

Physical Activity and Its Impact on Academic Achievement among Health Sciences Students
Universiti Kebangsaan Malaysia

*(Aktiviti Fizikal dan Kesannya terhadap Pencapaian Akademik Pelajar Sains Kesihatan Universiti
Kebangsaan Malaysia)*

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ABSTRAK

Self-determination influences physical activity which improves student's health status leading to an increase in their academic achievements. However, these relationships among health sciences students remain unclear. Therefore, this study aims to investigate the influences of self-determination towards physical activity and the relationship between physical activity level and academic achievement among third-year students of Faculty of Health Sciences, Universiti Kebangsaan Malaysia (UKM). A cross-sectional study was conducted among 180 third-year students from all programs in Faculty of Health Sciences, UKM from March to May 2020 using a self-administered short-form version of the International Physical Activity Questionnaire (IPAQ-SF) and the third version of the Behavioural Regulation in Exercise Questionnaire (BREQ-3). The Kruskal Wallis test was done to evaluate the relative autonomy index (RAI) and Metabolic Equivalent Task (MET) among groups, while a simple linear regression was performed to identify the relationship between self-determination and physical activity levels and between physical activity levels and academic achievements. A significant difference of self-determination level was found between light and a moderate level of physical activity ($p < 0.05$) and between light and vigorous level of physical activity ($p < 0.001$). Our findings also revealed that a positive moderate relationship was found between the level of physical activity and self-determination level ($R = 0.248$, $R^2 = 0.062$) where self-determination level significantly predicts the physical activity performed ($p < 0.01$). However, a low negative relationship was found between the level of physical activity and academic achievement ($R = 0.123$, $R^2 = 0.015$). In conclusion, self-determination plays a key role in contributing the physical activity levels, while the physical activity did not influence the academic achievement among the third-year students of Faculty of Health Sciences, Universiti Kebangsaan Malaysia.

Keywords: physical activity, academic achievement, self-determination

ABSTRACT

Motivasi sendiri mempengaruhi aktiviti fizikal yang mana keadaan ini mampu meningkatkan status kesihatan pelajar seterusnya berupaya meningkatkan tahap pencapaian akademik. Namun, hubungkait ini masih tidak jelas di kalangan pelajar sains kesihatan. Oleh itu, kajian ini dijalankan untuk menilai pengaruh motivasi sendiri terhadap aktiviti fizikal dan hubungkait antara aktiviti fizikal dan pencapaian akademik di kalangan pelajar tahun tiga Fakulti Sains Kesihatan, Universiti Kebangsaan Malaysia (UKM). Sebuah kajian keratan rentas telah dilakukan ke atas 180 orang pelajar tahun tiga daripada semua program di bawah Fakulti Sains Kesihatan, UKM bermula dari Mac hingga Mei 2020 menggunakan borang soal selidik individu versi pendek 'International Physical Activity Questionnaire (IPAQ-SF)' dan 'Behavioural Regulation in Exercise Questionnaire (BREQ-3)'. Ujian Kruskal-Wallis telah dilakukan untuk menilai indeks autonomi relative (RAI) dan tugas penyeteraan metabolik (MET) antara kumpulan, manakala ujian regresi linear mudah dilakukan untuk mengenalpasti hubungkait antara motivasi sendiri dan aktiviti fizikal serta aktiviti fizikal dan pencapaian akademik. Perbezaan yang signifikan

diperhatikan bagi tahap motivasi sendiri antara tahap aktiviti fizikal yang rendah sederhana ($p < 0.05$) dan antara aktiviti fizikal sederhana dan tinggi ($p < 0.001$). Hasil kajian juga menunjukkan hubungkait positif yang sederhana antara motivasi sendiri dan aktiviti fizikal ($R = 0.248$, $R^2 = 0.062$) yang mana tahap aktiviti fizikal boleh ditentukan oleh motivasi sendiri ($p < 0.01$). Walaubagaimanapun, hubungkait yang negatif diperhatikan antara aktiviti fizikal dan pencapaian akademik ($R = 0.123$, $R^2 = 0.015$). Kesimpulannya, motivasi sendiri memainkan peranan penting dalam menentukan tahap aktiviti fizikal, manakala aktiviti fizikal tidak mempengaruhi pencapaian akademik dalam kalangan pelajar Tahun tiga Fakulti Sains Kesihatan, Universiti Kebangsaan Malaysia.

Kata kunci: Aktiviti Fizikal, Pencapaian Akademik, Motivasi sendiri

INTRODUCTION

Physical activity has a well-known effect in improving the quality of health as it helps in lowering the risk of developing chronic diseases. According to the World Health Organization (WHO) (2018), physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure. Physical activity not only limited to exercise activities, yet it also includes activity such as part of working, playing, carrying out household chores, travelling, and engaging in recreational pursuits (WHO 2018). The recommended period of engaging with physical activity as suggested by the WHO for adults aged between 18 to 64 years old is at least 30 minutes per session within five days. Globally, the percentage of inactive adults recorded by WHO is about 25% while more than 80% of the world's adolescents were found to be insufficiently active. Malaysia is not exempted from this issue as well. According to the National Morbidity Health Survey (NHMS) in 2015, it was found that 75% of Malaysian adults were insufficiently active (Chan et al. 2017).

Physical activity influences by self-determination in which there are intrinsic and extrinsic components that are used to measure this continuum of self-determination. The components consist of six types of behavioural regulations which are amotivation, intrinsic motivation, external regulation, introjected regulation, identified regulation and integrated regulation (Deci & Ryan 1985). Amotivation is defined as the state of not being motivated to act upon activity and it is considered as the lowest level of self-determination towards physical activity (Holtey-Weber 2018). External regulation, introjected regulation, identified regulation and integrated regulation are the components of extrinsic motivation. External regulation involves the behaviour of doing physical activity for the sake to abide by external pressure. Introjected regulation on the other hand is a type of motivation to perform physical activity in avoidance of self-guilt and gaining self-pride.

Meanwhile, the identified regulation is defined as a type of motivation which reflects an individual's personal values towards the outcome of doing physical activity. The most self-determined form of extrinsic motivation is integrated regulation (Maitre et al., 2017). In this type of motivation, physical activity is done as a part of their belief or agreement in personal values or their identity. Lastly, the highest level of self-determination is the intrinsic motivation where people tend to engage in physical activity as they found it enjoyable and gives them self-pleasure.

Active is important in physical activity which not only in maintaining the healthy condition in an individual but also in enhancing the academic performance among students. According to Hashim et al. (2011), the relationship between physical activity and student's academic performance in Malaysia is remarkable because the education system in Malaysia is focusing on exam-oriented leads to inactive of physical activity. However, previous studies have reported that there is a significant association between physical activity and academic performance. A study done by Senthil et. al (2014) showed a positive correlation between physical activity and academic performance among medical college students. The physical activity is beneficial to students in their academic performance as it helps to induce arousal and decrease boredom in students, which are essential in providing prolonged attention to their studies, thus helps in enhancing their academic performance. A significant correlation was found between physical activity and academic performance among undergraduates' students (Kayani et al. 2018). An increase in the level of physical activity helps in reducing the level of depression and increase self-esteem within them which eventually lead to an improvement in academic performance.

However, a study done by Hashim et al. (2011) found a negative relationship between physical activity and academic performance. Students who are physically active exhibit low in academic performance compared to those who are physically inactive. It is speculated

that participation in physical activities or sports had replaced the study hours leading to less time spend for the students to do revision resulting in poor academic performance. Meanwhile, a study done by Riley et al. (2014) shows no significant correlation between physical activity and academic performance however it was also stated that students who never exercised are shown to have a poor academic performance. Therefore, due to the conflict in some findings regarding the relationship between physical activity and academic achievement, this study was done to further investigate the relationship between physical activity and academic performance among students in Faculty of Health Sciences, Universiti Kebangsaan Malaysia (UKM).

METHODOLOGY

Study Design

An analytical cross-sectional study was conducted among 180 third-year students from all undergraduate programs under the Faculty of Health Sciences, Universiti Kebangsaan Malaysia. The undergraduate program offered by Faculty of Health Sciences, UKM includes 11 programs which are biomedical sciences, occupational therapy, speech sciences, optometry, nutrition sciences, dietetics, audiology, diagnostic imaging and radiotherapy, physiotherapy, environmental health, and forensic sciences. The participants must be Malaysian, aged between 21 to 27 years old and were attending the second semester of their third-year studies. The third-year students were chosen in this study as most of them will be doing their final year project and attachment elsewhere in their final year. We excluded the students who are not healthy and have physical disabilities record. This study was conducted in line with the Declarations of Helsinki (World Medical Association 2013).

Sample Size

We estimated the sample size of the study based on a comparison between two proportions with the total number of populations of third-year students of the

Faculty of Health Science, Universiti Kebangsaan Malaysia are 290. Therefore, by using the following formula, $n = \chi^2 NP (1 - P) / \Delta^2 (N - 1) + \chi^2 P (1 - P)$ with a significance level of 5% and the degree of accuracy is 5%, the sample size was calculated is 166. It is expected there is a 10% non-response rate, hence, it is decided for the final sample size to be taken for the study was 180. Finally, the subjects were chosen by stratified random sampling method.

Data Collection

The respondents were briefed shortly about the objective of the research and the written informed consent was obtained from all subjects enrolled in the study. The subjects were handed two types of questionnaire, International Physical Activity Questionnaire (IPAQ-SF) and Behavioural Regulation in Exercise Questionnaire (BREQ-3). The questionnaires were distributed to the students via online Google form. The aim of using IPAQ-SF is to obtain data on physical activity and the short version is being used in this study. The questionnaire has been validated for use globally with the test-retest repeatability/ reliability using Spearman's ρ was about 0.8 (Craig et al. 2003).

Meanwhile, to identify the influential factor of physical activity, which is self-determination, the BREQ-3 questionnaire was used. The self-determination was ranged from non-self-determination to completely self-determination. Respondents were also required to provide their official latest cumulative grade point average (CGPA) records throughout their study. The questionnaires were then collected for data analysis.

Data Analysis

The physical activity intensity of the respondents was categorised according to the metabolic equivalent task (MET)(Table 2.1). The intensity of physical activity was categorised as vigorous, moderate, walking, and sitting. Then, these scores were then categorised for the physical activity level as light, moderate and vigorous with the MET total score are ≤ 600 , $601 - 3000 \geq$ and 3001 , respectively (Table 2.2).

TABLE 2.1. The intensity of physical activity and their MET score

Type of physical activity	MET Score
Vigorous	8.0
Moderate	4.0
Walking	3.3
Sitting	1.8

TABLE 2.2. The categorisation of physical activity level according to the MET score

MET values	Level of physical activity
≤ 600	Light
601 - 3000	Moderate
≥ 3001	Vigorous

Table 2.3 showed the BREQ-3 dimension and scoring based on the organismic integration theory of self-determination theory (SDT), including amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic regulation. We also classified the academic achievement of the respondent's CGPA as distinction (more than 3.67) and below. The distinction CGPA is set by the Universiti Kebangsaan Malaysia under undergraduate guidelines. The data were analysed using

Statistical Product and Service Solution (SPSS) version 23.0. The Kruskal Wallis test was chosen to evaluate the relative autonomy index (RAI) and the Metabolic Equivalent Task (MET) among groups. Meanwhile, the simple linear regression test was done to identify the relationship between self-determination and physical activity levels and between physical activity levels and academic achievements. For all the statistical analysis, the significance values were set as $p < 0.05$.

TABLE 2.3. BREQ-3 Dimension

BREQ-3 Dimension	Item	Scoring
Amotivation	2, 8, 14, 20	- 3
External regulation	6, 12, 18, 24	- 2
Introjected regulation	4, 10, 16, 22	- 1
Identified regulation	1, 7, 13, 19	+ 1
Integrated regulation	5, 11, 17, 23	+ 2
Intrinsic regulation	3, 9, 15, 21	+ 3

RESULTS

Academic achievement of the respondents

Figure 3.1 shows the academic achievement of the respondents, which is the frequency of cumulative grade point average (CGPA) scores. Among the respondent, 155 respondents (86.1%) with CGPA less than or equal to 3.66 and 25 respondents (13.9%) with CGPA more than or equal to 3.67.

Level of Physical Activity Level

The measurement of the physical activity level in the current study was categorized according to the score of metabolic equivalent task (METs) based on exercise intensity. The physical activity level was categories as light, moderate, and vigorous. Figure 3.2 shows the exercise level of physical activity among the respondent. The lowest percentage of exercise level is light exercise

(10.6%) followed by vigorous exercise (31.1%) and the highest percentage is moderate exercise (58.3%).

Level of Self-determination

Meanwhile, the self-determination level of the respondents was measured through the Relative autonomy index (RAI) shown in Figure 3.3. Identified and intrinsic regulations are the highest mean among the other level of self-determination in engaging physical activity in our respondents. The amotivation is the lowest mean among the other level of self-determination in engaging physical activity in our respondents.

Assessment of self-determination towards physical activity level

There was a statistical difference between self-determination and physical activity level at $p < 0.05$.

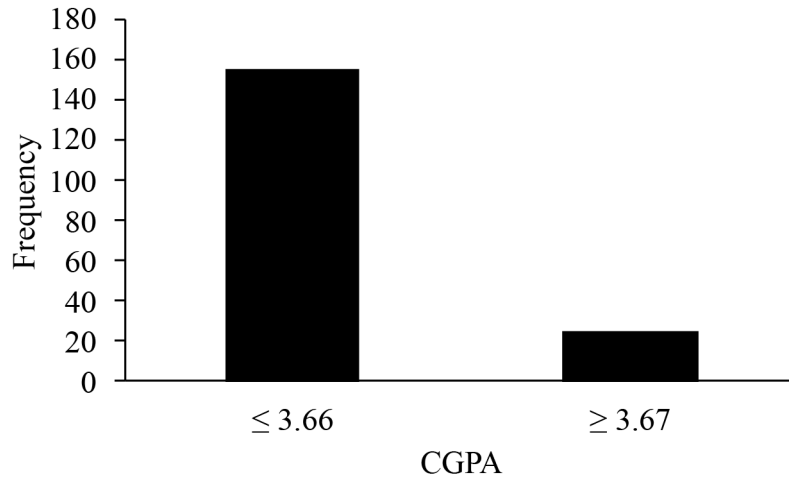


FIGURE 3.1. Frequency of respondents based on CGPA

The light physical activity was significantly lowered as compared to moderate ($p < 0.05$) and vigorous physical activity ($p < 0.001$) (Table 3.1).

that self-determination level = $37.99 + (0.02 * \text{physical activity})$.

Relationship between self-determination and physical activity

Relationship between physical activity and academic performance

Figure 3.4 shows a significant positive moderate relationship between self-determination and the physical activity level among students of the Faculty of Health Sciences ($p < 0.01$, $R = 0.248$, $R^2 = 0.062$). From the simple linear regression analysis, it is predicted

Figure 3.5 shows the insignificant negative relationship between physical activity level and the academic achievement among students of the Faculty of Health Sciences ($R = 0.123$, $R^2 = 0.015$). Based on the simple linear regression analysis, it is predicted that Academic achievements (CGPA) = $3.4 - ((1.35 \times 10^{-5}) * \text{physical activity})$.

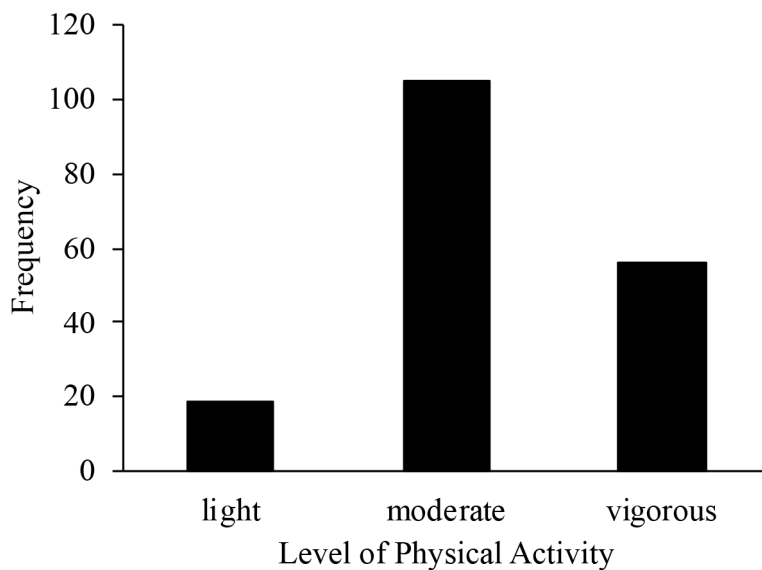


FIGURE 3.2. Level of physical activity among respondents

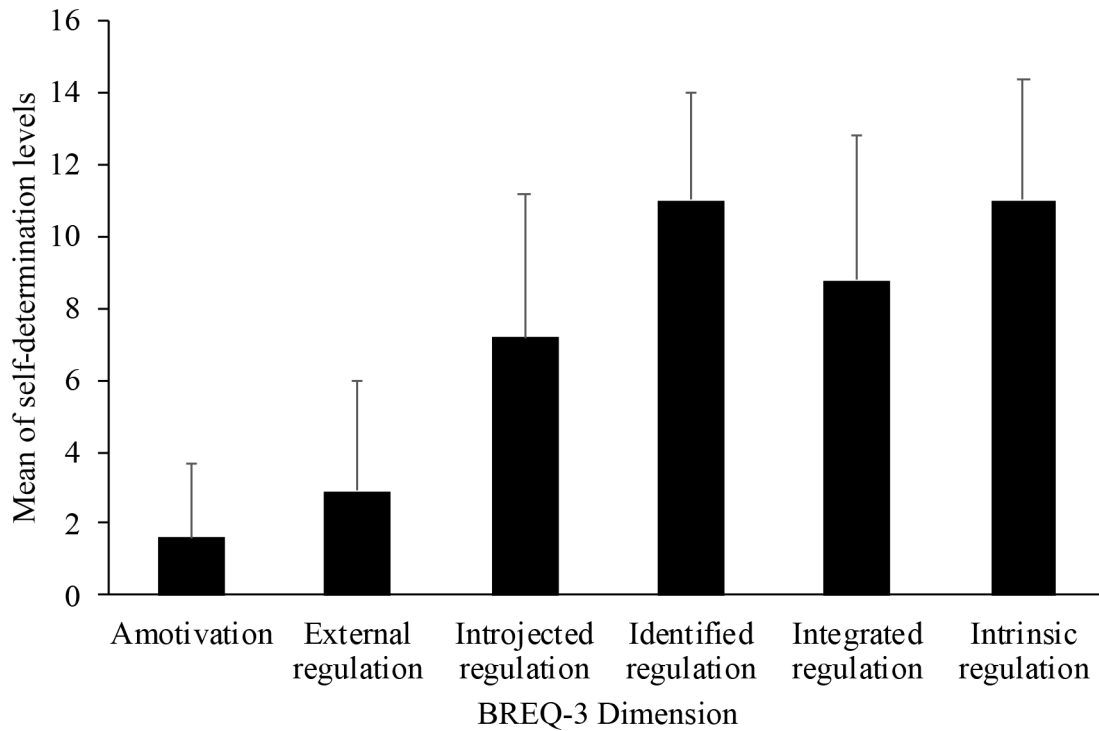


FIGURE 3.3. Self-determination level in engaging physical activity among respondents

TABLE 3.1. The self-determination based on the physical activity level. a is significantly different compared to moderate exercise ($p < 0.05$), b is significantly different as compared to vigorous exercise ($p < 0.001$)

The intensity of physical activity	Median \pm Interquartile range
Light	26 \pm 40 ^{a,b}
Moderate	41 \pm 27
Vigorous	55 \pm 36

DISCUSSION

Based on the survey that has been carried out, the results showed different types of physical activities intensity among the students of Faculty of Health Sciences, Universiti Kebangsaan Malaysia that can be categorised as light, moderate and vigorous. Meanwhile, the results also found that self-determination which is the intrinsic

and extrinsic components influence the physical activity performance. The current finding revealed that intrinsic and identified regulations are the highest self-determination components which indicate that these two factors have contributed the most in behavioural regulation towards performing physical activity among respondents. This finding suggests that third-year students of Faculty of Health Sciences, Universiti

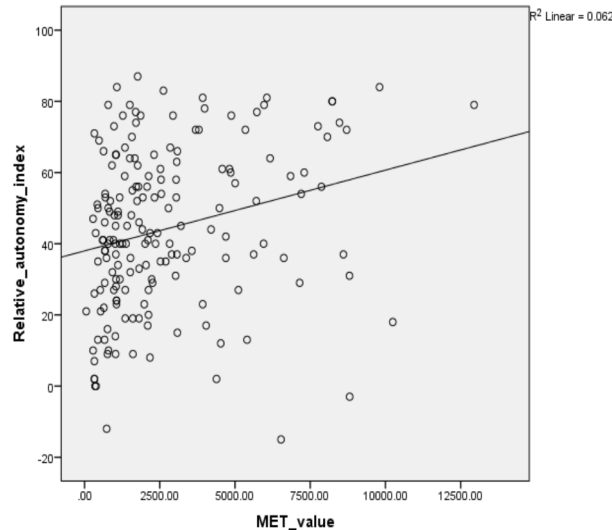


FIGURE 3.4. The significant positive moderate relationship between self-determination and physical activity level among programmes of Faculty of Health Sciences, UKM ($p < 0.01$). The formula for simple linear regression is (Self-determination level = $37.99 + (0.02 * \text{physical activity})$).

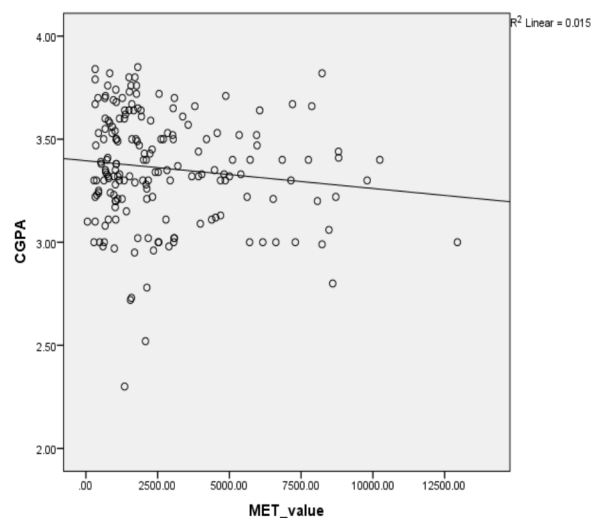


FIGURE 3.5. The insignificant negative relationship between physical activity level and the academic achievement among programmes of Faculty of Health Sciences, UKM. There was no significant different The formula for simple linear regression is Academic achievements = $3.4 - ((1.35 \times 10^{-5}) * \text{physical activity})$.

Kebangsaan Malaysia were mainly motivated by their own personal beliefs of the benefits in doing the exercise, as well as motivated by the environments of their college since it is located near Titiwangsa Lake Garden. Being surrounded by this kind of environment can encourage the students to engage in physical activity. According to Maitre et al. (2017), high autonomous motivation is crucial in ensuring continuous engagement towards

physical activity.

Self-determination was also influencing the intensity of physical activity. The current study shows there is a significant difference between self-determination level and the intensity of physical activity. Students who performed light vigorous activity exhibit significantly lower self-determination level from the moderate and vigorous group. This

means that students who are less self-determined tend to perform a lower level of physical activity and while those who are highly self-determined tend to perform a higher level of physical activity. This finding correlates with Ryan et al. (2009) who found that a higher level of self-determination was found to encourage higher physical activity participation. Furthermore, the higher motivational level was reported among the group who are very active while those who are inactive showed amotivation in physical activity (Hashim et al. 2011).

A significant correlation was found between self-determination and physical activity among health sciences students. Therefore, identifying the physical activity-related motives take an important role in developing effective physical activity and health-related programs among students (Tao et al. 2019). The previous finding indicated that controlled motivation may have more impact than autonomous motivation for predicting initial or short-term physical activity behaviours, but the intrinsic motivation (autonomous) may be more predictive of long-term physical activity maintenance (Tao et al. 2019). Previous research by Verloigne et al. (2011) also stated that the environmental factors influence the psychological needs for autonomy, competence and relatedness which is a prerequisite to increase autonomous motivation. This finding also can have great potential for developing interventions that apply the concept of intrinsic components to the improvement of self-determination levels for increasing physical activity levels. The level of physical activity could account for any variance in the self-determination than we would expect to happen by chance.

Increase in physical activity enhances the study driven in medical & healthcare students which improves their academic achievement (Chung et al. 2018). However, a low negative association towards academic achievement was found in the current study and it is not consistent with previous finding (Chung et al. 2018). Meanwhile, Meacham & Gorman (2015) found a negative relationship between levels of physical activity with academic performance. The researchers suggest that vigorous activity cause tiredness among students thus causing them to spend more time to rest instead of studying. As a result, they are unable to perform well in their studies and obtained lower academic performance (Meacham & Gorman 2015). It is suggested that the health sciences student might also think that vigorous physical activity may cause tiredness, so they did not have more time to study and do revision as they spend more time to rest. This might explain the current findings which the physical activity of health sciences students did not give a positive impact on their academic achievement.

Even though this finding did not show any positive correlation between physical activity and academic performance, it still can be stipulated that the hypothetical theory on the mechanism of physical activity providing cognitive changes are still correct. It is because the positive effects of physical activity are not limited to improved blood circulation to the brain, the growth of new brain cells, blood vessels, protein brain-derived neurotrophic factor (BDNF), and increased levels of neurotrophins and neurotransmitters, but a combination of all these factors along with changes in synaptic plasticity and spine density that have the potential to mediate the beneficial effects on learning and memory.

LIMITATION

The purpose of this research is to study the association of physical activity and academic achievement among the Faculty of Health Sciences students at Universiti Kebangsaan Malaysia. However, there is a limitation on this project where the world is in a pandemic situation due to COVID19. The 2020 Malaysian movement control order by the government has cause limitation for the students to do their physical activity. Various physical activity campaigns and programs should be held either in the university level or national level to raise awareness of its benefits along with to promote self-enjoyment in physical activity participation.

CONCLUSION

In conclusion, there is a positive correlation between the self-determination and physical activity levels among health sciences students. However, the correlation between physical activity and academic achievement shows the negative correlation among the health sciences students, Universiti Kebangsaan Malaysia.

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