., & Wijesinghe, N. (2011). Social and health factors associated with physical activity among Kuwaiti college students. *Journal of Obesity*, 2011.
- Al-Naggar, R. A., Bobryshev, Y. V, Mohd, N., & Nor, A. B. (2013). Lifestyle practice among Malaysian university students. *Asian Pacific Journal of Cancer Prevention*, 14(3), 1895–1903.
- Al Sabbah, H., Vereecken, C., Kolsteren, P., Abdeen, Z., & Maes, L. (2007). Food habits and physical activity patterns among Palestinian adolescents: findings from the national study of Palestinian schoolchildren (HBSC-WBG2004). *Public Health Nutrition*, 10(7), 739–746.
- Alizadeh, M., & Ghabili, K. (2008). Health related lifestyle among the Iranian medical students. *Res Biol Sci*, 3(1), 4–9.
- Allender, S., Cowburn, G., & Foster, C. (2006). Understanding participation in sport and physical activity among children and adults: a review of qualitative studies. *Health Education Research*, 21(6), 826–835.
- Aminuddin, Y., Abdullah, M. N. H., Fauzee, M. S. O., Soh, K. G., Ismail, I. A., Abdullah, A. L., & Adam, Y. (2009). Kajian penglibatan golongan belia dan masyarakat dalam sukan. *Laporan Akhir Akademi Sukan, Universiti Putra Malaysia*.

- Ammouri, A. A., Kaur, H., Neuberger, G. B., Gajewski, B., & Choi, W. S. (2007). Correlates of exercise participation in adolescents. *Public Health Nursing, 24*(2), 111–120.
- Amod, A. (2012). The 2012 SEMDSA guideline for the management of type 2 diabetes. *Journal of Endocrinology, Metabolism and Diabetes in South Africa, 17*(1), 61–62.
- Asiamah, N. (2016). Socio-demographic determinants of physical activity (PA): A working class perspective. *Cogent Medicine, 3*(1), 1276037.
- Awotidebe, T. O., Adedoyin, R. A., Adegbesan, O. A., Babalola, J. F., Olukoju, I. O., Mbada, C. E., ... Bisiriyu, L. A. (2014). Psychosocial correlates of physical activity participation among Nigerian university students. *International Journal of Sports Science, 4*(6), 205–211.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. Macmillan.
- Bartholomew, J. B., Loukas, A., Jowers, E. M., & Allua, S. (2006). Validation of the Physical Activity Self-Efficacy Scale: Testing Measurement Invariance between Hispanic and Caucasian Children. *Journal of Physical Activity and Health, 3*(1), 70–78. <https://doi.org/10.1123/jpah.3.1.70>
- BASSETT, D. R. (2000). Validity of four motion sensors in measuring moderate intensity physical activity. *Medicine & Science in Sports & Exercise, 32*(9), S471–S480.
- Bauman, A., Bull, F., Chey, T., Craig, C. L., Ainsworth, B. E., Sallis, J. F., ... Pratt, M. (2009). The international prevalence study on physical activity: results from 20 countries. *International Journal of Behavioral Nutrition and Physical Activity, 6*(1), 21.
- Becker, M. H., & Maiman, L. A. (1975). Sociobehavioral determinants of compliance with health and medical care recommendations. *Medical Care, 10*–24.
- Berkey, C. S., Rockett, H. R. H., Field, A. E., Gillman, M. W., Frazier, A. L., Camargo, C. A., & Colditz, G. A. (2000). Activity, dietary intake, and weight changes in a longitudinal study of preadolescent and adolescent boys and girls. *Pediatrics, 105*(4), e56–e56.
- Berkman, L. F. (2000). Social support, social networks, social cohesion and health. *Social Work in Health Care, 31*(2), 3–14.
- Bernstein, A., Bilheimer, L. T., & Makuc, D. M. (2012). *Health, United States, 2011; with special feature on socioeconomic status and health*.
- Beville, J. M., Umstadd Meyer, M. R., Usdan, S. L., Turner, L. W., Jackson, J. C., & Lian, B. E. (2014). Gender differences in college leisure time physical activity: application of the theory of planned behavior and integrated behavioral model. *Journal of American College Health, 62*(3), 173–184.

- Black, A E. (2000). The sensitivity and specificity of the Goldberg cut-off for EI: BMR for identifying diet reports of poor validity. *European Journal of Clinical Nutrition*, 54(5), 395.
- Black, Alison E. (2000). Critical evaluation of energy intake using the Goldberg cut-off for energy intake: basal metabolic rate. A practical guide to its calculation, use and limitations. *International Journal of Obesity*, 24(9), 1119.
- Blair, J., Czaja, R. F., & Blair, E. A. (2013). *Designing surveys: A guide to decisions and procedures*. Sage Publications.
- Blair, S. N. (2009). Physical inactivity: the biggest public health problem of the 21st century. *British Journal of Sports Medicine*, 43(1), 1–2.
- Booth, M. L., Owen, N., Bauman, A., Clavisi, O., & Leslie, E. (2000). Social-cognitive and perceived environment influences associated with physical activity in older Australians. *Preventive Medicine*, 31(1), 15–22.
- Bowling, A. (2005). Mode of questionnaire administration can have serious effects on data quality. *Journal of Public Health*, 27(3), 281–291.
- Brawley, L. R., & Martin, K. A. (1995). The interface between social and sport psychology. *The Sport Psychologist*, 9(4), 469–497.
- Brownson, R. C., Baker, E. A., Housemann, R. A., Brennan, L. K., & Bacak, S. J. (2001). Environmental and policy determinants of physical activity in the United States. *American Journal of Public Health*, 91(12), 1995–2003.
- Brownson, R. C., Eyler, A. A., King, A. C., Brown, D. R., Shyu, Y.-L., & Sallis, J. F. (2000). Patterns and correlates of physical activity among US women 40 years and older. *American Journal of Public Health*, 90(2), 264.
- Bull, F. C., Maslin, T. S., & Armstrong, T. (2009). Global physical activity questionnaire (GPAQ): nine country reliability and validity study. *Journal of Physical Activity and Health*, 6(6), 790–804.
- Cai Lian, T., Bonn, G., Si Han, Y., Chin Choo, Y., & Chee Piau, W. (2016). Physical Activity and Its Correlates among Adults in Malaysia: A Cross-Sectional Descriptive Study. *PLOS ONE*, 11(6), e0157730. <https://doi.org/10.1371/journal.pone.0157730>
- Calfas, K J, Sallis, J. F., Lovato, C. Y., & Campbell, J. (1994). Physical activity and its determinants before and after college graduation. *Medicine, Exercise, Nutrition, and Health*, 3(323–334).
- Calfas, Karen J, Sallis, J. F., Nichols, J. F., Sarkin, J. A., Johnson, M. F., Caparosa, S., ... Alcaraz, J. E. (2000). Project GRAD: Two-year outcomes of a randomized controlled physical activity intervention among young adults. *American Journal of Preventive Medicine*, 18(1), 28–37.

- Castro, C. M., Sallis, J. F., Hickmann, S. A., Lee, R. E., & Chen, A. H. (1999). A prospective study of psychosocial correlates of physical activity for ethnic minority women. *Psychology and Health, 14*(2), 277–293.
- Chang, Y.-C., Liu, P.-H., Lee, W.-J., Chang, T.-J., Jiang, Y.-D., Li, H.-Y., ... Chuang, L.-M. (2008). Common variation in the fat mass and obesity-associated (FTO) gene confers risk of obesity and modulates BMI in the Chinese population. *Diabetes, 57*(8), 2245–2252.
- Chaput, J., Klingenberg, L., Astrup, A., & Sjödén, A. M. (2011). Modern sedentary activities promote overconsumption of food in our current obesogenic environment. *Obesity Reviews, 12*(5), e12–e20.
- Cheah, Y. K. (2011). Influence of socio-demographic factors on physical activity participation in a sample of adults in Penang, Malaysia. *Malaysian Journal of Nutrition, 17*(3).
- Cheah, Yong Kang, & Poh, B. K. (2014). The Determinants of Participation in Physical Activity in Malaysia. *Osong Public Health and Research Perspectives, 5*(1), 20–27. <https://doi.org/10.1016/j.phrp.2013.12.002>
- Cheah, Yong Kang, & Tan, A. K. G. (2014). Determinants of leisure-time physical activity: Evidence from Malaysia. *The Singapore Economic Review, 59*(02), 1450017.
- Chen, Y., & Mao, Y. (2006). Obesity and leisure time physical activity among Canadians. *Preventive Medicine, 42*(4), 261–265.
- Chiu, L. K. (2009). University Students' attitude, Self-Efficacy And Motivation Regarding Leisure Time Physical Participation. *Journal of Educators & Education/Jurnal Pendidik Dan Pendidikan, 24*.
- Choi, Y., Kim, C.-W., Cho, J., Suh, B.-S. & Cho, Y. K. (2015). Relationship of sitting time and physical activity with non-alcoholic fatty liver disease. *Journal of Hepatology 63*(5): 1229–1237.
- Cleland, V. J., Ball, K., Salmon, J., Timperio, A. F., & Crawford, D. A. (2008). Personal, social and environmental correlates of resilience to physical inactivity among women from socio-economically disadvantaged backgrounds. *Health Education Research, 25*(2), 268–281.
- Cole, T. J., & Lobstein, T. (2012). Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatric Obesity, 7*(4), 284–294.
- Cradock, A. L., Kawachi, I., Colditz, G. A., Gortmaker, S. L., & Buka, S. L. (2009). Neighborhood social cohesion and youth participation in physical activity in Chicago. *Social Science & Medicine, 68*(3), 427–435.
- Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., ... Sallis, J. F. (2003). International physical activity questionnaire: 12-country

reliability and validity. *Medicine & Science in Sports & Exercise*, 35(8), 1381–1395.

Crouter, S. E., Churilla, J. R., & Bassett, D. R. (2006). Estimating energy expenditure using accelerometers. *European Journal of Applied Physiology*, 98(6), 601–612.

Dan, S. P., Mohd, N. M., & Zalilah, M. S. (2011). Determination of factors associated with physical activity levels among adolescents attending school in Kuantan, Malaysia. *Malays J Nutr*, 17(2), 175–817.

Daniels, R. (1959). International Standard Classification of Occupations. *Journal of Occupational and Environmental Medicine*, 1(11), 615.

Davidson, O. B., Feldman, D. B., & Margalit, M. (2012). A focused intervention for 1st-year college students: Promoting hope, sense of coherence, and self-efficacy. *The Journal of Psychology*, 146(3), 333–352.

Davis, M. G., Fox, K. R., Hillsdon, M., Coulson, J. C., Sharp, D. J., Stathi, A., & Thompson, J. L. (2011). Getting out and about in older adults: the nature of daily trips and their association with objectively assessed physical activity. *International Journal of Behavioral Nutrition and Physical Activity*, 8(1), 116.

De Bourdeaudhuij, I., Teixeira, P. J., Cardon, G., & Deforche, B. (2005). Environmental and psychosocial correlates of physical activity in Portuguese and Belgian adults. *Public Health Nutrition*, 8(7), 886–895.

Deforche, B. I., De Bourdeaudhuij, I. M., & Tanghe, A. P. (2006). Attitude toward physical activity in normal-weight, overweight and obese adolescents. *Journal of Adolescent Health*, 38(5), 560–568.

Dietary Assessment Primer. (2016). National Institutes of Health., *National Cancer Institute*.

Dishman, R. K., Hales, D. P., Pfeiffer, K. A., Felton, G. A., Saunders, R., Ward, D. S., ... Pate, R. R. (2006). Physical self-concept and self-esteem mediate cross-sectional relations of physical activity and sport participation with depression symptoms among adolescent girls. *Health Psychology*, 25(3), 396.

Dishman, R. K., Motl, R. W., Saunders, R., Felton, G., Ward, D. S., Dowda, M., & Pate, R. R. (2004). Self-efficacy partially mediates the effect of a school-based physical-activity intervention among adolescent girls. *Preventive Medicine*, 38(5), 628–636.

Downward, P., & Rasciute, S. (2010). The relative demands for sports and leisure in England. *European Sport Management Quarterly*, 10(2), 189–214.

Downward, P., & Riordan, J. (2007). Social interactions and the demand for sport: An economic analysis. *Contemporary Economic Policy*, 25(4), 518–537.

Ebben, W., & Brudzynski, L. (2008). Motivations And Barriers To Exercise Among College Students. *Journal of Exercise Physiology Online*, 11(5).

- Eberth, B., & Smith, M. D. (2010). Modelling the participation decision and duration of sporting activity in Scotland. *Economic Modelling*, 27(4), 822–834.
- El Ansari, W., & Stock, C. (2014). Relationship between attainment of recommended physical activity guidelines and academic achievement: undergraduate students in Egypt. *Global Journal of Health Science*, 6(5), 274.
- Essiet, I. A., Baharom, A., Shahar, H. K., & Uzochukwu, B. (2017). Application of the Socio-Ecological Model to predict physical activity behaviour among Nigerian University students. *The Pan African Medical Journal*, 26.
- Farrell, L., & Shields, M. A. (2002). Investigating the economic and demographic determinants of sporting participation in England. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 165(2), 335–348.
- Feltz, D. L., & Lirgg, C. D. (2001). Self-efficacy beliefs of athletes, teams, and coaches. *Handbook of Sport Psychology*, 2(2001), 340–361.
- Fernández, J. R., Redden, D. T., Pietrobelli, A., & Allison, D. B. (2004). Waist circumference percentiles in nationally representative samples of African-American, European-American, and Mexican-American children and adolescents. *The Journal of Pediatrics*, 145(4), 439–444.
- Fishbein, M. A., & Ajzen, I. (2011). I.(1975). Belief, attitude, intention and behaviour: An introduction to theory and research. Reading, Addison-Wesley.
- Fontaine, C. J., Liguori, G. A., Mozumdar, A., & Schuna Jr, J. M. (2011). Physical activity and screen time sedentary behaviors in college students. *International Journal of Exercise Science*, 4(2), 3.
- Freedson, P., Bowles, H. R., Troiano, R., & Haskell, W. (2012). Assessment of physical activity using wearable monitors: recommendations for monitor calibration and use in the field. *Medicine and Science in Sports and Exercise*, 44(1 Suppl 1), S1.
- Galán, I., Boix, R., Medrano, M. J., Ramos, P., Rivera, F., & Moreno, C. (2014). Individual factors and school-based policies related to adherence to physical activity recommendations in Spanish adolescents. *Prevention Science*, 15(4), 588–599.
- Gan, W. Y., Nasir, M. T. M., Zalilah, M. S., & Hazizi, A. S. (2011). Direct and indirect effects of sociocultural influences on disordered eating among Malaysian male and female university students. A mediation analysis of psychological distress. *Appetite*, 56(3), 778–783.
- Goje, M., Salmiah, M. S., Ahmad Azuhairi, A., & Jusoff, K. (2014). Physical inactivity and its associated factors among university students. *IOSR Journal of Dental and Medical Sciences*, 13(10), 119–130.
- Gonçalves, P. B., Lopes, A. A. dos S., Silva, A. A. de P., Silva, J. S. B., da Silva, A. T., Becker, L. A., ... Reis, R. S. (2017). Combined physical activity and sitting time

and their contribution to body mass index in adults. *Revista Brasileira de Cineantropometria & Desempenho Humano*, 19(2), 174–184.

- Gordon-Larsen, P., McMurray, R. G., & Popkin, B. M. (2000). Determinants of adolescent physical activity and inactivity patterns. *Pediatrics*, 105(6), e83–e83.
- Graham, S., Munniksma, A., & Juvonen, J. (2014). Psychosocial benefits of cross-ethnic friendships in urban middle schools. *Child Development*, 85(2), 469–483.
- Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political Economy*, 80(2), 223–255.
- Hagger, M. S., Chatzisarantis, N., & Biddle, S. J. H. (2001). The influence of self-efficacy and past behaviour on the physical activity intentions of young people. *Journal of Sports Sciences*, 19(9), 711–725.
- Han, J. L., Dinger, M. K., Hull, H. R., Randall, N. B., Heesch, K. C., & Fields, D. A. (2008). Changes in women's physical activity during the transition to college. *American Journal of Health Education*, 39(4), 194–199.
- Haskell, W. L., Lee, I.-M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., ... Bauman, A. (2007). Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation*, 116(9), 1081.
- Haughton McNeill, L., Wyrwich, K. W., Brownson, R. C., Clark, E. M., & Kreuter, M. W. (2006). Individual, social environmental, and physical environmental influences on physical activity among black and white adults: a structural equation analysis. *Annals of Behavioral Medicine*, 31(1), 36–44.
- Hazizi, A. S., Hamdi B, M., Leong, Y. M. & Izumi, T. (2012). Assessment of Physical Activity among Undergraduate Students in a Local University using a Pedometer. *Health and the Environmental Journal*, 3(1), 54–66.
- Hazizi, A. S., Hamdi, B. M., Leong, Y. M., & Izumi, T. (2012). Assessment of physical activity among undergraduate students in a local university using a pedometer. *Health and Environment Journal*, 3(1).
- Hemmingsson, E., & Ekelund, U. (2007). Is the association between physical activity and body mass index obesity dependent? *International Journal of Obesity*, 31(4), 663.
- Hendelman, D., Miller, K., Baggett, C., Debold, E., & Freedson, P. (2000). Validity of accelerometry for the assessment of moderate intensity physical activity in the field. *Medicine & Science in Sports & Exercise*, 32(9), S442–S449.
- Heng, L. H., Rasli, A. M., & Senin, A. A. (2012). Knowledge determinant in university commercialization: A case study of Malaysia Public University. *Procedia-Social and Behavioral Sciences*, 40, 251–257.

- Herrera, H., Rebato, E., Arechabaleta, G., Lagrange, H., Salces, I., & Susanne, C. (2003). Body mass index and energy intake in Venezuelan University students. *Nutrition Research*, 23(3), 389–400.
- Hohepa, M., Scragg, R., Schofield, G., Kolt, G. S., & Schaaf, D. (2007). Social support for youth physical activity: Importance of siblings, parents, friends and school support across a segmented school day. *International Journal of Behavioral Nutrition and Physical Activity*, 4(1), 54.
- Hoos, T., Espinoza, N., Marshall, S., & Arredondo, E. M. (2012). Validity of the global physical activity questionnaire (GPAQ) in adult Latinas. *Journal of Physical Activity and Health*, 9(5), 698–705.
- Hosseinpanah, F., Mirbolouk, M., Mossadeghkhah, A., Barzin, M., Serahati, S., Delshad, H., & Azizi, F. (2016). Incidence and potential risk factors of obesity among Tehranian adults. *Preventive Medicine*, 82, 99–104.
- Huang, T. T.-K., Harris, K. J., Lee, R. E., Nazir, N., Born, W., & Kaur, H. (2003). Assessing overweight, obesity, diet, and physical activity in college students. *Journal of American College Health*, 52(2), 83–86.
- Humphreys, B. R., & Ruseski, J. E. (2011). An economic analysis of participation and time spent in physical activity. *The BE Journal of Economic Analysis & Policy*, 11(1).
- Humphreys, B. R., & Ruseski, J. E. (2015). The Economic Choice of Participation and Time Spent in Physical Activity and Sport in Canada. *International Journal of Sport Finance*, 10(2).
- Hunt, K., Ford, G., & Mutrie, N. (2001). Is sport for all? Exercise and physical activity patterns in early and late middle age in the West of Scotland. *Health Education*, 101(4), 151–158.
- Ishii, K., Inoue, S., Ohya, Y., Odagiri, Y., Takamiya, T., Suijo, K., ... Shimomitsu, T. (2009). Sociodemographic variation in the perception of barriers to exercise among Japanese adults. *Journal of Epidemiology*, 906170086.
- James, K. J. (2010). *Assessing Dietary Intake, Eating and Exercise Attitudes and Fitness Levels in College-Aged Students*.
- Jurj, A. L., Wen, W., Gao, Y.-T., Matthews, C. E., Yang, G., Li, H.-L., ... Shu, X.-O. (2007). Patterns and correlates of physical activity: a cross-sectional study in urban Chinese women. *BMC Public Health*, 7(1), 213.
- Kalmi, Z. N., Saad, H. A., Taib, M. N. M., Yassin, Z., & Tabata, I. (2012). Objective assessment of physical activity in the workplace setting. *Pakistan J Nutr*, 11(6), 523–528.
- Kantomaa, M. T., Tammelin, T. H., Näyhä, S., & Taanila, A. M. (2007). Adolescents' physical activity in relation to family income and parents' education. *Preventive*



*Medicine*, 44(5), 410–415.

- Kaplan, M. S., Newsom, J. T., McFarland, B. H., & Lu, L. (2001). Demographic and psychosocial correlates of physical activity in late life. *American Journal of Preventive Medicine*, 21(4), 306–312.
- Kerksick, C., Harvey, T., Stout, J., Campbell, B., Wilborn, C., Kreider, R., ... Landis, J. (2008). International Society of Sports Nutrition position stand: nutrient timing. *Journal of the International Society of Sports Nutrition*, 5(1), 17.
- Khalaf, A., Ekblom, Ö., Kowalski, J., Berggren, V., Westergren, A., & Al-Hazzaa, H. (2013). Female university students' physical activity levels and associated factors—a cross-sectional study in southwestern Saudi Arabia. *International Journal of Environmental Research and Public Health*, 10(8), 3502–3517.
- Khera, R., & Sharma, R. (2012). Physical inactivity among college students in associated with living in hostels. *Global Journal of Medicine and Public Health*, 1(5), 82–85.
- Khong Chiu, L., Mat Yusof, M., Sofian Omar Fauzee, M., Tajuddin Othman, A., Salleh Aman, M., Elumalai, G., & Mohd Ali, H. (2016). Examining Sport and Physical Activity Participation, Motivations and Barriers among Young Malaysians. *Asian Social Science*, 12(1). <https://doi.org/10.5539/ass.v12n1p159>
- Kiefer, I., Rathmanner, T., & Kunze, M. (2005). Eating and dieting differences in men and women. *Journal of Men's Health and Gender*, 2(2), 194–201.
- Kremmyda, L.-S., Papadaki, A., Hondros, G., Kapsokefalou, M., & Scott, J. A. (2008). Differentiating between the effect of rapid dietary acculturation and the effect of living away from home for the first time, on the diets of Greek students studying in Glasgow. *Appetite*, 50(2–3), 455–463.
- Kuan, P. X., Ho, H. L., Shuhaili, M. S., Siti, A. A., & Gudum, H. R. (2011). Gender differences in body mass index, body weight perception and weight loss strategies among undergraduates in Universiti Malaysia Sarawak. *Malaysian Journal of Nutrition*, 17(1).
- Lahti-Koski, M., Pietinen, P., Heliövaara, M., & Vartiainen, E. (2002). Associations of body mass index and obesity with physical activity, food choices, alcohol intake, and smoking in the 1982–1997 FINRISK Studies. *The American Journal of Clinical Nutrition*, 75(5), 809–817.
- Lasheras, L., Aznar, S., Merino, B., & López, E. G. (2001). Factors associated with physical activity among Spanish youth through the National Health Survey. *Preventive Medicine*, 32(6), 455–464.
- Lear, S. A., Humphries, K. H., Kohli, S., Chockalingam, A., Frohlich, J. J., & Birmingham, C. L. (2007). Visceral adipose tissue accumulation differs according to ethnic background: results of the Multicultural Community Health Assessment Trial (M-CHAT). *The American Journal of Clinical Nutrition*, 86(2), 353–359.

- Lechner, M. (2009). Long-run labour market and health effects of individual sports activities. *Journal of Health Economics*, 28(4), 839–854.
- Lee, Y. G., & Bhargava, V. (2004). Leisure time: Do married and single individuals spend it differently? *Family and Consumer Sciences Research Journal*, 32(3), 254–274.
- Leslie, E., Owen, N., Salmon, J., Bauman, A., Sallis, J. F., & Lo, S. K. (1999). Insufficiently active Australian college students: perceived personal, social, and environmental influences. *Preventive Medicine*, 28(1), 20–27.
- Leslie, E., Sparling, P. B., & Owen, N. (2001). University campus settings and the promotion of physical activity in young adults: lessons from research in Australia and the USA. *Health Education*, 101(3), 116–125.
- Lewis, B. A., Marcus, B. H., Pate, R. R., & Dunn, A. L. (2002). Psychosocial mediators of physical activity behavior among adults and children. *American Journal of Preventive Medicine*, 23(2), 26–35.
- Lim, K. C., & Kayat, K. (2010). Psychological determinants of leisure time physical activity participation among public university students in Malaysia. *ASEAN Journal of Teaching and Learning in Higher Education*.
- Magarey, A. M., Daniels, L. A., Boulton, T. J. C., & Cockington, R. A. (2001). Does fat intake predict adiposity in healthy children and adolescents aged 2–15 y? A longitudinal analysis. *European Journal of Clinical Nutrition*, 55(6), 471.
- Maillard, G., Charles, M. A., Lafay, L., Thibault, N., Vray, M., Borys, J. M., ... Romon, M. (2000). Macronutrient energy intake and adiposity in non obese prepubertal children aged 5–11 y (the Fleurbaix Laventie Ville Santé Study). *International Journal of Obesity*, 24(12), 1608.
- Marques-Vidal, P., Bochud, M., Mooser, V., Paccaud, F., Waeber, G., & Vollenweider, P. (2008). Prevalence of obesity and abdominal obesity in the Lausanne population. *BMC Public Health*, 8(1), 330.
- Marquez, D. X., Jerome, G. J., McAuley, E., Snook, E. M., & Canaklisova, S. (2002). Self-efficacy manipulation and state anxiety responses to exercise in low active women. *Psychology and Health*, 17(6), 783–791.
- Maruyama, S., & Yin, Q. (2012). The opportunity cost of exercise: Do higher-earning Australians exercise longer, harder, or both? *Health Policy*, 106(2), 187–194.
- Mathews, E., Salvo, D., Sarma, P. S., Thankappan, K. R., & Pratt, M. (2016). Peer Reviewed: Adapting and Validating the Global Physical Activity Questionnaire (GPAQ) for Trivandrum, India, 2013. *Preventing Chronic Disease*, 13.
- Mc Auley, E., & Courneya, K. S. (1993). Adherence to exercise and physical activity as health-promoting behaviors: Attitudinal and self-efficacy influences. *Applied and Preventive Psychology*, 2(2), 65–77.

- McAuley, E., Jerome, G., Marquez, D., ... S. E.-A. of B., & 2003, undefined. (n.d.). Exercise self-efficacy in older adults: social, affective, and behavioral influences. *Springer*. Retrieved from [https://link.springer.com/article/10.1207/S15324796ABM2501\\_01](https://link.springer.com/article/10.1207/S15324796ABM2501_01)
- McAuley, Edward, & Blissmer, B. (2000). Self-efficacy determinants and consequences of physical activity. *Exerc Sport Sci Rev*, 28(2), 85–88.
- McAuley, Edward, Courneya, K. S., & Lettunich, J. (1991). Effects of acute and long-term exercise on self-efficacy responses in sedentary, middle-aged males and females. *The Gerontologist*, 31(4), 534–542.
- McAuley, Edward, Jerome, G. J., Marquez, D. X., Elavsky, S., & Blissmer, B. (2003). Exercise self-efficacy in older adults: social, affective, and behavioral influences. *Annals of Behavioral Medicine*, 25(1), 1.
- McAuley, Edward, Morris, K. S., Motl, R. W., Hu, L., Konopack, J. F., & Elavsky, S. (2007). Long-term follow-up of physical activity behavior in older adults. *Health Psychology*, 26(3), 375.
- McAuley, Edward, Szabo, A., Gothe, N., & Olson, E. A. (2011). Self-efficacy: Implications for Physical Activity, Function, and Functional Limitations in Older Adults. *American Journal of Lifestyle Medicine*, 5(4). <https://doi.org/10.1177/1559827610392704>
- McGloin, A. F., Livingstone, M. B. E., Greene, L. C., Webb, S. E., Gibson, J. M. A., Jebb, S. A., ... Prentice, A. M. (2002). Energy and fat intake in obese and lean children at varying risk of obesity. *International Journal of Obesity*, 26(2), 200.
- Meltzer, D. O., & Jena, A. B. (2010). The economics of intense exercise. *Journal of Health Economics*, 29(3), 347–352.
- Mesters, I., Wahl, S., & Van Keulen, H. M. (2014). Socio-demographic, medical and social-cognitive correlates of physical activity behavior among older adults (45–70 years): a cross-sectional study. *BMC Public Health*, 14(1), 647.
- Mikolajczyk, R. T., El Ansari, W., & Maxwell, A. E. (2009). Food consumption frequency and perceived stress and depressive symptoms among students in three European countries. *Nutrition Journal*, 8(1), 31.
- Miller, A., Christensen, E., Eather, N., Gray, S., Sproule, J., Keay, J., & Lubans, D. (2016). Can physical education and physical activity outcomes be developed simultaneously using a game-centered approach? *European Physical Education Review*, 22(1), 113–133.
- Miller, S. T., Marolen, K. N., & Beech, B. M. (2010). Perceptions of physical activity and motivational interviewing among rural African-American women with type 2 diabetes. *Women's Health Issues*, 20(1), 43–49.
- Milton, S. (1986). A sample size formula for multiple regression studies. *Public Opinion*

*Quarterly*, 50(1), 112–118.

- Mirnalini, J. K., Zalilah, M. S., Safiah, M. Y., Tahir, A., Siti, M. D. H., Siti, D. R., ... Normah, H. (2008). Energy and Nutrient Intakes: Findings from the Malaysian Adult Nutrition Survey (MANS). *Malaysian Journal of Nutrition*, 14(1), 1–24.
- Mo, P. K. H., Blake, H., & Batt, M. E. (2011). Getting healthcare staff more active: The mediating role of self-efficacy. *British Journal of Health Psychology*, 16(4), 690–706.
- Monge-Rojas, R., Nuñez, H. P., Garita, C., & Chen-Mok, M. (2002). Psychosocial aspects of Costa Rican adolescents' eating and physical activity patterns. *Journal of Adolescent Health*, 31(2), 212–219.
- Mota, J., Almeida, M., Santos, R., Ribeiro, J. C., & Santos, M. P. (2009). Association of perceived environmental characteristics and participation in organized and non-organized physical activities of adolescents. *Pediatric Exercise Science*, 21(2), 233–239.
- Motl, R. W., Dishman, R. K., Dowda, M., & Pate, R. R. (2004). Factorial validity and invariance of a self-report measure of physical activity among adolescent girls. *Research Quarterly for Exercise and Sport*, 75(3), 259–271.
- Moy, F. M., Surin, J., Ismail, Y., Mahad, R., Tie, F. H., & Wan Ismail, W. M. A. (2009). Breakfast skipping and its associated factors among undergraduates in a public university in Kuala Lumpur. *Malaysian Journal of Nutrition*, 15(2), 165–174.
- Muntner, P., Gu, D., Wildman, R. P., Chen, J., Qan, W., Whelton, P. K., & He, J. (2005). Prevalence of physical activity among Chinese adults: results from the International Collaborative Study of Cardiovascular Disease in Asia. *American Journal of Public Health*, 95(9), 1631–1636.
- Musharrafieh, U., Tamim, H. M., Rahi, A. C., El-Hajj, M. A., Al-Sahab, B., El-Asmar, K., & Tamim, H. M. (2008). Determinants of university students physical exercise: a study from Lebanon. *International Journal of Public Health*, 53(4), 208–213.
- Naing, L., Winn, T., & Rusli, B. N. (2006). Practical issues in calculating the sample size for prevalence studies. *Archives of Orofacial Sciences*, 1, 9–14.
- Nelson, M. C., Story, M., Larson, N. I., Neumark-Sztainer, D., & Lytle, L. A. (2008). Emerging adulthood and college-aged youth: an overlooked age for weight-related behavior change. *Obesity*, 16(10), 2205–2211.
- Ness-Abramof, R., & Apovian, C. M. (2008). Waist circumference measurement in clinical practice. *Nutrition in Clinical Practice*, 23(4), 397–404.
- Newby, P. K., Muller, D., Hallfrisch, J., Qiao, N., Andres, R., & Tucker, K. L. (2003). Dietary patterns and changes in body mass index and waist circumference in adults. *The American Journal of Clinical Nutrition*, 77(6), 1417–1425.

- Nikolopoulou, A., & Kadoglou, N. P. E. (2012). Obesity and metabolic syndrome as related to cardiovascular disease. *Expert Review of Cardiovascular Therapy*, 10(7), 933–939.
- Norimah, A. K. (2012). Development and validation of a Food Frequency Questionnaire (FFQ) for assessing sugar consumption among adults in Klang Valley, Malaysia. *Malaysian Journal of Nutrition*, 18(3).
- Nursha'adah, T. (2009). *Factors Associated with Physical Activity level among University Students in Universiti Putra Malaysia*.
- Oman, R. F., & King, A. C. (1998). Predicting the adoption and maintenance of exercise participation using self-efficacy and previous exercise participation rates. *American Journal of Health Promotion*, 12(3), 154–161.
- Oppert, J. M., Thomas, F., Charles, M. A., Benetos, A., Basdevant, A., & Simon, C. (2006). Leisure-time and occupational physical activity in relation to cardiovascular risk factors and eating habits in French adults. *Public Health Nutrition*, 9(6), 746–754.
- Organization, W. H. (2000). *Obesity: preventing and managing the global epidemic*. World Health Organization.
- Organization, W. H. (2002). *The world health report 2002: reducing risks, promoting healthy life*. World Health Organization.
- Organization, W. H. (2010). *World health statistics 2010*. World Health Organization.
- Organization, W. H. (2015). *Global recommendations on physical activity for health. 2010*.
- Ottevaere, C., Huybrechts, I., Béghin, L., Cuenca-Garcia, M., De Bourdeaudhuij, I., Gottrand, F., ... Moreno, L. A. (2011). Relationship between self-reported dietary intake and physical activity levels among adolescents: The HELENA study. *International Journal of Behavioral Nutrition and Physical Activity*, 8(1), 8.
- Pender, N. J., Bar-Or, O., Wilk, B., & Mitchell, S. (2002). Self-efficacy and perceived exertion of girls during exercise. *Nursing Research*, 51(2), 86–91.
- Pender, N. J., Murdaugh, C. L., & Parsons, M. A. (2002). The health promotion model. *Health Promotion in Nursing Practice*, 4, 59–79.
- Poh, B. K., Safiah, M. Y., Tahir, A., Siti Haslinda, N., Siti Norazlin, N., Norimah, A. K., ... Azmi, M. Y. (2010). Physical Activity Pattern and Energy Expenditure of Malaysian Adults: Findings from the Malaysian Adult Nutrition Survey (MANS). *Malaysian Journal of Nutrition*, 16(1).
- POLICY., D. O. F. H. C. O. N. T. H. E. M. A. O. F. F. (1991). *Dietary Reference Values for Food Energy and Nutrients for the United Kingdom: Report of the Panel on Dietary Reference of the Committee on Medical Aspects of Food Policy*. HM

Stationery Office.

- Popkin, B. M., Duffey, K., & Gordon-Larsen, P. (2005). Environmental influences on food choice, physical activity and energy balance. *Physiology & Behavior*, 86(5), 603–613.
- Prochaska, J. O., Redding, C. A., & Evers, K. E. (2015). The transtheoretical model and stages of change. *Health Behavior: Theory, Research, and Practice*, 125–148.
- Pryer, J. A., Vrijheid, M., Nichols, R., Kiggins, M., & Elliott, P. (1997). Who are the 'low energy reporters' in the dietary and nutritional survey of British adults? *International Journal of Epidemiology*, 26(1), 146–154.
- Rajappan, R., Selvaganapathy, K., & Liew, L. (2015). Physical activity level among university students: a cross-sectional survey. *Int J Physiother Res*, 3(6), 1336–1343.
- Rasciute, S., & Downward, P. (2010). Health or happiness? What is the impact of physical activity on the individual? *Kyklos*, 63(2), 256–270.
- Razali, N. M., & Wah, Y. B. (2011). Power comparisons of shapiro-wilk, kolmogorov-smirnov, lilliefors and anderson-darling tests. *Journal of Statistical Modeling and Analytics*, 2(1), 21–33.
- Rech, C. R., Reis, R. S., Hino, A. A. F., & Hallal, P. C. (2014). Personal, social and environmental correlates of physical activity in adults from Curitiba, Brazil. *Preventive Medicine*, 58, 53–57.
- Reichert, F. F., Barros, A. J. D., Domingues, M. R., & Hallal, P. C. (2007). The role of perceived personal barriers to engagement in leisure-time physical activity. *American Journal of Public Health*, 97(3), 515–519.
- Resnick, B., & Jenkins, L. S. (2000). Testing the reliability and validity of the self-efficacy for exercise scale. *Nursing Research*, 49(3), 154–159.
- Romaguera, D., Tauler, P., Bannasar, M., Pericas, J., Moreno, C., Martinez, S., & Aguilo, A. (2011). Determinants and patterns of physical activity practice among Spanish university students. *Journal of Sports Sciences*, 29(9), 989–997.
- Rose, S., Spinks, N., & Canhoto, A. I. (2014). *Management research: Applying the principles*. Routledge.
- Sagatun, Å., Kolle, E., Anderssen, S. A., Thoresen, M., & Sjøgaard, A. J. (2008). Three-year follow-up of physical activity in Norwegian youth from two ethnic groups: associations with socio-demographic factors. *BMC Public Health*, 8(1), 419.
- Sakamaki, R., Toyama, K., Amamoto, R., Liu, C.-J., & Shinfuku, N. (2005). Nutritional knowledge, food habits and health attitude of Chinese university students—a cross sectional study—. *Nutrition Journal*, 4(1), 4.

- Salamudin, N., & Harun, M. T. (2013). Physical activity index among Malaysian youth. *Asian Social Science*, 9(12), 99.
- Sallis, J. F., Grossman, R. M., Pinski, R. B., Patterson, T. L., & Nader, P. R. (1987). The development of scales to measure social support for diet and exercise behaviors. *Preventive Medicine*, 16(6), 825–836.
- Sallis, J. F., & Saelens, B. E. (2000). Assessment of physical activity by self-report: status, limitations, and future directions. *Research Quarterly for Exercise and Sport*, 71(sup2), 1–14.
- Sanlier, N., & Unusan, N. (2007). Dietary habits and body composition of Turkish University students. *Pakistan J Nutr*, 6(4), 332–338.
- Santos, R., Silva, P., Santos, P., Ribeiro, J. C., & Mota, J. (2008). Physical activity and perceived environmental attributes in a sample of Portuguese adults: results from the Azorean Physical Activity and Health study. *Preventive Medicine*, 47(1), 83–88.
- Šatalić, Z., Colić Barić, I., & Keser, I. (2007). Diet quality in Croatian university students: energy, macronutrient and micronutrient intakes according to gender. *International Journal of Food Sciences and Nutrition*, 58(5), 398–410.
- Scheerder, J., Vanreusel, B., & Taks, M. (2005). Stratification patterns of active sport involvement among adults: Social change and persistence. *International Review for the Sociology of Sport*, 40(2), 139–162.
- Scheerder, J., Vanreusel, B., Taks, M., & Renson, R. (2002). Social sports stratification in Flanders 1969-1999: Intergenerational reproduction of social inequalities? *International Review for the Sociology of Sport*, 37(2), 219–245.
- Schofield, L., Mummery, W. K., & Schofield, G. (2005). Effects of a controlled pedometer-intervention trial for low-active adolescent girls. *Medicine and Science in Sports and Exercise*, 37(8), 1414–1420.
- Schwarzer, R., Luszczynska, A., Ziegelmann, J. P., Scholz, U., & Lippke, S. (2008). *Social-cognitive predictors of physical exercise adherence: three longitudinal studies in rehabilitation*. (Vol. 27). American Psychological Association.
- Sechrist, K. R., Walker, S. N., & Pender, N. J. (1987). Development and psychometric evaluation of the exercise benefits/barriers scale. *Research in Nursing & Health*, 10(6), 357–365.
- Seo, D.-C., Torabi, M. R., Chin, M. K., Huang, S. F., Chen, C. K., Mok, M. M. C., ... Wang, C. (2012). A comparison of factors associated with physical inactivity among East Asian college students. *International Journal of Behavioral Medicine*, 19(3), 316–323.
- Services, U. S. D. of H. and H. (2009). Youth physical activity: The role of schools. *Washington, DC: US Department of Health and Human Services*.

- Shibata, A., Oka, K., Harada, K., Nakamura, Y., & Muraoka, I. (2009). Psychological, social, and environmental factors to meeting physical activity recommendations among Japanese adults. *International Journal of Behavioral Nutrition and Physical Activity*, 6(1), 60.
- Shimbo, S., Zhang, Z.-W., Matsuda-Inoguchi, N., Higashikawa, K., Nakatsuka, H., Watanabe, T., & Ikeda, M. (2004). Effects of life away from home and physical exercise on nutrient intake and blood/serum parameters among girl students in Japan. *The Tohoku Journal of Experimental Medicine*, 203(4), 275–286.
- Shores, K. A., & West, S. T. (2010). Pursuing leisure during leisure-time physical activity. *Journal of Physical Activity and Health*, 7(5), 685–694.
- Sinclair, K. M., Hamlin, M. J., & Steel, Gd. (2005). Physical Activity Levels of First-year New Zealand University Students: A Pilot Study. *Youth Studies Australia*, 24(1), 38. Retrieved from <http://search.informit.com.au/documentSummary;dn=903517869247756;res=IELFSC>
- Siti Affira, K., Mohd Nasir, M. T., Hazizi, A. S., & Kandiah, M. (2011). Socio-demographic and psychosocial factors associated with physical activity of working woman in Petaling Jaya, Malaysia. *Malaysian Journal of Nutrition*, 17(3).
- Sjöström, M., Oja, P., Hagströmer, M., Smith, B. J., & Bauman, A. (2006). Health-enhancing physical activity across European Union countries: the Eurobarometer study. *Journal of Public Health*, 14(5), 291–300.
- Slootmaker, S. M., Schuit, A. J., Chinapaw, M. J. M., Seidell, J. C., & Van Mechelen, W. (2009). Disagreement in physical activity assessed by accelerometer and self-report in subgroups of age, gender, education and weight status. *International Journal of Behavioral Nutrition and Physical Activity*, 6(1), 17.
- Sonmez, A., Bayram, F., Barcin, C., Ozsan, M., Kaya, A., & Gedik, V. (2013). Waist circumference cutoff points to predict obesity, metabolic syndrome, and cardiovascular risk in Turkish adults. *International Journal of Endocrinology*, 2013.
- Soon, H. K., Saad, H. A., Taib, M. N. M., Rahman, H. A., & Mun, C. Y. (2011). Accelerometer-determined physical activity level in adults with abdominal obesity. *International Journal of Sport and Health Science*, 1108110077.
- Sreeramareddy, C. T., Kutty, N. A. M., Jabbar, M. A. R., & Boo, N. Y. (2012). Physical activity and associated factors among young adults in Malaysia: an online exploratory survey. *Bioscience Trends*, 6(3), 103–109.
- Ståhl, T., Rütten, A., Nutbeam, D., Bauman, A., Kannas, L., Abel, T., ... Van Der Zee, J. (2001). The importance of the social environment for physically active lifestyle—results from an international study. *Social Science & Medicine*, 52(1), 1–10.



- Steptoe, A., Wardle, J., Fuller, R., Holte, A., Justo, J., Sanderman, R., & Wichstrøm, L. (1997). Leisure-time physical exercise: prevalence, attitudinal correlates, and behavioral correlates among young Europeans from 21 countries. *Preventive Medicine, 26*(6), 845–854.
- Suminski, R. R., Petosa, R., Utter, A. C., & Zhang, J. J. (2002). Physical activity among ethnically diverse college students. *Journal of American College Health, 51*(2), 75–80.
- Taylor-Piliae, R. E., Haskell, W. L., Stotts, N. A., & Froelicher, E. S. (2006). Improvement in balance, strength, and flexibility after 12 weeks of Tai chi exercise in ethnic Chinese adults with cardiovascular disease risk factors. *Alternative Therapies in Health and Medicine, 12*(2), 50.
- Tee, E.-S. (2011). Development and promotion of Malaysian dietary guidelines. *Asia Pacific Journal of Clinical Nutrition, 20*(3), 455–461.
- Tergerson, J. L., & King, K. A. (2002). Do perceived cues, benefits, and barriers to physical activity differ between male and female adolescents? *Journal of School Health, 72*(9), 374–380.
- The Institute for Public Health. (2011). Malaysia National Health and Morbidity Survey. *Clinical Chemistry, 1*–2. <https://doi.org/10.1373/clinchem.2005.048611>
- Thwe, K., Hayati, K. S., & Minhat, H. S. (2016). Determinants Of Physical Activity Participation Among The Universiti Putra Malaysia Students. *International Journal of Public Health and Clinical Sciences, 3*(6), 171–182.
- Touvier, M., Kesse-Guyot, E., Méjean, C., Pollet, C., Malon, A., Castetbon, K., & Hercberg, S. (2011). Comparison between an interactive web-based self-administered 24 h dietary record and an interview by a dietitian for large-scale epidemiological studies. *British Journal of Nutrition, 105*(7), 1055–1064.
- Trinh, O. T. H., Do Nguyen, N., Van Der Ploeg, H. P., Dibley, M. J., & Bauman, A. (2009). Test-retest repeatability and relative validity of the Global Physical Activity Questionnaire in a developing country context. *Journal of Physical Activity and Health, 6*(s1), S46–S53.
- Trost, S. G., Owen, N., Bauman, A. E., Sallis, J. F., & Brown, W. (2002). Correlates of adults' participation in physical activity: review and update. *Medicine & Science in Sports & Exercise, 34*(12), 1996–2001.
- Tucker, L. A., Seljaas, G. T., & Hager, R. L. (1997). Body fat percentage of children varies according to their diet composition. *Journal of the American Dietetic Association, 97*(9), 981–986.
- Tucker, P., Irwin, J. D., Gilliland, J., He, M., Larsen, K., & Hess, P. (2009). Environmental influences on physical activity levels in youth. *Health & Place, 15*(1), 357–363.

- Tudor-Locke, C., Brashear, M. M., Johnson, W. D., & Katzmarzyk, P. T. (2010). Accelerometer profiles of physical activity and inactivity in normal weight, overweight, and obese US men and women. *International Journal of Behavioral Nutrition and Physical Activity*, 7(1), 60.
- Tudor-Locke, C. E., & Myers, A. M. (2001). Methodological considerations for researchers and practitioners using pedometers to measure physical (ambulatory) activity. *Research Quarterly for Exercise and Sport*, 72(1), 1–12.
- Tyson, P., Wilson, K., Crone, D., Brailsford, R., & Laws, K. (2010). Physical activity and mental health in a student population. *Journal of Mental Health*, 19(6), 492–499.
- Van Domelen, D. R., Koster, A., Caserotti, P., Brychta, R. J., Chen, K. Y., McClain, J. J., ... Harris, T. B. (2011). Employment and physical activity in the US. *American Journal of Preventive Medicine*, 41(2), 136–145.
- Wallace, L. S., Buckworth, J., Kirby, T. E., & Sherman, W. M. (2000). Characteristics of exercise behavior among college students: application of social cognitive theory to predicting stage of change. *Preventive Medicine*, 31(5), 494–505.
- Ward, D. S., Dowda, M., Trost, S. G., Felton, G. M., Dishman, R. K., & Pate, R. R. (2006). Physical activity correlates in adolescent girls who differ by weight status. *Obesity*, 14(1), 97–105.
- Wengreen, H. J., & Moncur, C. (2009). Change in diet, physical activity, and body weight among young-adults during the transition from high school to college. *Nutrition Journal*, 8(1), 32.
- Wenthe, P. J., Janz, K. F., & Levy, S. M. (2009). Gender similarities and differences in factors associated with adolescent moderate-vigorous physical activity. *Pediatric Exercise Science*, 21(3), 291–304.
- Westerterp, K. R. (1999). Physical activity assessment with accelerometers. *International Journal of Obesity*, 23(S3), S45.
- White, S. M., Wójcicki, T. R., & McAuley, E. (2011). Social cognitive influences on physical activity behavior in middle-aged and older adults. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 67(1), 18–26.
- Whitt-Glover, M. C., Keith, N. R., Ceaser, T. G., Virgil, K., Ledford, L., & Hasson, R. E. (2014). A systematic review of physical activity interventions among African American adults: evidence from 2009 to 2013. *Obesity Reviews*, 15, 125–145.
- Wicker, P., Breuer, C., & Pawlowski, T. (2009). Promoting sport for all to age-specific target groups: the impact of sport infrastructure. *European Sport Management Quarterly*, 9(2), 103–118.
- World Health Organisation. (2010a). *Global Health Observatory (GHO) Data: Prevalence of insufficient physical activity*. 16–17.

- World Health Organisation. (2010b). *Global Health Observatory (GHO) Data: Prevalence of insufficient physical activity*. 16–17. Retrieved from [http://www.who.int/gho/ncd/risk\\_factors/physical\\_activity\\_text/en/](http://www.who.int/gho/ncd/risk_factors/physical_activity_text/en/)
- Wu, B., & Porell, F. (2000). Job characteristics and leisure physical activity. *Journal of Aging and Health, 12*(4), 538–559.
- Yahia, N., Achkar, A., Abdallah, A., & Rizk, S. (2008). Eating habits and obesity among Lebanese university students. *Nutrition Journal, 7*(1), 32.
- Yan, Z., & Cardinal, B. J. (2013). Perception of physical activity participation of Chinese female graduate students: A case study. *Research Quarterly for Exercise and Sport, 84*(3), 384–396.
- Zaher, Z. M. M., Zambari, R., Chan, S.-P., Muruga, V., Ng, B., Appannah, G., & Lim, T. O. (2009). Optimal cut-off levels to define obesity: body mass index and waist circumference, and their relationship to cardiovascular disease, dyslipidaemia, hypertension and diabetes in Malaysia. *Asia Pacific Journal of Clinical Nutrition, 18*(2), 209–216.
- Zaki, M., Robaayah, Z., Chan, S. P., Vadivale, M., & Lim, T. O. (2010). Malaysia Shape of the Nation (MySoN): a primary care based study of abdominal obesity in Malaysia. *Med J Malaysia, 65*(143), e9.
- Zalesin, K. C., Franklin, B. A., Miller, W. M., Peterson, E. D., & McCullough, P. A. (2008). Impact of obesity on cardiovascular disease. *Endocrinology and Metabolism Clinics of North America, 37*(3), 663–684.
- Zunft, H.-J. F., Friebe, D., Seppelt, B., Widhalm, K., de Winter, A.-M. R., de Almeida, M. D. V., ... Gibney, M. (1999). Perceived benefits and barriers to physical activity in a nationally representative sample in the European Union. *Public Health Nutrition, 2*(1a), 153–160.

## BIODATA OF STUDENT

Noor Ahmed Jameel was born in Babylon, Iraq in 1992. She started primary school at Aby-Tamam school. Later, she continued her secondary school at Balqes school. After that, she entered collage of Medical and Health Tecnologies / Baghdad, graduation from the the community health department in 2013 as a bachelor's degree. She continues her master due to her interest in Nutrition in Universiti Putra Malaysia (UPM).



## PUBLICATION

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