







ORIGINAL ARTICLE



# COVID-19 Lockdown: Physical Activity, Sedentary Behaviour, and Academic Motivation Among Undergraduates University Students in Malaysia

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## ABSTRACT

**Background.** In the wake of the COVID-19 global pandemic, the implementation of social restrictions has disrupted daily life routines, including physical activity (PA), sedentary behavior, and academic motivation for undergraduates. The interaction between the changes in PA and academic motivation has not been studied deeply. **Objectives.** The present study aims to determine the PA level and academic motivation during the restriction movement during the COVID-19 pandemic and to identify the correlation between PA influence and students' academic motivation. **Methods.** One hundred and five participants (male, n= 38 and female, n=67) aged between 22-and 26 years old of the Sultan Idris Education University, Malaysia, participated in the study. The PA levels were evaluated using International Physical Activity Questionnaire-Short Form (IPAQ-SF), and the students' motivation was evaluated using the eMpowerment, Usefulness, Success, Interest, and Caring (MUSIC) Model of Academic Motivation Inventory. **Results.** The findings showed gender differences between males and females with higher mean values for times per week for vigorous, moderate, and light intensity PA. Both genders displayed the highest rates on Caring (female=5.42, male=5.34), followed by Success (female=5.23, male=5.22) and Usefulness (female=3.96, male=3.92). The lowest motivation was rated on eMpowerment (female=3.42, male=3.30) and Interest (female=3.85, male 3.84). A significant difference was found between males and females in their rate of both eMpowerment and Caring subscales. The Pearson test demonstrated a strong correlation between PA (measured by IPAQ-SF) and academic motivation (accessed by MUSIC inventory) among students during the COVID-19 pandemic ( $r=0.912$ ), suggesting that the reduction of total PA had a profound impact on the academic motivation among undergraduates. **Conclusion.** They maintained that PA as routine is a key strategy for physical and mental health, specifically academic motivation during a forced rest period such as the current COVID-19 lockdown.

**KEYWORDS:** SARS-COV-2, Lockdown, Physical Activity (PA), Sedentary, Motivation, Students.

## INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has negatively impacted economic and social life worldwide. It has also negatively influenced people's general health and quality of

life. Due to the continuing spread of COVID-19, the Malaysian government announces a lockdown to prevent individuals from exposure to infection of COVID-19. At the onset of the Covid-19

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outbreak, Malaysia had initiated travel restrictions and quarantine. However, with a persistent increase in new Covid-19 cases, the Movement Control Order (MCO) was finally rolled out on March 18, 2020, requiring the closure of all businesses, including schools/colleges and learning institutions, except those providing essential services and items (1-5). Limiting outdoor activities and regular PA and exercises have affected most individuals' daily activities. Subsequently, nearly 4 billion people worldwide reportedly experience social isolation, and PA patterns of people have changed significantly during the COVID-19 lockdown (6-8). Governments worldwide implemented different strategies to curtail the spread of the pandemic (9 and 10), including Malaysia, in which MCO implementation was strictly done on the prohibition of mass movements, religious, sports, social and cultural activities (10).

Overall, the closure of learning institutions and exercise facilities has further prevented individuals from complying with the World Health Organization (WHO) recommendation of moderate-to-vigorous physical activity during home confinement. During the first phase of the global pandemic declaration by WHO, the PA and other outdoor activities were restricted for people of all ages, reducing PA levels and outdoor time spent (11). Recent multinational investigations have shown that the negative effect of COVID-19 restrictions includes increased engagement in sedentary behavior and increased screen time exposure. In contrast, isolation is necessary to protect public health, PA level, and eating behaviors in a health-compromising direction (12).

Regular physical activity improves mental health and can reduce the risk of depression, and cognitive decline, delay the onset of dementia and improve overall feelings of well-being (13). A comparison between non-athletes and athletes shows that athletes' students gain better mental health, self-esteem, clarity of self-concept, emotional regulation, psychological endurance, and well-being (14). During COVID-19 MCO, a more significant presence of symptoms related to anxiety and depression were associated with low physical activity levels, low family monthly income, and younger age. Besides, it has been found that the percentage of men who had no mood disorders was observed among those who were very active than among those less active

(15). Staying home for a prolonged time might lead to sedentary behaviors, such as spending more time on sitting activities and playing games. Watching television and decreased regular outdoor activity and exercises leads to an increased risk of chronic health conditions (16). A healthy lifestyle, notably physical activity, is widely recognized as a critical factor in encouraging and maintaining students' motivation.

The present study aimed to determine the physical activity level and the association between academic motivation among university students. The objectives of this study were (i) to compare the differences in physical activity levels (light, moderate, and vigorous-intensity PA between male and female students during COVID-19 lockdown, (ii) to determine the differences in sedentary behavior between male and female students during COVID-19 lockdown, (iii) to compare the differences on academic motivations (based on five MUSIC model components) between male and female students during COVID-19 lockdown and lastly (iv) to identify the correlation between PA and academic motivations during COVID-19 lockdown.

## MATERIALS AND METHODS

**Participants and Study Design.** A total of 105 undergraduate university students (22-26 years old; male: n=38 and female; n=67) participated in this study which was selected by purposive sampling. Data were collected during phase 1 MCO (also known as lockdown) at the end of the year 2020. During this MCO period, the Malaysian population was strictly home-confined and only allowed to leave home for essential needs and emergencies. This study was conducted following the declaration and protocol approved by the Human Research Ethics Committee Sultan Idris Education University, Malaysia (2020-0137-01), and all participants were ensured of anonymous data collection.

**Instruments and Procedures.** A self-administered questionnaire collected demographic information such as sex, age, ethnicity, and their current academic semester, as presented in [Table 1](#). Concerning the level of physical activity using IPAQ-SF among male and female university students during the COVID-19 pandemic lockdown, 105 students participated in this survey (male, 36.2%, and 63.8%, female).

Table 1. Participant Demographic Data

Participant Characteristics	Frequency (n)	Frequency Percentage (%)
<b>Gender</b>		
Male	38	36.2
Female	67	63.8
<b>Academic Semester</b>		
7 <sup>th</sup>	76	72.4
8 <sup>th</sup>	29	27.6
<b>Race</b>		
Malay	79	75.2
Chinese	1	1.0
Sabah / Sarawak Ethnic	23	21.9
Others	2	1.9
<b>Age (years)</b>		
22	7	6.7
23	63	60.0
24	30	28.8
25	3	2.9
26	2	1.6

**IPAQ-SF.** Physical activity was measured using the International Physical Activity Questionnaire-Short Form (IPAQ-SF), which has been translated into Malay form (IPAQ-M), which contains seven questions (17). The questionnaire was used to obtain the total minutes of PA per week and sitting time per day. Participants were required to self-rate overall PA level at home for the past six months after MCO was implemented.

**MUSIC Model of Academic Motivation Inventory.** As shown in Table 2, the students' academic motivation Inventory which consists of was assessed using the inventory called MUSIC Model of five components (a) eMpowerment, (b) Usefulness, (c) Success, (d) Interest, and (e) Caring (18). The MUSIC Inventory has been shown to produce valid scores with samples of undergraduate students in the United States (19) and in a non-U.S. culture (20) which provide instructor in any subject area with an overview of current motivation. The MUSIC inventory consisted of 5 categories

(eMpowerment, Usefulness, Success, Interest, and Caring) with 26 items. Participants responded to the MUSIC inventory items on a 6-point Likert-type scale with the following descriptors: 1 (*strongly disagree*), 2 (*disagree*), 3 (*somewhat disagree*), 4 (*somewhat agree*), 5 (*agree*), and 6 (*strongly agree*).

**Statistical Analysis.** The study was executed by sending the online link of the E-survey to undergraduates who are pursuing Sport Sciences programs (Physical Education, Coaching Sciences, and Sports Rehabilitation) through the social networking site; WhatsApp. Two hundred and twenty potential participants were identified, and only 105 complete questionnaires were returned. The survey was administered using an online survey platform (Google form). A brief explanation of the purpose and procedure of the study was described at the beginning of the Google form ®. The participants were given ten days to answer the questionnaire. The reminder was sent to them if a response was not received within ten days.

Table 2. MUSIC Model of Academic Motivation Inventory (19).

MUSIC model component	Related construct
eMpowerment	Autonomy
Usefulness	Utility value
	Instrumentality
Success	Expectancy for success
	Self-efficacy
Interest	Competence
	Situational interest
	Intrinsic motivation
	Intrinsic interest value
Caring	Flow
	Caring
	Belongingness
	Relatedness
	Attachment

## RESULTS

Table 3 compared the physical activity levels of male and female participants. IPAQ-SF score expressed as metabolic equivalent minutes per day (MET-min/day) was used as a general indicator of physical activity. As shown in Table 3, significant gender differences were found between males and females, with higher mean values for times per week for vigorous, moderate, and light intensity PA ( $p < 0.05$ ). Males showed the highest mean values on light-intensity PA (5.60 times/week) compared to females (4.88 times/week),  $p < 0.05$ , moderate-intensity PA (5.03 times/week) compared to females (2.07 times/week), and the lowest mean values on vigorous-intensity (4.16 times/week) compared to female (2.23 times/week),  $p < 0.05$ .

Meanwhile, male participants showed the highest prevalence of active light intensity PA for minutes per day PA activities, which reached 162.6 minutes per day, followed by high-intensity PA (148.2 min/day) and moderate-intensity PA was 121.8 minutes per day. For female participants, the highest prevalence was on high-intensity PA, which demonstrated 142.2 minutes per day, followed by light intensity PA (123.6 min/day), and the lowest prevalence was on moderate-intensity PA (94.8 min/day). The significant differences were shown in minutes per day PA activities on moderate and light PA with  $p < 0.05$ , respectively. No gender differences were found in MET minutes of high-intensity PA per day ( $p = 0.728$ ) and MET minutes of sedentary activity per day (male,  $M = 194.4$  min/day) and female (212.4 min/day),  $p < 0.05$ .

**Table 3. Comparison between male and female students on Physical Activity and Sedentary (Mean  $\pm$  SD)**

Physical Activity Measures	Male (n=38)	Female (n=67)	p
<b>IPAQ-SF (times/week)</b>			
Vigorous PA	4.16 $\pm$ 5.40	2.23 $\pm$ 3.61	0.000*
Moderate PA	5.03 $\pm$ 2.95	2.07 $\pm$ 1.17	0.000*
Light PA	5.60 $\pm$ 1.65	4.88 $\pm$ 1.33	0.000*
<b>Sedentary</b>			
<b>MET (min/ day)</b>			
Vigorous PA	148.2 $\pm$ 77.4	142.2 $\pm$ 114	0.728
Moderate PA	121.8 $\pm$ 47.28	94.8 $\pm$ 70.2	0.001*
Light PA	162.6 $\pm$ 81	123.6 $\pm$ 57.12	0.005
Sedentary	194.4 $\pm$ 71.7	212.4 $\pm$ 67.18	0.219

*MET, metabolic equivalent; IPAQ-SF, International Physical Activity Questionnaire Short Form; PA, Physical Activity. \*Significant differences at  $p < 0.05$*

Data presented in Table 4 shows that females rated their perceptions of Caring ( $M = 5.42$ ) the highest, followed by the second-highest rates of Success ( $M = 5.23$ ). Students rated their perceptions of Usefulness ( $M = 3.96$ ), eMpowerment ( $M = 3.42$ ), and Interest ( $M = 3.85$ ). For male participants, it was

shown that their perceptions of Caring ( $M = 5.34$ ) were the highest, followed by the rates of Success ( $M = 5.22$ ), Usefulness ( $M = 3.92$ ), Interest ( $M = 3.84$ ), and eMpowerment ( $M = 3.30$ ). There was a significant difference between males and females in their rate of both eMpowerment and Caring subscales ( $p < 0.05$ ).

**Table 4. Mean Scores of the MUSIC Inventory Scales**

MUSIC Subscales	Mean	Standard Deviation	t	p
<b>eMpowerment</b>				
Male	3.30	0.286	1.87	0.002**
Female	3.42	0.324		
<b>Usefulness</b>				
Male	3.92	0.394	-0.618	0.538
Female	3.96	0.381		
<b>Success</b>				
Male	5.22	0.306	-1.17	0.907
Female	5.23	0.325		
<b>Interest</b>				
Male	3.84	0.285	-0.057	0.954
Female	3.85	0.330		
<b>Caring</b>				
Male	5.34	0.230	-1.56	0.000**
Female	5.42	0.233		

*\*Significant differences at  $p < 0.05$ .*

As shown in Table 5, the Pearson correlation between PA (measured by IPAQ-SF) and academic motivation (accessed by MUSIC inventory) was  $r= 0.912$  ( $p<0.05$ ), thus showing that there was a strong correlation between PA and academic motivation among students during COVID-19 pandemic.

**Table 5. Correlation between IPAQ-SF & MUSIC Inventory**

<i>n</i>	<i>Pearson Correlation</i>	<i>p</i>
105	0.912	0.000*

\*Significant differences at  $p<0.05$ .

## DISCUSSION

This study explores the PA levels, sedentary behavior, and academic motivation among university undergraduates during COVID-19 lockdown. The levels of PA were a primary variable explaining the multiple serial relationships between lifestyle and motivation among university students. Generally, the lockdown period is associated with an imbalance of emotion and depression, leading to an unhealthy routine lifestyle and reduced PA (21). The outbreak of COVID-19 has had a significant impact on all areas of society, changing lifestyle patterns, mainly working and studying patterns.

Firstly, as shown in Table 3, significant gender differences were found, were male participants showed a higher mean value with times per week for vigorous, moderate, and light intensity PA ( $p<0.05$ ). This situation likely showed that females demonstrate less participation in daily PA during the phase of COVID-19 lockdown at home. In addition, female participants' motivation to be involved in PA might be influenced by age decline as their sports participation decreases dramatically from late childhood to early- and mid-adolescence (22). A cross-sectional on secondary in United States population in 2017 reported that males demonstrated moderate or vigorous physical activity more often than females in all age and race or ethnicity categories. Physically active males reported more daily activities than females in all age categories (23).

The latest report shows that the reduction of PA indices appears to vary unevenly by gender, as this decline is reflected more among females, where men had a higher motivation for engaging in PA among university students (24). Apart from the reduction due to lack of time, reflected in both genders, in the case of women, other aspects are

identified as the main reasons for physical inactivities, such as physical, social anxiety linked to body image, fatigue or laziness, or the environment and lack of facilities (25). Regarding the association between PA and age, it has been reported that there is an increase in students withdrawing from active lifestyle practices and a decrease in their engagement in PA (26).

Secondly, during the first phase of lockdown, going outside included outdoor activities, including regular PA and exercise were restricted, which generally disrupted the individual daily routine activities. Prolonged homestay may lead to increased sedentary behaviors, such as sitting or lying down for screening activities (playing games, watching television, or using mobile devices) (27). In this study, we found no significant differences between sedentary behaviors for minutes per day between gender during the phase of the lockdown COVID-19 pandemic ( $p< 0.05$ ). The previous finding points out that although there was an increase in sitting time, there was also an increase in the amount of time spent doing PA and the number of days on which participants were active (28). Improving PA and reducing sedentary behavior would benefit undergraduate students' health, explicitly maintaining their academic performance by increasing their motivation to learn.

Thirdly, in this study, we determine the student's academic motivation using the MUSIC Model of Academic Motivation Inventory, which consists of five components (a) eMpowerment, (b) Usefulness, (c) Success, (d) Interest, and (e) Caring (18). Data presented in Table 4 shows that females rated the highest on Caring ( $M=5.42$ ), followed by the second-highest rates on Success ( $M=5.23$ ), followed by their perceptions of Usefulness ( $M=3.96$ ), eMpowerment ( $M=3.42$ ), and Interest ( $M=3.85$ ). For male participants, it was shown that their perceptions of Caring ( $M=5.34$ ) were the highest, followed by the rates of Success ( $M=5.23$ ), Usefulness ( $M=3.92$ ), Interest ( $M=3.84$ ), and eMpowerment ( $M=3.30$ ). A significant difference was found between males and females in their rate of both eMpowerment and Caring subscales ( $p<0.05$ ). The Caring component of the MUSIC model involves the extent to which a student believes that others in the learning environment (e.g., the instructor, other students) care about whether he or she succeeds in the coursework and cares about his or her well-being. When students feel cared for by

the instructor, they perceive the instructor's caring through actions such as listening to students, helping students with their academic needs, and being respectful of students. The Caring component is divided into academic caring (i.e., caring about students' success in the coursework) and personal caring (i.e., caring about students' well-being). However, because academic and personal caring have been shown to form one construct (29) and the educational implications are very similar (30), both academic and personal caring are assessed with one scale in the MUSIC Inventory.

Fourthly, we identify the correlation between PA and students' academic motivations. A strong correlation was found between PA and academic motivation among undergraduates during COVID-19 lockdown ( $r= 0.912$ ,  $p<0.05$ ). This finding may indicate that the PA during the restriction period plays an essential role in students' motivation, affecting their academic performances. Hence, a three-way interaction between stress, PA, and intrinsic motivation, specifically, a stress-buffering effect of PA, was observable only when intrinsic motivation was high (31). Thus, it can be highlighted that the critical role of PA in improving motivation or reducing stress through maintaining PA during the situation of lockdown.

Numerous studies show that regular PA is associated with overall emotional well-being, including self-confidence and improving cognitive level. For example, Kalak et al. 2012 showed that 30 minutes of running in the morning during weekdays for three consecutive weeks positively impacted sleep and psychological functioning in healthy adolescents compared with a control group (32). Besides, a more excellent PA has been suggested to improve psychological functioning, increased curiosity, exploratory behavior, and mental toughness (33). In the meantime, PA is also positively exploited to control not only mental health but also immunodepression, which not only can be done by conducting a traditional exercise or regular home routine, but the current trends showed by adolescents are by performing viral dances (e.g., TikTok), virtually seeing coaches/physical education teacher (e.g., online physical education class or physically active gaming (e.g., Nintendo Just Dance or Wii Fit) (34). The latest commentary articles suggest that, for the intra-individual level, enjoyment is a critical factor, and the students need to find creative ways

to engage in PA. In fact, during a crisis like COVID-19, body physiology is not the sole one to be rapidly harmed by physical inactivity. Physical inactivity per se deteriorates mood profiles and has been associated with poor mental wellness (35).

## CONCLUSION

Findings from this study demonstrate that PA level among males was significantly higher than females for times per week PA, with no differences between sedentary behavior among gender. Finally, there was a strong correlation between PA and academic motivation among undergraduates during the COVID-19 lockdown. These data highlight the opportunities and efforts that should be taken to emphasize the importance of PA among students and peers at the institutional level to lay the foundations for healthy lifestyles in the future, particularly for maintaining academic motivation. Considering that much of the current literature comprises survey data or commentary discussion at this time, more research examining lifestyle changes and PA levels during the COVID-19 lockdown is suggested for future research.

## APPLICABLE REMARKS

- Since this global health crisis will likely continue into 2023, there is critical to consider the interactions between lockdown situations during the COVID-19 pandemic and PA levels/activities across the days or weeks in adolescents.
- PA interventions among students should also aim to improve cognitive functions related to cognitive flexibility and intrinsic academic motivation. With a view to future similar research, it would be exciting and add value to measuring behavior modification by using different instruments and expanding the target populations, thus increasing the connection between behavior, academic motivation, and PA practice.

## CONFLICT OF INTERESTS

There are no conflicts of interest to declare by any of the authors of this study.

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