Original Article

Physical Activity Levels and Associated Factors for Health Complaints among Female University Students During the COVID-19 Pandemic in Malaysia: A University-based Cross-Sectional Survey

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Abstract:

Objective: This cross-sectional study assessed the prevalence of health complaints and physical activity levels among female university students; including determining the risk factors of health complaints during the pandemic.
Material and Methods: Data were collected from 205 female university students, aged 18-29 years old via self-administered online questionnaires during a nationwide movement-restricted order. The Global Physical Activity Questionnaire (GPAQ) and a modified health symptoms questionnaire were used to assess physical activity levels and health complaints.
Results: The most prevalent daily health complaint was sleeping difficulties (8.3%). The total minutes of sedentary behaviour were positively associated with health complaints (r=0.131, p-value=0.031), while the total minutes of moderate recreation were negatively associated with health complaints (r=-0.166, p-value=0.009). Marital status (standardised beta coefficient, β=-0.167, p-value=0.030) and employment (β=-0.180, p-value=0.017) were risks of health complaints.
Conclusion: Sedentariness; including sociodemographic factors during the pandemic was associated with health complaints. Appropriate counselling, finance and social supports and physical activity programmes are recommended at universities to prevent future health risks.

Keywords: COVID-19, female university students, GPAQ, subjective health complaints, well-being

Introduction

Physical activity is vital, as it has been shown to reduce depression, increase cognitive function, mood, self-esteem, general mental health; short- and long-term memory, sleep, and the common feeling of a disease-free life[1]. Additionally, it has been associated with a reduced threat of cancer all-cause death; such as colon and breast cancers[2]. Generally, moderate- and vigorous-intensity physical activity enhances good health[3]. Adults aged 18 years and above are recommended a minimum of 150 minutes per week of moderate-intensity, a minimum of 75 minutes per week of vigorous-intensity, or an equivalent mixture of moderate- and vigorous-intensity physical activities[3]. However, the unexpected lockdown and movement restrictions imposed following the announcement of the rapidly spreading novel coronavirus disease (COVID-19) pandemic caused a considerable impact on the mental health and well-being of university students[4]. Malaysia's first movement control order was declared on the 18th of March 2020, with universities and institutions of higher learning executing online learning as of the beginning of the order[5].

As numerous movement control orders were announced, to curb the spread of the disease and with students confined to their rooms without physical interactions within a campus setting, the health of these university students in Malaysia was unknown. Health complaints, when self-reported, could indicate an impending risk to these students. A valid measure, known as subjective health complaints (SHC), can be used to gauge indications faced with or without a health analysis to assess health outcomes[6]. Results confirmed that subjective health instincts are linked to clinical health results[7], with SHC showing a relation to low physical well-being and subtle poor mental health[8]. A negative correlation was found between higher physical activity levels and psychological health complaints; such as

anxiety and depressive mood among university students[9]. Women are exposed to various, exclusive health concerns as previously found; wherein, women represented 28% of whom were least physically active compared to men: 39% were students[10]. Moreover, female university students have a greater prevalence of musculoskeletal symptoms, with headaches, neck and arm pain being the most common complaints[11]. Before the pandemic, sedentariness was one of the most significant risk factors for developing chronic diseases, with women having a greater prevalence of sedentariness than men (32.3%).This is because women spend less time on physical exercise and have smaller energy expenditure on overall physical activities[12]. This shows that women are less physically active and may develop greater health issues compared with men. This data indicates that female students may be predisposed to a higher risk of health problems, due to restricted movement orders imposed on them.

Physical inactivity was also noticeably greater among female students with minimal family income, mental health, and low self-efficacy for physical activity[13]. Previously, students that participated in health-enhancing physical activity (HEPA) have been shown to perform well academically, where the probability of getting a higher-grade score was doubled compared to non-HEPA active students; proving that there is a substantial relationship between physical activity levels and academic achievement[14]. Conversely, inadequate physical activity adversely affects health-related quality of life; including physical functioning, role limitation produced by physical health complications, vitality, and general health[15]. Hence, there is a greater concern for the increase in health issues caused by the pandemic lockdown, as physical activity was heavily restricted indoors or at home in Malaysia. To our best knowledge to date, it is unclear whether the level of physical activity can affect health complaints in female

university students in Malaysia. Therefore, this present study aimed to investigate the prevalence of health complaints and physical activity levels; including associated risk factors for the health complaints among female university students in Malaysia.

Material and Methods

Participants and study design

A total of 205 female university students, with ages ranging from 18 to 40 years, agreed to participate in the study during the second semester of the academic year of online learning. The period of data collection was in June 2021, during which a nationwide reinstatement of a full movement control order (total lockdown) was imposed on all except essential social and economic sectors[16]. A cross–sectional study design was used to collect responses from female university students at Universiti Sains Malaysia. The Global physical activity Questionnaire (GPAQ) and SHC were administered through an online link that was created using a Google Form, and the link was shared via social media and messaging applications. Participation in this study was voluntary and the participants clicked on the "Yes" or "No" button at the end of an online informed consent form to confirm if they agreed–disagreed to participate in the study, respectively. The study was approved by the human research ethics committee of Universiti Sains Malaysia (Approval code USM∕JEPeM∕21010027) and the study protocol conformed to the Declaration of Helsinki. The flow of the study is presented in Figure 1.
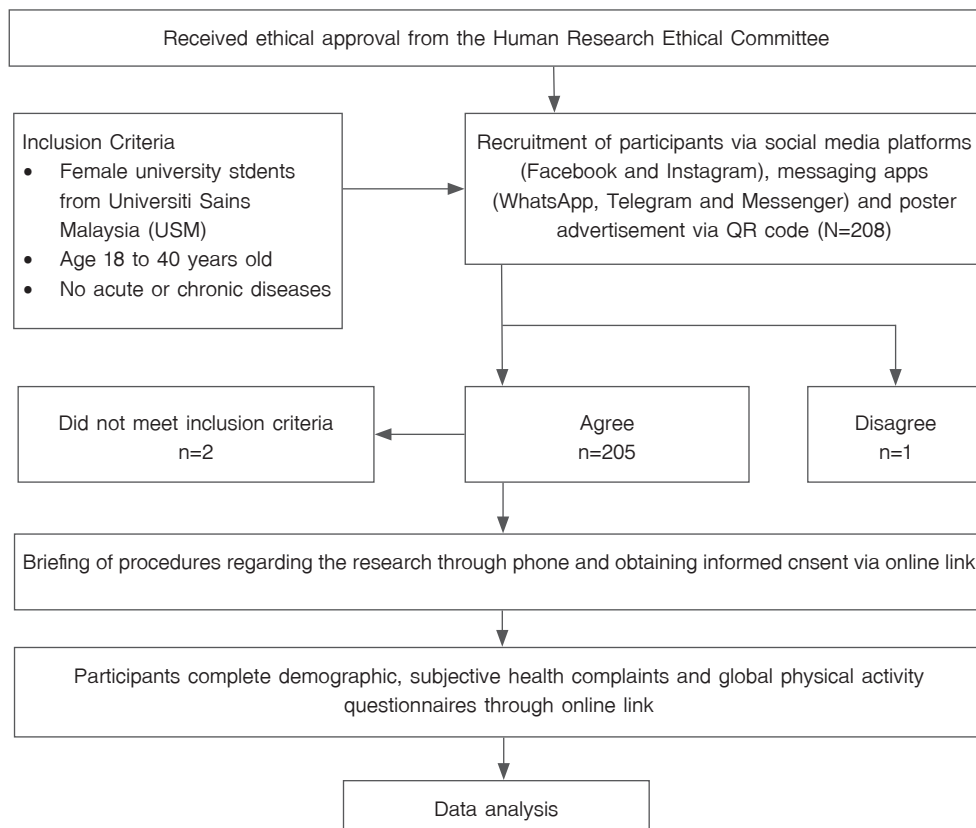

Figure 1 Flow chart of the study

Instrument and study administration
Demographic and Health Complaints

A modified survey, based on a previous study, was used to determine the demographics and health complaints of the students[8]. Section one of the survey comprised six items on socio-demographic characteristics, gender, and age; whereas, section two contained 20 items on the family affluence scale, parents' education, and occupation as well as anthropometric and medical items (body weight and presence of diagnosed diseases). The survey also included section three to assess health complaints, which comprised eight items; in which each item measured the frequency of eight common symptoms in the last 6 months: headaches, stomach-aches, backaches, feeling low, feeling irritable or bad-tempered, feeling nervous or anxious, sleeping difficulties and dizziness. The survey also included additional questions; such as ethnicity, family type, marital status, level of study, employment (part-time), presence of chronic diseases, height (m), weight (kg), body mass index (BMI) (kg/m^2), and current residential status and family information.

Global Physical Activity Questionnaire (GPAQ)

The physical activity level among the participants was assessed using the GPAQ V2, which has been previously validated across multiple countries; including Malaysia[17,18]. It consists of 16 questions on the level of physical activity of an individual in three domains: activity at work, travel to and from places, recreational activities and sedentary behaviour[19]. The total physical activity was calculated as metabolic equivalents per minute (MET-minutes) to express the amount of energy expenditure of the physical activities. For this a 4.0 MET value was applied to the time spent on moderate activities, while an 8.0 MET value was applied to the time spent on vigorous activities in the work and recreation domain. In the transport domain, a 4.0 MET value was applied to activities; such as cycling and walking. Participants who meet the World Health Organisation (WHO) recommendations on PA for health were defined as having a total physical activity MET minutes/week of at least 600 MET-minutes of an equivalent combination of moderate- and vigorous-intensity physical activity, while those who did not meet the WHO recommendations were achieving less than 600 MET-minutes weekly[20].

Statistical Analysis

Statistical analysis was performed using the statistical package for social sciences, (SPSS) version 27 (IBM, Chicago, USA). A descriptive analysis was performed to determine the prevalence (N) and percentage (%) of the demographic items, self-reported physical activity levels (GPAQ) and SHC. The independent sample t-test was used to investigate the mean differences. Pearson correlation was used to measure the relationship between self-reported physical activity (GPAQ) and SHC in female university students. The SHC was entered as dependent variables, with the GPAQ subdomain (vigorous work, moderate work, transport, vigorous recreation, moderate recreation and sedentary behaviour) as well as total physical activity MET-minutes/week. A multiple regression model was conducted to address the predictive risk factors of demographics (family type, marital status, level of study, employment status, presence of chronic diseases, body weight, body mass index, current residential status, employment statuses of participant's father, mother or guardian and money spent for food purchases per day) that affect the degree of SHC. In addition, the obtained SHC variables had been entered as dependent variables, with GPAQ tested as predictors. The acceptance level of significance was set at a p-value<0.05.

Table 1 Demographic of the participants (N=205)

Variables	N (%)
Physical characteristics/ Demographic	
Ethnicity	
Malay	174 (84.9)
Chinese	15 (7.3)
Indians	10 (4.9)
Others	6 (2.9)
Family type	
Nuclear	183 (89.3)
Extended	20 (9.8)
Non-related household members	2 (1.0)
Marital status	
Single	204 (99.5)
Married	1 (0.5)
Divorcee	0 (0.0)
Widow/Widower	0 (0.0)
Level of study	
Diploma	22 (10.7)
Undergraduate	174 (84.9)
Postgraduate (Masters)	8 (3.9)
Postgraduate (PhD)	0 (0.0)
Postgraduate (MMed)	1 (0.5)
Employment	
Part-time	14 (6.8)
Not employed	191 (93.2)
Presence of chronic diseases	
None	201 (98.0)
1–2	4 (2.0)
>3	0 (0.0)
Body mass index (kg/m^2)	
Under 18.5	30 (14.6)
Between 18.5–24.9	131 (63.9)
Between 25 to 29.9	34 (16.6)
Between 30 to 34.9	10 (4.9)
Between 35 to 39.9	0 (0.0)
More than 40	0 (0.0)
Current residential status	
Campus	83 (40.5)
Own house	122 (59.5)
Money for daily food purchases	
<RM25	115 (56.1)
RM25 – RM50	48 (23.4)
>RM50	42 (20.5)
Family information	
Father's information	

RM=Ringgit Malaysia

Table 1 (continue)

Variables	N (%)
Marital status	
Married	174 (84.9)
Cohabiting	2 (1.0)
Widower	2 (1.0)
Married in second marriage	2 (1.0)
Separated/divorced	13 (6.3)
Not specified	12 (5.9)
Education level	
None	2 (1.0)
Primary	19 (9.3)
Secondary	98 (47.8)
University	65 (31.7)
Others	9 (4.4)
Not specified	12 (5.9)
Occupation	
Working	152 (74.1)
Full time	137 (90.1)
Part-time	15 (9.9)
Not working	8 (3.9)
Retired	33 (16.1)
Not specified	12 (5.9)
Mother's Information	
Marital status	
Married	178 (86.8)
Cohabiting	1 (0.5)
Widow	10 (4.9)
Married in second marriage	4 (2.0)
Separated/divorced	10 (4.9)
Not specified	2 (1.0)
Education level	
None	3 (1.5)
Primary	14 (6.8)
Secondary	109 (53.2)
University	74 (36.1)
Others	3 (1.5)
Not specified	2 (1.0)
Occupation	
Working	95 (46.3)
Full time	90 (94.7)
Part-time	5 (5.3)
Not working	93 (45.4)
Retired	15 (7.3)
Not specified	2 (1.0)

Results

Demographic data

The demographic profile of the students is presented in Table 1. The students were mostly of Malay ethnicity (84.9%), undergraduate (84%), unmarried (99.5%) and had a healthy body mass index (63.9%). Most students were living at home during the pandemic (59.5%). They were also mostly unemployed (93.2%), with less than 25 Ringgit Malaysia (United States Dollar, (USD) 5.55) daily money to spend on food purchases during the time of the survey. The highest education attained was that of a secondary level for most of the student's parents, and they were working full-time.

The sleeping difficulties were a daily health complaint

Compared to other symptoms, 8.3% of the students reported sleeping difficulties 'almost every day'; however, the majority of them reported' rarely or never' (44%) (Figure 2).

It was found that 18% of the students were 'feeling low' more than once a week and 22% felt 'irritable/bad tempered' almost once a week. The students experienced 'stomach-ache' almost once a month.

Students spent more time on moderate activity at work, but expended the highest energy expenditure performing vigorous activities at work

Most of the students (n=159) met the recommended physical activity, based on the total MET of at least 600 MET-minutes and above per week, as an equivalent combination of moderate and vigorous-intensity physical activity. Although moderate activity at work was more prevalent in university students (64.4%), their total MET-minutes/week was highest for vigorous work (2373.33±3397.28 MET-minutes/week). They spent 369.96±689.55 total minutes/week travelling and 452.76±304.80 total minutes/week sitting. Table 2 shows physical activity levels by domain among female university students.
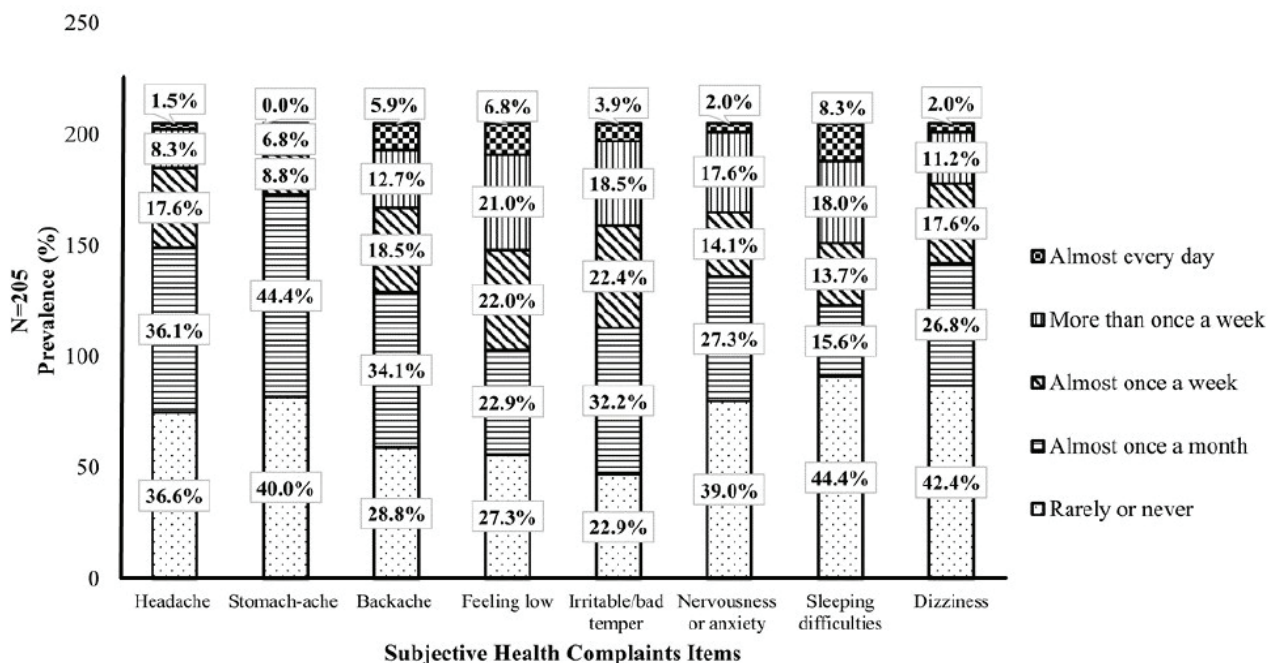

Figure 2 Prevalence of subjective health complaints by items in female university students

Table 2 Physical activity levels by domains among female university students (N=205)

GPAQ Domain	n (%)	Total MET−minutes/week (Mean±S.D.)	Total minutes/week (Mean±S.D.)
Activity at work			
Vigorous work			
Yes	39 (19.0)	2373.33±3397.28	296.67±424.66
No	166 (81.0)	–	–
Moderate work			
Yes	132 (64.4)	2150.82±2746.73	537.70±686.68
No	73 (35.6)	–	–
Travel to and from places			
Yes	129 (62.9)	1479.84±2758.21	369.96±689.55
No	76 (37.1)	–	–
Recreational activities			
Vigorous recreation			
Yes	103 (50.2)	1394.95±1714.23	174.37±214.28
No	102 (49.8)	–	–
Moderate recreation			
Yes	115 (56.1)	563.65±692.78	140.91±173.20
No	90 (43.9)	–	–
GPAQ Domain	N (%)		Total minutes of sedentary behaviour per day (Mean±S.D.)
Sitting	205 (100)	–	452.76±304.80

S.D.=standard deviation, GPAQ=global physical activity questionnaire, MET=metabolic equivalent

Table 3 The correlation between GPAQ domain (MET value and total minutes per week) with subjective health complaints (SHC) in female university students

Physical activity by GPAQ domain per week (MET value)	r	p−value
1. Work−vigorous	0.057	0.207
2. Work−moderate	−0.106	0.066
3. Transport	−0.066	0.172
4. Recreation−vigorous	−0.048	0.248
5. Recreation−moderate	−0.166	0.009*
6. Total physical activity (MET−minutes/week)	−0.094	0.091

Total minutes of GPAQ domain per week	r	p−value
1. Vigorous work	0.057	0.207
2. Moderate work	−0.106	0.066
3. Transport activity	−0.066	0.172
4. Vigorous recreation	−0.048	0.248
5. Moderate recreation	−0.166	0.009*
6. Sedentary behaviour	0.131	0.031*

GPAQ=global physical activity questionnaire, MET=metabolic equivalent, Values are expressed as Pearson correlation (r)
*Significant correlation at a p−value<0.05

The moderate recreational activity and sedentary behavior were correlated with the SHC

Table 3 shows the relationship between GPAQ domains (physical activity MET value and total minutes) with SHC, and the relationship between total minutes of physical activity by GPAQ domains with SHC, respectively. There was a significant correlation between the moderate recreational activity in MET–minutes/week (r=−0.166, p–value=0.009) and the total score of SHC. There was also a significant correlation between total minutes of moderate recreation (r=−0.166, p–value=0.009) and total minutes of sedentary behavior (r=0.131, p–value=0.031) with the total score of SHC. However, the predictive analysis showed that GPAQ domains did not predict the relative risk of SHC (Table 4 and Table 5).

Marital and employment status were the strongest risk factors for SHC

Table 6 shows the relationship between predictors of demographic characteristics associated with the total score of SHC. The marital status (β=−0.167, p–value=0.030) and employment status (β=−0.180, p–value=0.017) were the strongest predictors for the total score of SHC.

Table 4 The relative risk between GPAQ domains (MET–minutes/week) and total score of subjective health complaints (SHC) in female university students.

GPAQ (MET–minutes/week)	Standardized coefficients beta	p–value
Work–vigorous	0.132	0.184
Work–moderate	−0.106	0.131
Transport	0.044	0.711
Recreation–vigorous	0.026	0.769
Recreation–moderate	−0.126	0.127
Total physical activity	−0.146	0.365

GPAQ=global physical activity questionnaire, MET=metabolic equivalent

Table 5 The relative risk between GPAQ domain (total minutes per week) and total score of subjective health complaints (SHC) in female university students.

GPAQ (Total minutes per week)	Standardized coefficients beta	p–value
Work–vigorous	0.082	0.259
Work–moderate	−0.056	0.467
Transport	−0.017	0.819
Recreation–vigorous	−0.025	0.742
Recreation–moderate	−0.136	0.072
Sedentary behaviour	0.112	0.113

GPAQ=global physical activity questionnaire

Table 6 The relative risk between demographics and total score of subjective health complaints (SHC) in female university students.

Demographics	Standardized coefficients beta	p–value
Family type	0.011	0.884
Marital status	−0.167	0.030*
Level of study	−0.047	0.528
Employment status	−0.180	0.017*
Presence of chronic diseases	−0.019	0.803
Body weight (kg)	0.109	0.399
Body mass index (kg/m^2)	−0.154	0.234
Current residential status	0.115	0.138
Father employment status	−0.104	0.533
Mother employment status	0.084	0.793
Guardian employment status	0.297	0.488
Money spent for food purchases per day	0.034	0.637

*Denotes significant result at a p–value<0.05

Discussion

This study assessed the association between physical activity and SHC in female university students during the movement control order or lockdown in Malaysia. The physical activity outlook in other countries during the pandemic lockdown showed a trend in sedentary

behaviour. In Italy, the United States, and France, students decreased their physical activity during the COVID-19 home confinement, causing an increase in sedentariness[21]. In this current study, it found a significant correlation between sedentary behaviours and SHC during restricted movement orders. Although a shift to a new normal and endemic phase was implemented in some countries, movement restrictions were still in force in Malaysia throughout the year 2021. Interestingly, this study also found that total minutes used for moderate recreation were significantly associated with SHC. Although it was hypothesised that moderate recreational activities have an inverse relationship with SHC, it is believed this study's results could have been caused by anxiety, lower social activities and general negative sentiments during the restricted movements; due to women being more susceptible to stress[22].

Physical activity may vary by context. According to Vittengl[23], physical activity during recreation; such as exercising for fitness or sports, predicted significantly lower odds of depression; whereas, activities during work; such as paid work, household chores or transportation (e.g., walking or cycling to get places). were much weaker predictors of depression Recreation programmes that focus on mindfulness, meditation, Tai Chi, yoga, and animal therapy decreases perceived stress, anxiety, depression, and negative moods[24]. Furthermore, women performing low-to-moderate physical activities while staying at home were primarily attributed to domestic duties as primary carers[22]. Hence, women who engage in physical activities mainly for work or transportation instead of recreation may not receive the psychological benefit associated with recreational activities. In the context of recreational activity, a study by Doyle et al.[25] on Emirati university students revealed that most students prefer to perform activities with a fun element. This includes choosing the intensity of the activities, activities which can be done on their own,

are done at a fixed time/schedule and involve little or no cost. The stressful nature of academic life means that students might gravitate towards the fun element as it is less evaluative and result-oriented[26]. Although this study's results showed students spent less time in physical activities for recreation than for work or transportation, there was no correlation between all GPAQ domains and SHC. In multiple countries, poor health outcomes have been linked to pandemic lockdowns among university students[26–28]. It is not clear how the students in this present study cohort coped during the pandemic, a period when distance learning was enforced, as to which increased perceived stress was subsequently experienced in students[29]. However, since health complaints are prevalent among university students[30], it is paramount to increase recreational activities to help reduce adverse health in university students. It is believed that a shift to a 'new normal' after the movement control order will gradually improve the students' physical activity and health outcomes. During the 'new normal' period after the lockdown, students tended to engage highly in recreational activities, followed by increased work activities and transportation[31].

In this study, it was found that 8.3% of female students had sleeping difficulties almost every day. In general, 55.6% of the female students respondents had sleeping difficulties ranging from 'almost once a month' to 'almost every day'. Sleep quality in women has been shown to worsen during the pandemic compared to men[22]. Other studies on gender differences in multi-nationalities have shown a similar worsening of sleep during pandemic times[32–33]. College students living in the 'new normal' had greater regularity in daily sleep, indicating that a 'new normal' offered college students a more sustainable lifestyle, which was associated with more hours of sleep during the week and lower sleep debt[34]. Pre-pandemic studies found that students engaging in moderate recreational activities

have better health outcomes. This includes lower odds of non-suicidal self-harm and suicide attempts[35] and are more likely to report better mental health and happiness[36].

The time spent 'sitting' was second highest after 'work' among the female university student respondents. In a study by Lee and Kim[37], sedentary behaviour in Korean university students elevated stress, anxiety, and depression. Students who spent more than 6 hours working in a seated position had significantly higher psychological distress[38]. Independent factors associated with higher depression were: being female, having a younger age, having a lower income, having one or more comorbid health conditions, having a previous diagnosis of mood disorder and having increased sitting time[39]. This study showed that female university students' marital and employment status were the best predictors of SHC, which indicates that female university students who are single and unemployed are at risk of having health complaints. This finding is similar to a previous study by Haile and colleagues[40], which found that single students were more likely to have insomnia than other students who are either divorced or married. Surprisingly, even during the enforcement of the pandemic movement control order, the students showed the highest physical activities were performed at work. Physical activities associated with work and transportation were not affected by the pandemic.

This study has its limitations. As it is a cross-sectional study, conducted in a public university, no causality can be inferred. The administration of self-reported measures provides estimates of physical activity levels and health complaints via validated questionnaires; however, we could not control errors that may have been incorrectly completed by the participants. In addition, other factors could contribute to health complaints that could not be captured entirely with our questionnaires; such as trauma-exposed individuals due to pandemic-related deaths and other traumatic events. Due to the complex psychological and behavioural responses associated with pandemic-related events, further investigation of integrating clinical evaluation may be necessary. This current data should be interpreted cautiously, as it shows students were largely unmarried and unemployed. Therefore, further investigations using prospective data from a more socio-economically diverse population during the pandemic should be conducted.

Conclusion

Time spent in moderate physical activity for work was highest in female university students. Their total MET-minutes/week was highest for vigorous physical activity at work. The most prevalent SHC symptom that occurred almost every day was sleeping difficulties. However, the physical activity levels of female university students were not associated with health complaints. Although marital status and employment status were the risk factors for health complaints, this may not be the case in a more socioeconomically diverse female student population.

Acknowledgement

Conflict of interest

All authors have no conflicts of interest to declare.

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