

Association between Lifestyle-Related Behaviors and Academic Performance among Students [†]

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Abstract: A healthy lifestyle is one factor that minimizes the risk of becoming seriously ill or dying early. A student with a healthy mind and body would be a better learner and thus would achieve a better academic performance. However, the lifestyle of university students was disrupted due to online learning introduced by higher education institutions in response to the outbreak of the coronavirus. Therefore, this study aimed to identify the association between students' lifestyle-related behavior (physical activity, poor diet, healthy diet, sleep, screen time and body mass index) and the academic performance of all full-time students from the October 2021 to February 2022 session in UiTMKB excluding part 1 students, practical students and part-time students. A cross-sectional study was carried out and proportionate stratified random sampling technique was applied to select a sample from the Faculty of Computer and Mathematical Sciences and Faculty of Business and Management. A total of 281 students (24.20% students from the Faculty of Computer and Mathematical Sciences and 75.80% students from the Faculty of Business and Management) were surveyed through questionnaires using Google forms. Binary logistic regression was used to assess the relationship between the lifestyle-related behaviour and the academic performance of the UiTMKB students. The results showed poor diet, healthy diet and sleep have statistically significant influence on the academic performance of the UiTMKB students; meanwhile, the other variables (physical activity, screen time and body mass index) have no significant influence on the academic performance. Thus, this study will significantly assist the students to improve academic performances in terms of the factor of the student's lifestyle-related behavior.



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1. Introduction

A healthy lifestyle is a manner of life that reduces the chances of being seriously ill or dying prematurely [1]. However, maintaining health has become a challenge during the pandemic because evidence from previous outbreaks has demonstrated that when a pandemic progress, it has a significant influence on lifestyle-related behaviors [2]. For instance, Malaysia had introduced Movement Control Order (MCO) that started on March 18th, 2020, in response to the respiratory illness caused by the SARS-CoV-2 coronavirus that had been declared a "pandemic" by the World Health Organization (WHO) as of March 2020 [3]. Consequently, educational institutions were highly affected where students had to proceed to learning online, also known as open and distance learning (ODL).

Higher education institutions (HEIs) were severely impacted at their core due to the effect of the COVID-19 pandemic, as some studies conducted during the pandemic showed unfavorable results with regard to academic performance [4]. This has led to isolation

among the younger generation in public and private higher education institutions (HEIs). Moreover, a study by [5] revealed that more than one-third of undergraduate nursing students in the nursing school in the Philippines were reported to have low academic achievement. In addition, the results of a study in a university in Italy showed that approximately 60% of all students did not meet their curriculum objectives [6]. University students aim for a high cumulative grade point average (CGPA) as it is one of the qualifications that employers in the professional field seek when hiring employees. This is a big concern because many studies suggest that a healthier lifestyle has a positive impact on academic performance [7,8]. Studies during the pre-pandemic phase showed that students' academic performance are related to lifestyle-related behavior. The implementation of online learning however has indirectly altered the lifestyle of university students specifically in terms of physical activity, dietary habits, sleep, screen time and body weight status.

Describing this scenario, ref. [9] emphasized that numerous studies throughout the world show a significant reduction in students' physical activity, ranging from 48 to 61 percent, when compared to the years prior to the advent of the coronavirus (COVID-19). These affect the students academically because some studies identified that academic performance has been proven to have a significant correlation with physical activity [10,11]. In addition, during the period of university, students are exposed to a variety of unhealthy dietary options, including meals high in saturated fat and refined sugar, which may impair cognitive function [12]. Valladares et al. [12] have proven that students who practice a healthy diet are more likely to perform well academically, therefore, consuming a healthy diet is to be encouraged among students. Moreover, a study of sleep quality among students and administration staff in a university in Italy by [13] during the pandemic found that there is a greater impact of sleeping habits on the students rather than the staff in terms of bedtime and wake up time. Thus, sleep matters for students. The authors of [14] highlighted that most studies found an association between better academic achievement and optimum sleep duration. Furthermore, screen time is related to academic performance as shown in a study by [15]. Their study found an independent inverse relationship between screen time and academic performance. Lastly, ref. [16] discovered that body weight was reported to increase amid the pandemic due to negative eating habits and more sedentary time.

This is a big concern because many studies suggest that a healthier lifestyle has a positive impact on academic performance [8,17]. Therefore, this study was conducted to analyze the factors associated with the academic performance in terms of lifestyle-related behaviors among UiTMKB students during the pandemic.

- ❖ Academic performance: the word "academic performance" has typically been used to refer to any means of expressing a student's scholastic status. Frequently, grade-point average is used as a measure of academic accomplishment, particularly at the college level [18]. Academic performance has been a prominent issue among university students [19]. As [20] mentioned, students' academic excellence will lead to more employment. Therefore, any university's primary goal is to improve the academic performance of its students. Živčić-Bećirević et al. [21] highlighted that the performance of university students is typically represented in terms of a grade point average (GPA). College GPA is commonly thought of as a measure of academic success.
- ❖ Physical activity: numerous studies [11,15,22] found that engaging in physical exercise enhances academic performance. A study by [15] was examined the relationship of weight status, physical activity and screen time with academic achievement in Chilean adolescents. The result showed that adolescents classified with medium–low physical activity are less likely to obtain high academic achievement compared to those with high levels of physical activity. Moreover, refs. [11,22] identified that academic performance has been reported to have a significant correlation with physical activity.
- ❖ Poor diet: Kim et al. [23] investigated how the frequency of different diet items and mealtimes affects school performance. The study discovered that consuming soft

- drink, instant noodle, fast food, and confectionery more than seven times per week had a detrimental impact on school performance.
- ❖ **Healthy diet (fruits and vegetables):** Rehman et al. [24] aimed to see if there is an association between university students' self-reported academic achievement and various socio-demographic characteristics, health behaviours and mental health among students in Bahria University in Karachi. In the study, they uncovered that more than half of the students said they ate breakfast every day, and this was linked to higher grades. In addition, ref. [12] has discovered that students who practice a healthy diet are more likely to perform well academically.
 - ❖ **Sleep:** Adelantado-Renau et al. [7] analyzed the association of sleep patterns with academic and cognitive performance in adolescents. The results showed that sleep quality was associated with academic performance and analysis of covariance revealed that higher grades among adolescents were associated with better sleep quality. Meanwhile, ref. [25] emphasised that sleep habits and sleep duration are affected by prolonged screen time as the blue light emitted from the screens of devices before bedtime is associated with sleep inefficiency and shortened sleep duration. In addition to this, sleep matters for students because [7] highlighted that higher grades were associated with better sleep quality.
 - ❖ **Screen time:** Yan et al. [26] identified the amount of time spent by adolescents in Wuhan, China on screen-based behaviours and its associations with academic performance. The results indicated that more than four hours spent on social networking sites on school days and non-school days, watching television from two to four hours and watching videos less than one hour on school days or not every day were all negatively associated with academic performance. Meanwhile, ref. [15] has proven that screen time is one of the aspects of lifestyle that is related to academic performance. Their study found an independent inverse relationship between screen time and academic performance.
 - ❖ **Body mass index:** Wehigaldeniya et al. [27] conducted a cross-sectional study at the University of Kelaniya in Sri Lanka to evaluate the association between academic achievement and body mass index (BMI) of undergraduate students. Their study found that there was a positive association between BMI and university students' academic performance. A study by [28] among youth in Canadian schools has shown that body weight status is related to academic performance as their study found that obesity was linked to a lower academic performance.

The main purpose of this research generally is to determine the association between lifestyle-related behaviours and academic performance among Universiti Teknologi MARA Kota Bharu (UiTMKB) students during the COVID-19 pandemic. Specifically, there are two major objectives. The first objective is to determine the associations between individual indicators of lifestyle-related behaviours (physical activity, poor diet, healthy diet, sleep, screen time and body mass index) and academic performance among UiTMKB students. Secondly, to identify factors of lifestyle-related behaviors (physical activity, poor diet, healthy diet, sleep, screen time and body mass index) that influence UiTMKB students' academic performance.

2. Methodology

2.1. Data Collection

A cross-sectional study was carried out in this study to determine the association between individual indicators of lifestyle-related behaviour (physical activity, poor diet, healthy diet, sleep, screen time, body mass index) and academic performance among UiTMKB students. The population is 1037 of all full-time students (251 students from Faculty of Computer and Mathematical Sciences and 786 students from Faculty of Business and Management) from October 2021 to February 2022 session in UiTMKB, excluding part one students, practical students and part-time students. The questionnaires in Google forms were distributed online by personally administering to 281 students (68 students from the Faculty of Computer and

Mathematical Sciences and another 213 students from the Faculty of Business and Management) that were randomly selected using proportionate stratified random sampling. Table 1 shows the research instruments were used in this study.

Table 1. Research Instruments.

Section	Item	Scale of Measurement
Demographic	Gender/Faculty Program/Current semester Age	Nominal Ordinal Interval
Academic performance [29]	An open-ended question on academic performance required students to self-report their latest GPA in a ratio scale.	Scale of measurement: <ul style="list-style-type: none"> poor (0.00–1.99); average (2.00–2.99); good (3.00–4.00).
Physical activity [30]	Physical activity = 150 min divided by 7 days (22 min/day) Physical activity was assessed by taking 150 minutes divided by 7 days to obtain an average least duration in minutes recommended on a day	Scale of measurement: <ul style="list-style-type: none"> 0–2 days; 3–5 days; 6–7 days.
Dietary habits [22]	Dietary habit of ‘poor diet’ and ‘healthy diet’ <ul style="list-style-type: none"> ‘Poor diet’: seven questions ‘healthy diet’: five questions 	Scale of measurement: <ul style="list-style-type: none"> Almost never = 1; Less than once a week = 2; Every week = 3; Once a day = 4; More than once a day = 5.
Sleep [31]	Scale with a range from 0 to 40	Scale of measurement: <ul style="list-style-type: none"> Never = 1; Less than once a week = 2; Once or twice a week = 3; 3 to 5 nights/days = 4; Almost every day/night = 5.
Screen time [22]	The questions of typical usage of a variety of screens on typical weekdays and weekend days were used to calculate average daily screen time. The average of these two totals was calculated to represent average daily screen time during a typical week.	Scale of Measurement: <ul style="list-style-type: none"> less than 2 h = 1; 2 to less than 4 h = 2; 4 to 7 h = 3; more than 7 h = 4.
Body mass index [32]	Body mass index (BMI) required students to report their height in metre (m) and weight in kilogram (kg). These values used to calculate BMI (kg/m ²)	Scale of measurement: <ul style="list-style-type: none"> 15.0 to 19.9 = underweight; 20.0 to 24.9 = normal weight; 25.0 to 29.9 = overweight; 30.0 or greater = obese.

2.2. Data Analysis

Descriptive analysis was used to describe demography, lifestyle-related behaviors and academic performance of the respondents. Frequency and percentage were applied to describe and summarise the data obtained from categorical variables, which were physical activity, screen time and body mass index. Meanwhile, mean and standard deviation were used to examine continuous data such as poor diet, healthy diet and sleep. Binary logistic regression was applied as a main inferential analysis in order to identify the factors of students’ lifestyle-related behavior that influenced academic performance. The model was assessed by analysing the omnibus test, Cox and Snell R Square and Nagelkerke R Square, goodness-of-fit and classification table.

The target variable with two values was academic performance which are the success event ($Y = 1$) for good, whereas ($Y = 0$) for other than good. In estimating the logistic

regression model, the probability was expressed in terms of odds $\left(\frac{p}{1-p}\right)$ as shown in Equation (1).

$$\text{logit}(p) = \ln(\text{odds}) = \ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_0 X_1 + \dots + \beta_k X_k \quad (1)$$

where

β_0 = the intercept (the value of Y when all $X_i = 0$)

β_1 = the parameter of the model

p = the probability of interest ($Y = 1$)

3. Results and Discussion

Table 2 shows the descriptive statistics for this study. Firstly, female respondents had the highest percentage of 77.22% (217 respondents) followed by male respondents with the percentage of 22.78% (64 respondents). Next, most of the respondents achieved a good academic performance with a percentage of 71.89% (202 respondents), compared to the respondents that did not achieve a good academic performance with a percentage of 28.11% (79 respondents). Then, based on physical activity, most of the respondents achieved at least 22 min of physical activity for 0–2 days with a percentage of 53.4% (150 respondents) followed by 3–5 days with a percentage of 35.9% (101 respondents). Whereas respondents who achieved at least 22 min of physical activity for 6–7 days had the lowest percentage, of 10.7% (30 respondents). Meanwhile, in the variable screen time, the respondents who spent more than 7 h using screens had the highest percentage of 63.3% (178 respondents) followed by respondents who spent 4–7 h using screens, which is 14.2% (40 respondents). The second lowest wa the respondents that spent 2–4 h using the screen with a percentage of 11.4% (32 respondents), while the lowest was respondents that spent less than 2 h using the screen with a percentage of 11% (31 respondents). Next, in the variable body mass index, most of the respondents appeared to be normal weight with a percentage of 40.9% (115 respondents) followed by respondents who are underweight with a percentage of 29.5% (83 respondents). The next two lowest percentage of respondents' body mass index were overweight and obese with a percentage of 19.9% (56 respondents) and 9.6% (27 respondents) respectively.

Table 2. Descriptive Statistics of Categorical Variables.

Variables	Frequency of Respondents	Percentage (%)
Gender		
Male	64	22.78
Female	217	77.22
Academic performance		
Good	202	71.89
Other than good	79	28.11
Physical activity (days/week active for at least 22 min)		
0–2 days	150	53.4
3–5 days	101	35.9
6–7 days	30	10.7
Screen time		
Less than 2 h	31	11.0
2 to less than 4 h	32	11.4
4 to 7 h	40	14.2
More than 7 h	178	63.3
Body mass index		
Underweight	83	29.5
Normal weight	115	40.9
Overweight	56	19.9
Obese	27	9.6

Table 3 shows the basic summary statistics of three continuous variables which are poor diet, healthy diet and sleep. The total scores of poor diet ranges from 7 to 31, with a mean of 16.22 and standard deviation of 4.965. Next, the total scores of healthy diet ranges from 8 to 25, with a mean of 18.07 and standard deviation of 4.046. Lastly, total scores of sleep ranges from 8 to 40, with a mean of 22.73 and standard deviation of 6.566.

Table 3. Descriptive Statistics of Continuous Variables.

	Minimum	Maximum	Mean	Standard Deviation
Poor diet	7	31	16.22	4.965
Healthy diet	8	25	18.07	4.046
Sleep	8	40	22.73	6.566

Table 4 indicates several statistical tests for assessing criteria for multiple logistic regression model. The significant value (*p*-value) of the omnibus tests is less than 0.05 with chi-square value is 251.373, meaning that the model is statistically significant. Then, the value 0.850 of Cox and Snell R Square and Nagelkerke R Square shows that the independent variable was able to explain the variability of the dependent variable by 85% while the rest is explained by other variables not included in the model. The Hosmer and Lemeshow test to recognise the results of the goodness-of-fit test indicate that the model fits the data well, as the value of the *p*-value is larger than 0.05. Moreover, the classification accuracy was 95.7%, which indicates that the model is 95.7% accurate in classifying the students of “good” and “other than good” academic performance. Since the classification accuracy is greater than 80%, the model has a good prediction. The classification error rate means that a fraction of predictions was incorrect is 4.3%.

Table 4. Assessing Criteria for Multiple Logistic Regression.

Model Assessing Criteria	Value (<i>p</i> -Value)
Results of omnibus tests of model coefficient (Chi-square)	251.373 (<0.05)
Cox and Snell R Square	0.591
Nagelkerke R Square	0.850
Hosmer and Lemeshow test	10.33 (0.243)
Results of classification table (classification accuracy)	95.7%

Table 5 tabulates the results of Wald chi-squared test, indicating that poor diet, healthy diet and sleep were significant to the model developed in this study, since all the *p*-values are less than significance level (0.05).

Table 5. Multiple Logistic Regression Results (Coefficient).

	B	Exp (B)	Wald	<i>p</i> -Value
Constant	−7.070	0.00085	9.503	0.002
Poor diet	−0.351	0.704	34.397	0.000
Healthy diet	0.395	1.484	7.701	0.006
Sleep	0.368	1.445	11.671	0.001

Therefore, the model that can be derived from the results of the multiple logistic regression is in Equation (2).

$$\text{logit}(p) = \ln\left(\frac{p}{1-p}\right) = -0.7070 - 0.351\text{poordiet} + 0.395\text{healthdiet} + 0.368\text{sleep} \quad (2)$$

Based on forward selection method, three variables were significant, which were poor diet, healthy diet and sleep, and included in the final model as shown in Table 5.

The odds ratio from the results of the multiple logistic regression of the variable poor diet is 0.704 which means that one unit increase in poor diet will decrease the odds of achieving a good academic performance by 29.6%, holding all other predictors constant. Secondly, the odds ratio of variable healthy diet is 1.484 which shows that one unit increase in healthy diet will increase the odds of achieving a good academic performance by 48.4% holding all other predictors constant. Lastly, the odds ratio of variable sleep is 1.445 which indicates that one unit increase in sleep will increase the odds of achieving a good academic performance by 44.5%, holding all other predictors constant.

4. Conclusions

This study investigated the association between lifestyle-related behaviour and academic performance among UiTMKB students. From this study, variable poor diet has a statistically significant influence on academic performance. This study coincided with a study by [23]. Their studies found that an unhealthy diet has a detrimental impact on academic performance. The current study also reveals that a healthy diet is associated with good academic performance, and the results of this study matched with the study conducted by [24]. The study concluded that consumption of healthy diet among students has a positive impact on academic performance. Similarly, the current study also found that sleep has a significant relationship on academic performance. The result is supported by the previous literature that found a significant relationship between sleep and academic performance among students [7].

However, the current study identified that physical activity does not have significant influence on academic performance among the UiTMKB students. The finding is in contrast with the study by [15] because their study discovered that academic performance is associated with physical activity. Moreover, the current study also showed that there is no significant correlation between screen time and academic performance which is inconsistent with the previous studies investigated by [26]. The study proved that there is an inverse relationship between screen time and students' academic performance. Lastly, this study found that body mass index has no association with academic performance which is in contrast with the previous studies that showed a significant association between BMI and academic performance among students [27].

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The datasets used in the study are publicly available to everyone and can be accessed at https://drive.google.com/drive/folders/1KwaFZ_-3dWzxfNeXAx8TXH2g7mqUUpA-?usp=sharing.

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