

# Influence of Physical Activity Intensity on Daily Energy Level Among General Adult Population in Malaysia

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## ABSTRACT

Improving the quality of life, encompassing physical and mental well-being is always the ultimate goal throughout all stages of life. However, the association between physical activity intensity and daily energy level remains relatively unexplored. This study investigated the factors associated with physical activity intensity and daily energy level. This cross-sectional study was conducted by recruiting the general adult population in Malaysia. The online questionnaire, including demographics, Global Physical Activity Questionnaire (GPAQ), World Health Organization Quality of Life (WHOQOL-BREF), and opinion-based questions were used for the data collection. The data was analyzed using Epi Info software version 7.2.5. A total of 205 respondents were included in our study. It was suggested that a higher proportion of the male population (80%) meets the WHO Recommended Physical Activity compared to females (62.2%). Notably, individuals taking medication or nutritional supplements demonstrated a significantly higher adherence percentage to the recommended physical activity (74.1%) than those not taking (61.3%). Underlying medical conditions emerged as a major influencing factor on physical health with a mean difference of 5.89, while caffeine intake had a significant impact on psychological health accounting for a mean difference of 4.48. Time constraint was identified as the primary barrier, constituting 26.34% of the total, whereas motivation, encouragement, and awareness were recognized as the main enabler facilitating regular physical activity, accounting for 43.9%. Overall, the majority of the respondents have positive thoughts and experiences

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on physical activity which allows them to improve or maintain physical health (22.93%), increase energy level (20.98%) and achieve satisfaction in daily life (20%). This study provides valuable insights into factors that influence adherence to recommended physical activity guidelines among the adult population in Malaysia. Further research and target interventions could be developed to improve this population's well-being and quality of life.

## INTRODUCTION

Low energy levels and fatigue has become a widespread problem in the population [1]. It is seen in individuals with medical illnesses and healthy people without underlying diseases [1]. It is found that approximately 9.75%-33% of the general population experience brief periods of fatigue (i.e., less than 1 month in duration) [1]. Low energy level and fatigue affect individuals, the community, and the healthcare system [2]. Higher mortality in the general population has been associated with low energy levels in a recent report from a prospective cohort study done in Norfolk, UK [2]. After adjusting for confounders, the hazard ratio (HR) for all-cause mortality was 1.40 for the group reporting the highest fatigue compared to those reporting the lowest [2].

A promising effective non-pharmacological treatment to improve fatigue includes physical activity, defined as “any bodily movement produced by skeletal muscles that requires energy expenditure” [3-6]. Physical activity has well-established benefits on health through the prevention and management of non-communicable diseases. WHO recommends that adults should have at least 150-300 minutes of moderate-intensity aerobic physical activity throughout the week [3].

Previous cross-sectional studies found that higher fatigue is associated with poorer physical function and activity [4]. Puetz. et al. (2006) reported that low intensity exercise has a better reduction in fatigue level than moderate intensity exercise, 65% and 49%, respectively [4]. Another study was conducted by Bergouignan et. al (2016) found that physically active respondents had increased self-perceived energy and vigor compared to respondents with uninterrupted sitting ( $p < 0.05$  for all) [5]. Furthermore, a prospective, longitudinal study was conducted and proved that individuals who reported greater levels of physical activity had better feeling and functioning after two years compared to those who reported lower levels of physical activity [6].

Maintaining or enhancing the quality of life (QoL) is always the ultimate goal throughout all stages of life [7]. Evidence proves that being physically active is one of the methods to improve the quality of life of an individual. [8] Certain neurotransmitters of the brain and endogenous opioids are associated with multiple mental health issues such as depression, anxiety and other mood constructs [8]. However, physical activity induces changes in these neurotransmitters and opioids thus resulting in reduced psychological distress and improved well-being and life satisfaction [8]. Another advantage of physical activity is an enhanced endorphin release which is known as feel-good hormones [9]. According to previous research, people who engaged in a minimum of 150 minutes of moderate-intensity physical activity spread over a course of a week showed significantly

reduced insomnia symptom severity [10]. The researchers also found that this amount of physical activity was associated with a significant reduction in depression and anxiety scores [10].

There are several factors associated with physical activity, such as gender [11,12], age [13], occupation [14,15], certain comorbid conditions [14,16], nutritional supplements [17,18] and caffeine [19]. Unfortunately, the rise of physical inactivity & sedentary lifestyle has developed into a global health issue [20]. According to the Physical Activity Profile 2022 of Malaysia, the prevalence of physical inactivity of the adult population aged 18 years old and above was 35% and 43% for males and females, respectively [20]. On another hand, there was 73% of the deaths attributable to non-communicable diseases such as cardiovascular disease being the major proportion, followed closely by cancers and other communicable, maternal, perinatal, and nutritional conditions while the remaining proportion contributed by injuries, chronic respiratory disease, and diabetes mellitus [20].

Many studies have been conducted to investigate the association between physical activity and mental health among elderly and individuals with chronic illness [21-25]. Cross-sectional studies found that individuals who followed vigorous physical activity recommendations were less likely to report poor mental health and perceived stress than those who did not meet these requirements [21]. In the elderly age group, physical activity has been proven to help improve cognitive function and psychological health [22]. A study conducted among breast cancer patients found that perceived energy levels increased immediately after a single exercise session for three out of four periods during the chemotherapy course [23]. Furthermore, physical activity was found to reduce fatigue in patients with multiple sclerosis [24]. However, the association between physical activity and daily energy level among healthy adults have yet to be investigated. The gender variation in physical activity and energy levels is also still unknown in Malaysia. Besides that, a similar study was previously conducted in Malaysia which reported the daily physical activity pattern and energy expenditure of Malaysian adults based on basal metabolic rate (BMR) and total energy expenditure (TEE). However, the study of association between physical activity and physical well-being among Malaysian adults as well as the factors associated with physical activity has yet to be discussed further [25]. Therefore, this study investigated the association between physical activity intensity and daily energy level (physical and mental well-being). We also intended to study the factors associated with physical activity intensity and daily energy level among general adults in Malaysia.

## METHODS

### *Study design and setting*

A cross-sectional study was conducted from May 2023 to July 2023 among the adult population (18 to 64 years old) in Malaysia. The mentioned target population in this study was a crucial factor in our study as it allowed us to explore one of the associated factors linked to daily energy levels, age. In addition, this study was conducted to examine and contrast the variations between physical activity intensity and daily energy level among general adult population in Malaysia, an area that was lacking in existing research.

### *Sample size and sampling*

The sample size was estimated with the prevalence of physical activity in the general population as 31.3%, with a precision of 6% and 95% confidence level for the infinite population using the Epi info sample size calculator. A minimum of 229 respondents were required in this study.

The respondents were recruited by convenience sampling method. The inclusion criteria were Malaysian adults aged 18 to 64 who voluntarily agreed to participate in the study and completed all the required sections of the questionnaire given after filling up the consent form. The reason for including this age group was determined by the Department of Statistics Malaysia, which mentioned individuals aged between 15 to 64 years old as working age [26]. The exclusion criteria were non- Malaysian, individuals with physical disability and those who do not provide informed consent.

### *Data Collection*

An online questionnaire form was created and distributed via social media, such as WhatsApp, Instagram, and emails. There were four sections in the questionnaire namely, demographics, Global Physical Activity Questionnaire (GPAQ) [27], World Health Organization Quality of Life (WHOQOL-BREF) [28] and opinion-based questions.

Section 1: The demographics included gender, age, ethnicity, BMI, occupation, comorbidities, regular medications or supplements and intake of caffeinated products.

Section 2: The Global Physical Activity Questionnaire (GPAQ) questionnaire was obtained from The World Health Organization to assess the physical activity intensity of the respondents [27]. Physical activity can be classified into vigorous-intensity activity which causes large increases in breathing or heart rate and moderate-intensity activity that causes small increases in breathing or heart rate. It encompasses different types of activity such as activity at work, usual way taken to travel to and from places, recreational activities. Physical activity is any bodily movement produced by skeletal

muscles that requires energy expenditure which might be positively associated with daily energy level.

Section 3: The World Health Organization Quality of Life (WHOQOL-BREF) was obtained from The World Health Organization comprises of 26 items divided into major four domains which are physical health, psychological, social relationships, and environment [28]. We have included two domains from this questionnaire, physical health and psychological, as part of our questionnaire in this study.

### ***Data analysis***

The data obtained was analyzed using the Epi Info version 7.2.5 software. The data was presented through frequency counts and other descriptive statistics such as mean, median and standard deviation. The association between physical activity intensity and daily energy level was analyzed using unpaired t-test, one-way ANOVA, Chi-square and Fisher's exact tests. The significant level (p-value) was set up at 0.05 with 95% confidence interval. The qualitative, open-ended answers of the respondents were analyzed by content analysis method. The text (qualitative data) was grouped according to the similarities and presented in frequency and percentage [29].

### ***Ethical consideration***

An informed consent form was given to the respondents, who were free to choose whether to participate in this study. The participation was a voluntary participation without any incentives of encouragement or force. The information of the participants was kept confidential in this study. Ethical approval was granted from the Research Ethics Committee, Manipal University College Malaysia (MUCM), Malaysia.

## **RESULTS**

Table 1 shows the sociodemographic characteristics of the 205 respondents of our study. The respondents were divided into 2 age groups based on their mean age which is 33.9 years (SD = 13.85), with 59.51% respondents in the <34 years age group and 40.49% in the >34 years age group. Among the respondents, there were 65.85% female. Malaysian Chinese contributed to the majority of the sample size with 67.32%, followed by 13.66% Indian. The Malay group had the least representation with 7.32% of respondents (Table 1).

Table 1. Sociodemographic characteristics of respondents (n=205)

<b>Variables</b>	<b>n (%)</b>
<b>Age (years)</b>	
Mean (SD) = 33.9 (13.85)	
<34	122 (59.51)
>34	83 (40.49)
<b>Gender</b>	
Male	70 (34.15)
Female	135 (65.85)
<b>Ethnicity</b>	
Chinese	138 (67.32)
Indian	28 (13.66)
Malay	15 (7.32)
Others	24 (11.71)
<b>BMI</b>	
Underweight (<18.5)	38 (18.54)
Normal weight (18.5-22.9)	88 (42.93)
Pre-obese (23-27.4)	48 (23.41)
Obese (>27.5)	31 (15.12)
<b>Occupation</b>	
Students	86 (41.95)
Employed at high occupational activity	5 (2.44)
Employed at intermediate occupational activity	26 (12.68)
Employed at low occupational activity	79 (38.54)
Others	9 (4.39)
<b>Underlying medical conditions</b>	
Yes	27 (13.17)
No	178 (86.83)
<b>Medications or nutritional supplements</b>	
Yes	94 (45.85)
No	111 (54.15)
<b>Caffeine intake</b>	
Yes	159 (77.56)
No	46 (22.44)

Table 2 reports the physical activity among the respondents based on their answers of the WHO GPAQ. Based on the activity at work domain, 15.12% respondents reported “Yes” for vigorous work. Based on the travel to & from places domain, 54.63% of respondents continuously walk or cycle for at least 10 minutes to get to and from places. For the recreational activities domain, 37.07% of respondents responded yes for vigorous recreation. For the sedentary behaviour domain, the respondents reported their time spent sitting in minutes with a median of 360 (270 – 480) (Table 2).

Table 2. Physical activity among the respondents (n=205)

<b>Domains</b>	<b>Yes n (%)</b>	<b>No n (%)</b>
<b>Activity at work</b>		
Vigorous work	31 (15.12%)	174 (84.88%)
Moderate work	82 (40.0 %)	123 (60.0%)
<b>Travel to and from places</b>		
Travel	112 (54.63%)	93 (45.37%)
<b>Recreational activities</b>		
Vigorous recreation	76 (37.07%)	129 (62.93%)
Moderate recreation	117 (57.07%)	88 (42.93%)
<b>Sedentary behaviour</b>		
	<b>Time spent sitting in minutes Median (IQR)</b>	
Sitting	360 (270 – 480)	

Table 3 reports the association between the demographic characteristics and physical activity among the respondents. Gender was significantly associated with meeting the WHO recommended physical activity requirement. The odds of males meeting the physical activity requirement is 2.43 times than the odds of meeting the physical activity requirement in females. (OR 2.43, 95% CI 1.23, 4.80).

Table 3. The association between the demographic characteristics and physical activity among respondents (n=205)

Variables	WHO Recommended Physical Activity		OR (95% CI)	P-value*
	Meet recommendation (>600 MET minutes) n (%)	Does not meet recommendation (< 600 MET minutes) n (%)		
<b>Age (years)</b>				
>34	61 (73.5)	22 (26.5)	Reference	
<34	79 (64.7)	43 (35.3)	0.66 (0.36, 1.22)	0.187
<b>Gender</b>				
Female	84 (62.2)	51 (37.8)	Reference	
Male	56 (80.0)	14 (20.0)	2.43 (1.23, 4.80)	0.009
<b>Ethnicity</b>				
Chinese	89 (64.5)	49 (35.5)	Reference	
Indian	25 (89.3)	3 (10.7)	0.22 (0.06, 0.76)	0.012
Malay	10 (66.7)	5 (33.3)	0.91 (0.29, 2.81)	0.867
Other	16 (66.7)	8 (33.3)	0.91 (0.36, 2.27)	0.837
<b>BMI (kg/m<sup>2</sup>)</b>				
Underweight (<18.5)	22 (57.9)	16 (42.1)	Reference	
Normal (18.5-22.9)	59 (67.1)	29 (33.0)	0.68 (0.31, 1.48)	0.325
Pre-obese (23-27.5)	41 (85.4)	7 (14.6)	0.23 (0.08, 0.66)	0.004
Obese (>27.5)	18 (58.1)	13 (41.9)	0.99 (0.38, 2.60)	0.989



<b>Occupation</b>				
Employed at high occupational activity	3 (60.0)	2 (40.0)	Reference	
Employed at intermediate occupational activity	16 (61.5)	10 (38.5)	0.94 (0.13, 6.63)	1.000
Employed at low occupational activity	50 (63.3)	29 (36.7)	0.87 (0.14, 5.51)	1.000
Students	62 (72.1)	24 (27.9)	0.58 (0.09, 3.69)	0.621
Other	9 (100)	0 (0)	Undefined	0.110
<b>Underlying medical conditions</b>				
No	120 (67.4)	58 (32.6)	Reference	
Yes	20 (74.1)	7 (25.9)	1.38 (0.55, 3.45)	0.488
<b>Medications or nutritional supplements</b>				
No	68 (61.3)	43 (38.7)	Reference	
Yes	72 (76.6)	22 (23.4)	2.03 (1.12, 3.81)	0.019
<b>Caffeine intake</b>				
No	26 (56.5)	20 (43.5)	Reference	
Yes	114 (71.7)	45 (28.3)	1.95 (0.99, 3.84)	0.051

\*Chi-square test/ Fisher's exact test

Table 4 shows the association between age, gender, ethnicity, BMI, occupation, underlying medical condition, medical or nutritional supplement, caffeine intake and physical and psychological health. The findings revealed no significant association between the respondents' demographic characteristics, underlying medical conditions, nutritional supplements, caffeine intake and physical and psychological health (Table 4).

Table 4. Association between the demographic characteristics and the mean scores of World Health Organization Quality of Life-BREF physical health among respondents (n=205)

Variables	Physical Health Score			Psychological Health Score		
	Mean (SD)	Mean difference (95% CI)	P-value*	Mean (SD)	Mean difference (95% CI)	P-value*
<b>Age (years)</b>						
<34	65.7 (15.83)	0.13	0.956	60.6 (20.63)	0.56	0.849
>34	65.6 (17.64)	(-4.52, 4.78)		61.1 (20.40)	(-6.32, 5.20)	
<b>Gender</b>						
Male	67.7 (17.5)	2.97	0.224	59.5 (24.12)	-1.96	0.518
Female	64.7 (16.0)	(-1.83, 7.77)		61.5 (18.39)	(-7.92, 4.00)	
<b>Ethnicity</b>						
Chinese	66.4 (15.90)		0.320	61.3 (19.87)		0.169
Indian	61.5 (17.91)			53.4 (18.98)		
Malay	62.1 (17.85)			63.9 (25.52)		
Others	68.8 (17.60)			64.9 (21.46)		
<b>BMI (kg/m<sup>2</sup>)</b>						
Underweight (<18.5)	65.3 (13.49)		0.777	61.4 (17.59)		0.640
Normal (18.5-22.9)	65.4 (17.95)			58.8 (21.73)		
Pre-obese (23-27.4)	67.7 (14.97)			62.5 (20.34)		
Obese (>27.5)	63.9 (18.47)			63.3 (20.76)		
<b>Occupation</b>						
Students	65.9 (15.44)		0.103	61.5 (18.93)		0.123
High occupational activity	54.3 (16.83)			45.8 (23.75)		
Intermediate occupational activity	62.4 (14.61)			57.5 (18.86)		
Low occupational activity	66.0 (18.17)			60.5 (22.54)		
Other	77.0 (12.51)			74.1 (12.97)		
<b>Underlying medical condition</b>						
Yes	60.6 (16.08)	-5.89	0.085	59.7 (22.50)	-1.26	0.767
No	66.5 (16.52)	(-12.66, 0.81)		61.0 (20.23)	(-9.62, 7.11)	
<b>Medication or nutritional supplement</b>						
Yes	67.0 (18.03)	2.38	0.307	61.6 (20.44)	1.48	0.608
No	64.6 (15.18)	(-2.20, 6.95)		60.1 (20.60)	(-4.19, 7.15)	
<b>Caffeine intake</b>						
Yes	65.9 (17.28)	0.72	0.796	61.8 (21.02)	4.48	0.192
No	65.1 (13.89)	(-4.76, 6.19)		57.3 (18.32)	11.23)	

\*Unpaired T-test, One-way ANOVA

Table 5 shows the association between physical activity towards World Health Organization Quality of Life physical and psychological health score. There is no significant association between physical activity and World Health Organization Quality of Life physical and psychological health scores (Table5).

Table 5. The association between physical activity towards World Health Organization Quality of Life- BREF physical health and psychological health score (n=205)

<b>WHO recommended physical activity</b>	<b>Physical Health Score Mean (SD)</b>	<b>Mean Difference (95% CI)</b>	<b>P-value</b>
Does not meet physical activity requirement (< 600 MET minutes)	64.5 (13.51)	-1.7 (-6.19, 2.70)	0.440*
Meets physical activity requirement (> 600 MET minutes)	66.3 (17.80)		
	<b>Psychological Health Score Mean (SD)</b>	<b>Mean Difference (95% CI)</b>	<b>P-value</b>
Does not meet physical activity requirement (< 600 MET minutes)	59.9 (17.67)	-1.4 (-7.45, 4.70)	0.655
Meets physical activity requirement (>600 MET minutes)	61.3 (21.72)		

According to our survey findings, the respondents identified several barriers to regular physical activity in Malaysia. The most significant barrier, reported by 26.34% of the respondents, was time constraints and poor time management. Following closely by laziness, a sedentary lifestyle and addiction to digital gadgets, mentioned by 20% of the respondents. The third major barrier 13.66% of the respondents identified was long working or schooling hours and lack of work-life balance. Motivation, encouragement and awareness are the most significant enablers among our respondents. 22.93% of the respondents believed that physical activity is needed in order to improve or maintain their physical health. Meanwhile, 20.98% experienced that physical activity increased their energy level and 20% considered that physical activity to be good, satisfactory, rewarding, and essential part of life. (Table 6).

Table 6. Barriers, enablers, and experiences of doing regular physical activity in Malaysia among respondents (n=205)

<b>Barriers, enablers, and experiences of doing regular physical activity</b>	
<b>Barriers</b>	
Time constraints	54 (26.34)
Poor time management	
Laziness Sedentary lifestyle Addiction to digital gadgets	41 (20.00)
Long working hours and schooling hours	28 (13.66)
Lack of work-life balance	
Stressful lifestyle and work Heavy responsibilities and duties Busy schedule	27 (13.17)
Insufficient recreational areas Lack of facilities	25 (12.20)
Difficult accessibility to gym and court Expensive sports equipment and rental of places Lack of group physical activities	
Hot and humid weather	23 (11.22)
Lack of motivation	10 (4.88)
Lack of awareness	9 (4.39)
Tiredness	5 (2.44)
Non-commitment	4 (1.95)
Attitude towards regular physical activity Personal preference Lack of interest	4 (1.95)
Poor health condition	3 (1.46)
Lack of peers	2 (0.98)
Financial instability	2 (0.98)
Safety concerns for outdoor sport activities	2 (0.98)
Lack of communication	1 (0.49)
<b>Enablers</b>	
Motivation, encouragement and awareness	90 (43.90)
Facilities	34 (16.59)
Time management	29 (14.15)

Media and advertisement	9 (4.39)
Promote sport activity	4 (1.95)
Financially stable	3 (1.46)
Weather	1 (0.49%)
Invention	1 (0.49%)
<b>Thoughts/experience on physical activity</b>	
Improve/maintain physical health	47 (22.93)
Increases energy level	43 (20.98)
Good/Satisfying/Rewarding	41 (20.00)
Important/essential part of life	
No comment	33 (16.10)
Unsure	
No exercise	19 (9.26)
Lack of exercise	
Improve/maintain mental health	16 (7.80)
Exercise daily	15 (7.32)
Balanced lifestyle including physical activity	
Increase happiness	12 (5.85)
Elevate mood	
Reduce stress	11 (5.37)
Good habit	7 (3.41)
Improve appearance	7 (3.41)
Decrease in energy level	7 (3.41)
Tiring	
Increase physical strength	6 (2.93)
Improve immunity/reduce risk of disease	6 (2.93)
Decrease/manage body weight	4 (1.95)
Boost-self confidence	4 (1.95)
Build new social relationships	3 (1.46)
Reduce body pain	2 (0.98)
Improve sleep quality	2 (0.98)

\*Multiple answers

## DISCUSSION

Our study aimed to investigate the factors associated with physical activity intensity and daily energy level among general adults in Malaysia. Besides that, this study was conducted to investigate the association between physical activity intensity and daily energy level among the general adults in Malaysia.

Our study demonstrated that gender had a significant association with the World Health Organization (WHO) recommended physical activity. The results showed that male adults were more likely to meet the recommended physical activity amount compared to females. In a study that assessed the physical activity of the 1114 adults in Sweden using accelerometers, men were significantly more active at moderate-intensity level activity and spent significantly more time in vigorous intensity activity when compared to women [30]. Regarding the ethnicity of the respondents, our study found that Chinese respondents were significantly more likely to meet the recommended physical activity levels when compared to Indian respondents. Malay and other ethnicities were also less likely to meet the physical activity level when compared to Chinese respondents, but this association was not statistically significant. A previous study conducted in Malaysia found significant differences between ethnicities in regard to their physical activity. Their study reported that Chinese ethnicity engaged in significantly fewer light exercises compared to Malays. They also found that other ethnicities engaged in more vigorous activity compared to Malay, Chinese and Indian groups [31].

The contrast in our results may be attributed to our study sample which does not depict the true racial distribution of Malaysia due to the majority of our sample consisting of Malaysian Chinese.

Our study findings also demonstrated that the pre-obese BMI group were significantly less likely to meet the WHO recommended physical activity when compared to underweight group. A study comparing the physical activity in different BMI groups measured by accelerometers found that overweight and obese adults engaged significantly less in moderate or greater intensity activity than the normal BMI group. The same study also reported that overweight and obese respondents were less likely to meet the 2002 Institute of Medicine (IOM) exercise recommendations when compared to normal BMI respondents [32]. The difference in the findings may be attributed to the difference in data collection method and tools. The use of self-administered questionnaires may have contributed to responder and recall bias in our findings.

Our study suggests that there is a significant association between intake of medications or nutritional supplements and physical activity and the odds of meeting World Health Organization physical activity recommendations in individuals taking medications or nutritional supplements is 2.03 times higher than those not taking. Our finding aligns with a previous cross-sectional study conducted in Brazil. They discovered that most individuals who take supplements had good or excellent eating habits and exercised regularly [33].

Our survey found no significant association between age, gender, ethnicity, BMI, occupation, underlying medical condition, medical or nutritional supplement and

caffeine intake with psychological health of respondents. However, in a cross-sectional study done in Iran, it was reported that there is a curvilinear relationship between age and psychological health. The study demonstrated that there is negative association among the younger population (<45 years), insignificant association among mid-aged population and positive among elderly over 70 years [34]. This difference might be attributable to the limited age range of samples in our study as our target population is adults aged 18 to 64 years old with a majority (59.51%) of the sample aged less than 34 years old.

Our study found no significant associations between physical activity intensity and daily energy level (physical and psychological health) among the general adult population in Malaysia. However, a descriptive analytical study conducted in Kermanshah Province has suggested a positive association between physical activity with quality of life and general health [35]. This difference is attributable to limited sample size in our study as a result of time constraints.

Majority of people living in this modern world lead a busy life with multiple responsibilities such as work, family, and other commitments. This aligns with the third and fourth major barriers identified in our study, namely long working or schooling hours and stressful lifestyle, working environment.

Prioritizing physical activity in limited time is a huge challenge for individuals facing heavy responsibilities and duties in competitive working or learning environments. Procrastination is a major issue most individuals encounter, with laziness being the second most common barrier identified in our research. Improper time management further hinders a regular exercise routine in daily life. To overcome these barriers, it is important to focus on efficient time utilization by incorporating physical activity into daily routine through minute changes such as active commuting, taking stairs instead of the elevator.

Apart from the primary barriers predominantly related to personal factors, our survey revealed that respondents reported multiple external environmental barriers. Inadequate access to parks and trails close to residential areas can discourage individuals from engaging in regular physical activity. Factors such as long distances, lack of safe pedestrian or cycling infrastructure, transportation limitations and inconvenient operating hours contribute to these challenges, particularly for individuals relying on public transportation. To address these barriers, promoting alternative forms of physical activity that require minimal equipment or space is crucial. This includes home workouts or utilizing online platforms and fitness applications that provide guided workouts accessible from anywhere. As urbanization in Malaysia has been steadily increasing from 71.61% in 2011 to 77.7% in 2021 [36], it is important to encourage policymakers and city planners to prioritize developing and maintaining accessible recreational areas within local communities.

In Malaysia, the climate is tropical all year round, characterized by high temperatures and humidity levels. As a result, our survey respondents also identified hot and humid weather as a barrier to regular physical activity. Excessive sweating and difficulty

regulating body temperature can make physical activity more challenging and exhausting. This discomfort may diminish motivation and discourage individuals from engaging in regular exercise. To surmount this barrier, individuals can consider several strategies. First, choose the appropriate timing such as early morning or late evening, when the temperature is generally lower to perform a more comfortable physical activity. Second, ensuring proper hydration is crucial. Drinking plenty of fluids before, during and after exercise helps maintain adequate hydration levels, especially after excessive sweating.

The most common enabler in our study is motivation, which is 43.9% of our respondents. Motivation is a will power that makes a person get up and get active. According to Mayo's Theory of Human Relations, the social needs of individuals are the most important motivating factor. A study conducted in 2013 stated that increased motivation positively affects function directly and indirectly by influencing physical activity levels. Therefore, changing the motivation to exercise will have a greater effect than improving a patient's exercise levels in isolation [37].

Lastly, the respondents were also asked to describe their thoughts and experiences on physical activity in daily life. Majority of the respondents believed that physical activity helps in the improvement or maintenance of physical health. This corresponds with the findings from a previous study done in the European Union, which reported that individuals who were sufficiently active rated their health better than those who were insufficiently active. They also reported that highly active individuals rated their health better than individuals who were only sufficiently active [38].

There are some limitations in this study. The respondents were recruited with convenience sampling, limiting the generalizability of the findings. There may also be some social desirability or reporting bias in our questionnaire which can influence the accuracy of our result.

## **CONCLUSION AND RECOMMENDATION**

Through the study, we found no significant association between physical activity and physical and psychological health. Underlying medical conditions emerged as a major influencing factor on physical health with a mean difference of 5.89, while caffeine intake had a significant impact on psychological health accounting mean difference of 4.48. Time constraint was identified as the primary barrier, whereas motivation, encouragement, and awareness were recognized as the main enabler facilitating regular physical activity. Overall, the majority of the respondents have a positive thought and experience on physical activity which allows them to improve or maintain physical health (22.93%), increase energy level (20.98%) and achieve satisfaction in daily life (20%).

Considering that our study was one of the few that examined the association between personal characteristics and their physical and psychological health, additional studies in this field can be done to fully comprehend the association between personal characteristics and physical and psychological health. Our study could be a reference for



future researchers who wish to conduct research study with similar topic. As time constraints and poor time management were the most significant barriers that stop individuals from exercising, people should schedule their tasks with the deadline so that they can more clearly see which tasks require more effort and better understand how they should arrange their time to complete the tasks. By doing so, they could easily complete the tasks with less effort and use the time saved to do some physical exercise. As mentioned in the result section above, they can also incorporate physical activity into daily routine such as taking the stairs instead of the elevator. From the data collected, we found that motivation, encouragement, and awareness were the most significant enablers that promote physical exercise among respondents. Hence, we recommend that the government frequently hold some talks or similar campaign in the community to raise individual's awareness about the benefits of physical health.

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