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A Multiple Linear Regression Analysis of The Relationship Between Lifestyle Factors and Classroom Concentration Among UiTM Seremban Students

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ABSTRACT

Classroom concentration is a key factor influencing students' academic performance and engagement. This study aimed to investigate the relationship of lifestyle factors, including sleep quality, physical activity, diet quality, and screen time, on classroom concentration among university students, especially in UiTM Seremban 3. Data were obtained through structured questionnaires and analysed using Multiple Linear Regression (MLR) to determine the strength of these relationships and build the best predicted regression model. A total of 375 students were selected by the convenience sampling method. After data cleaning, model adequacy checking, and one-time outlier removal, a final sample of 360 responses was used. Assumption testing confirmed the suitability of the data for regression analysis. The findings indicated that all four lifestyle factors had a statistically significant positive relationship with classroom concentration. This study highlights the importance of practicing balanced lifestyles to enhance students' concentration and learning outcomes. In conclusion, the study provides evidence that lifestyle behaviours significantly influence classroom concentration. The research provides insights for universities to encourage students to live a balanced lifestyle. The developed model also serves as a predictive tool for assessing students' classroom concentration in similar educational contexts.

1. INTRODUCTION

Concentration is clearly an important factor in learning. However, it was also influenced by a range of factors beyond the classroom. The ability to stay focused during lectures directly affects how well students absorb, retain, and apply information. There are many challenges in maintaining concentration in both internal and external factors, including sleep patterns, balanced diet, physical activity, and overall lifestyle choices.

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Lifestyle behaviours, including sleep quality, physical activity, diet and recreational screen time usage, are also significant contributors to students' ability to concentrate and perform academically (Faught et al., 2017). Despite this, many university students adopted unhealthy routines due to academic pressures, irregular schedules, social influences, and personal problems that caused them to lose the ability to focus in class. However, the specific relationship between these factors and classroom concentration must be examined in the context of university students, particularly in UiTM Seremban 3.

Understanding the association between a lifestyle and students' concentration was essential for developing strategies to improve educational outcomes and overall student well-being. This study intended to investigate the association between various elements of a lifestyle and concentration in class among university students, offering insights that could inform both personal behaviours and institutional support services.

Many university students often experience a noticeable decline in concentration after 10-15 minutes of lesson class (Bradbury, 2016). This drop in focus can be affected by many factors, including students' lifestyles, environmental distractions, and personal problems. As classes were ongoing, students may struggle to maintain attention, which may also prevent them from catching up on the lesson as a result. Nevertheless, there is limited empirical evidence relating these lifestyle habits to classroom concentration. Reigal et al. (2020) did research on the relationship between physical fitness level to attention and concentration. The other study examined the influence of breakfast on attention and concentration among high school students (Irfan & Irfan, 2021). However, screen time and sleep quality are underexplored to examine the association of these factors and class concentration.

The lack of quantitative research on how certain lifestyle characteristics affect students' ability to concentrate in class creates a gap in the existing knowledge. Concentration is an important component of effective learning, and yet it is influenced by various factors. Le (2021) did research on two main factors that affect attention span, which is internal and external factors. Most studies measure academic performance as a proxy for concentration. In addition, lifestyle factors are often studied in isolation. This gap in the existing knowledge limited the ability to draw evidence-based conclusions and develop targeted interventions.

By investigating these factors, this research seemed to offer data-driven recommendations to help UiTM Seremban 3 students optimize their classroom engagement and focus through lifestyle choices. Hence, clarifying the relationship between lifestyle factors and concentration in the classroom in UiTM Seremban 3 students would pave the way to show which factor is the most related.

2. METHODOLOGY

This study used a quantitative methodology of research under an explanatory research design. Since this research objective was to determine the relationship between lifestyle factors and concentration during class, examining cause-and-effect correlations between variables was appropriate for this research design. This study examined the relationship between one dependent variable, classroom concentration with four independent factors, which are sleep quality, physical activity, diet quality, and screen time as shown in the theoretical framework below:

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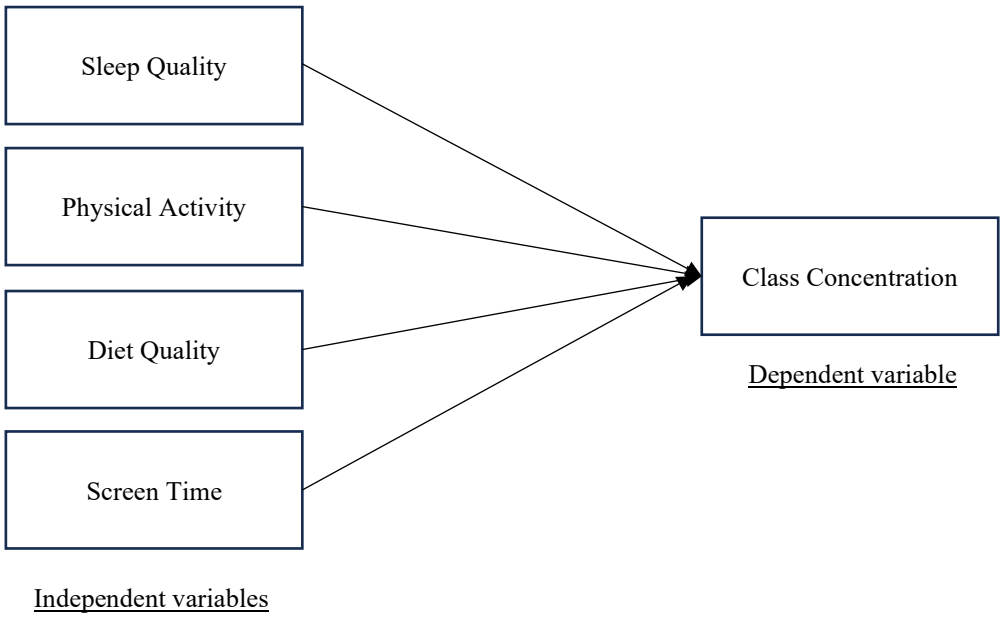

Fig.1. Theoretical framework

There were three faculties that involved which were Faculty of Computer and Mathematics (FSKM), Faculty of Administrative Science and Policy Studies (FSPPP) and Faculty of Sports Science and Recreation (FSR). Each of these faculty has difference number of students. The sample is the students who were accessible and willing to participate the online survey during the data collection period. A convenience sampling method was used to select a total of 375 students for this research. The population of UiTM Seremban students is 5649. While this approach may restrict the ability to generalize findings, the sample size was statistically sufficient for a population of around 6000 students, yielding a 95% confidence level. The selected sample size also reflected practical limitations related to time and accessibility, yet it provided enough data to examine the research question adequately (Lakens, 2022).

The data was gathered using an online survey. The survey has made in Google Form and distributed via WhatsApp and Telegram groups that contained students from UiTM Seremban 3. The questionnaire consists of 6 sections of which section A was for respondent's demographic information where the respondents were asked about their background such as age, gender, current semester and faculty. Besides that, in the next 5 section used Likert scale questions that consists of 5 options of answer which were "strongly disagree", "disagree", "neutral", "agree" and "strongly agree", and some of open-ended questions that allowed respondents to answer some numerical questions. Appendix 1 shows the questionnaire that distributed during the study. A five-point Likert Scale used to measure the extent of participants' lifestyle. These Likert Scale was adopted and modified from variety of previous research studies to correspond with this study's objective as below:

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Table 1. Referred topic from previous scientific questionnaires

Items	Citation	No. of Items
Section A: Demographics Age, gender, current semester, faculty		
Section B: Sleep Quality		
Sleep Duration	Kokubun et al. (2025)	4
Sleep Soundly	Kokubun et al. (2025)	2
Fall Asleep Easily	Kokubun et al. (2025)	1
Section C: Physical Activity		
Exercise (times/week)	Kokubun et al. (2025)	3
Hobbies engagement	Kokubun et al. (2025)	1
Outdoor leisure activities	de León et al. (2023)	3
Section D: Diet Quality		
Breakfast	de León et al. (2023)	2
Balanced Diet	de León et al. (2023)	3
Junk Food Intake	de León et al. (2023)	2
Section E: Screen Time		
Screens related activities	de León et al. (2023)	5
Videos watching	Turel et al. (2017)	1
Screen Breaks	de León et al. (2023)	1
Section F: Classroom Concentration		
Easy to focus	Sulaiman et al. (2011)	1
Behaviour during class	Sulaiman et al. (2011)	4
Focus duration	Sulaiman et al. (2011)	1

This research used one of the most accessible software for data analysis and executing computerized analysis of data which is The Statistical Package for Social Sciences (SPSS). Easy-access software means it has user-friendly statistical tool. SPSS offers a point-and-click interface with no coding involved. Multiple Linear Regression was employed to answer the research questions of this study. For data with several predictor variables and a single outcome, the MLR model is an extension of the simple linear regression (Marill & Lewis, 2003). The same analysis method can also produce the predicted model. Typically, the variables $X_1, X_2, \dots, X_{p-1}$ in the model do not necessarily need to represent distinct predictor variables.

3. FINDINGS AND DISCUSSION

3.1 Reliability analysis

The reliability test evaluates the internal consistency of the measurement instruments used to ensure that the constructs of healthy lifestyle and class concentration are measured with accuracy and dependability. Below is the result of the Cronbach's Alpha value for each instrument gained from the reliability test from SPSS output.

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Table 2. Reliability test result

Question Segment	Cronbach's Alpha
Sleep Quality	0.855
Physical Activity	0.748
Diet Quality	0.793
Screen Time	0.720
Class Concentration	0.879

Based on the Cronbach's Alpha value gained from the reliability test from SPSS, all variables, which are Sleep Quality, Physical Activity, Diet Quality, Screen Time, and Class Concentration, have an acceptable value, which is above 0.7. It is considered that all questions are reliable.

3.2 Model equation

The model equation can be expressed as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_{p-1} X_{p-1} + \varepsilon_i$$

Where:

Y_i = Dependent Variable

X_1, X_2, X_{p-1} = Independent Variable

$\beta_0, \beta_1, \beta_2, \beta_{p-1}$ = Parameters

p = Number of parameters

ε_i = Error Term

In this study, Y_i was represented as classroom concentration. Meanwhile, for the independent variables, X_1 was represented as sleep quality, X_2 as physical activity, X_3 as diet quality, and lastly X_4 as screen time. Therefore, p in this study is equal to 5.

3.3 Model adequacy checking

Six model adequacy was checked to fulfill all the assumptions before proceeding the use of the Multiple Linear Regression analysis for this study.

3.3.1 Before removing outliers

(i) Linearity between each independent and dependent variable

A scatter plot matrix is used to determine whether there is a relationship between dependent and independent variables (Shrestha, 2020). The points form a pattern that approximates a straight line with a positive slope, showing a positive linear relationship between two pairs of variables.

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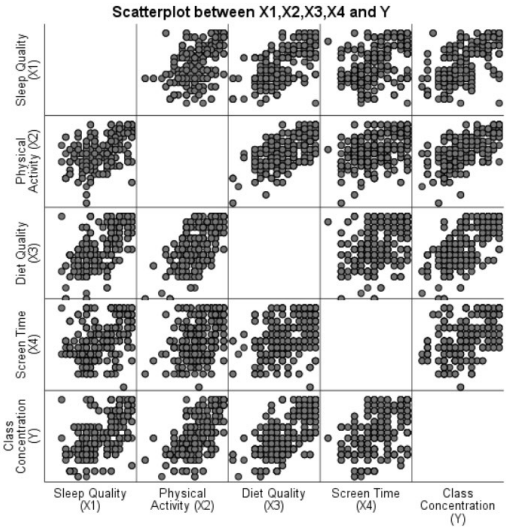

Fig. 2. Scatterplot matrix for original data

Based on Fig. 2, the linear relationship points form a pattern that approximates a straight line with a positive slope for all pairs between independent and dependent variables. This indicates a positive linear relationship between Sleep Quality (X_1), Physical Activity (X_2), Diet Quality (X_3), Screen Time (X_4), and Class Concentration (Y). Thus, the first assumption is met.

(ii) Normality of error variable

To check the normality of the error variable, the P-P plot, and Kolmogorov-Smirnov test are used. By using a P-P plot, the points of standardized residuals are arranged and plotted against the expected values from the standard normal distribution.

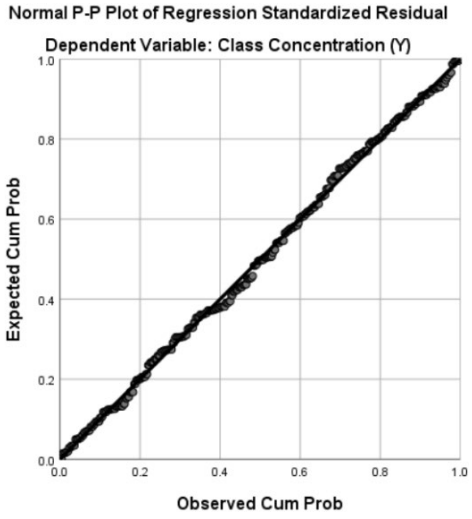

Fig. 3. P-P plot for original data

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The P-P plot shows that the residuals are roughly aligned with the diagonal line. It can assume that the errors are normally distributed when the plots are near or on the 45-degree line (Tranmer et al., 2020).

Table 3. Normality tests for original data

	Kolmogorov-Smirnov	Shapiro-Wilk
Standardised Residual	0.200	0.530

The Kolmogorov-Smirnov test in Table 3 is used to support the result from the P-P plot. Since the p-value is 0.200, it is greater than the significance level of α=0.05. This indicates that the null hypothesis of normality could not be rejected. Therefore, the residuals do follow a normal distribution.

(iii) Homoscedasticity

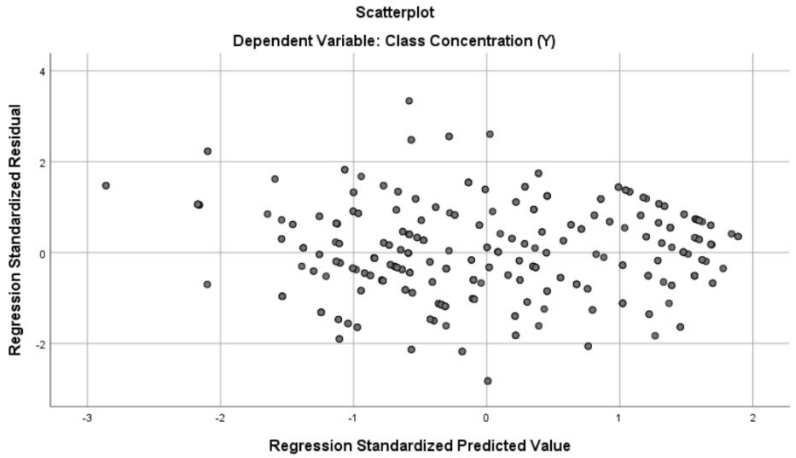

Fig. 4. Scatterplot of residual against predicted value

Based on Fig. 4, the pattern of the plot of residuals versus predicted value for Class Concentration shows that it is randomly scattered. It also does not have any obvious pattern. Thus, it indicates that the error variance is constant (Homoscedasticity) (Tranmer et al., 2020).

(iv) Detecting multicollinearity

Table 4. Coefficients for collinearity statistics for original data

	Tolerance	VIF
Sleep Quality (X_1)	0.558	1.793
Physical Activity (X_2)	0.585	1.710
Diet Quality (X_3)	0.442	2.260
Screen Time (X_4)	0.778	1.286

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According to the collinearity statistics output, the VIF value for all variables is less than 10. Thus, there is no multicollinearity between the variables. The TOL value is greater than 0.2 for all variables. Thus, there is no multicollinearity.

(v) Independence of error terms

Table 5. Durbin Watson value in model summary for original data

Model	Durbin-Watson
1	1.915

To check if the variables in the prediction model have a correlation that changes over time, the error terms of autocorrelation were tested using the Durbin-Watson statistic (Kumar, 2023). If the value is less than 2, the residuals are positively correlated. Since d = 1.915, the residuals are positively correlated.

(vi) Presence of outlier

Outlier detection is a critical step in statistical analysis and regression modelling. It has to be done to check the presence of unusual or extreme data points, as it can distort parameter estimates, weaken model validity, and lead to misleading conclusions. In this case study, Cook's distance is used in handling outliers.

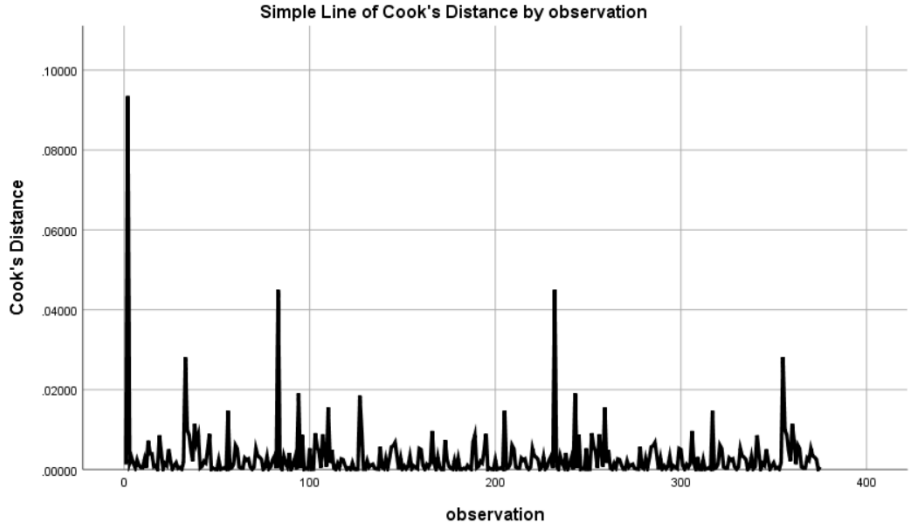

Fig. 5. Simple line of Cook's distance by observation

The case is influential when $D_i > \frac{4}{n-k-1}$. For this case, $D_i > \frac{4}{375-4-1}$. Thus, the cut-off point is 0.0108. The values exceeding 0.0108 are considered highly influential. Based on Fig. 5, 15 observations are influential in this study. The following table shows the influential observations with their Cook's Distance value.

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Table 6. Cook's distance influential observations

Observation	Cook's Distance
2	0.09351
33	0.02812
38	0.01147
56	0.01475
83	0.04499
94	0.01907
110	0.01552
127	0.01848
205	0.01475
232	0.04499
243	0.01907
259	0.01552
317	0.01475
355	0.02812
360	0.01147

Based on Table 6, 15 influential cases have been identified using Cook's Distance techniques. Since all of the observations above fall in the cut-off range, they were considered influential points and removed from the study.

3.3.2 After removing outliers

(i) Linearity between each independent and dependent variable

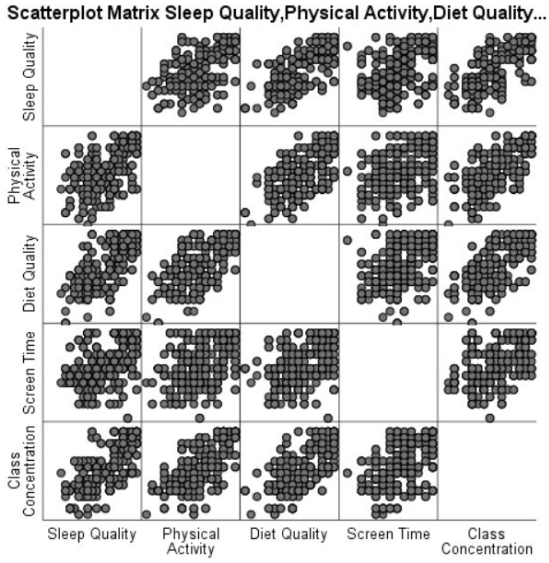

Fig. 6. Scatterplot matrix for data after removing outliers

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Based on Fig. 6, the linear relationship points form a pattern that approximates a straight line with a positive slope for all pairs between independent and dependent variables. This indicates a positive linear relationship between Sleep Quality (X_1), Physical Activity (X_2), Diet Quality (X_3), Screen Time (X_4), and Class Concentration (Y). Thus, the first assumption is met.

(ii) Normality of error variable

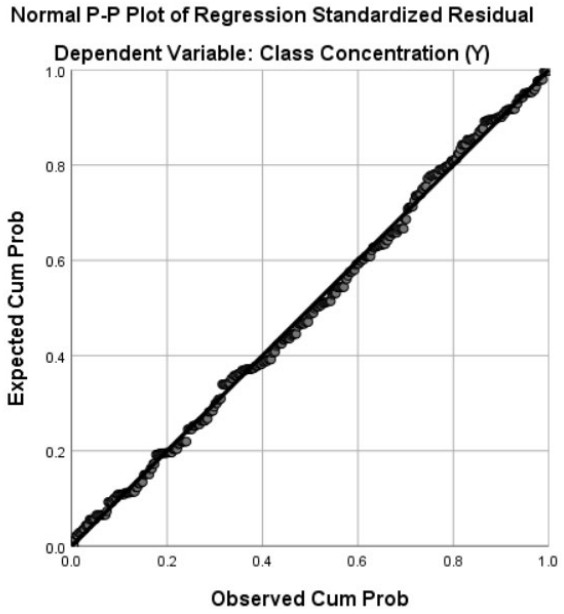

Fig. 7. P-P Plot

Based on Fig. 7, the P-P Plot shows the residuals lie on the 45º line. This indicates that the error variable has a normal distribution.

Table 7. Normality tests

	Kolmogorov-Smirnov	Shapiro-Wilk
Standardised Residual	0.200	0.227

The results from the P-P Plot is supported by the Kolmogorov-Smirnov test in Table 7. The significance level of α=0.05 is exceeded by the p-value is 0.200. The null hypothesis of normality could not be rejected, according to this test statistic. Thus, the residuals do follow a normal distribution.

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(iii) Homoscedasticity

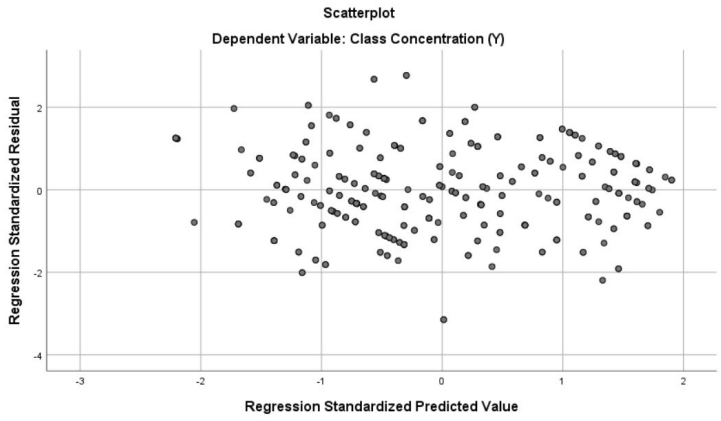

Fig. 8. Scatterplot of residual against predicted value

Based on Fig. 8, the pattern of the plot of residuals versus predicted value for Class Concentration shows that it is randomly scattered. It also lacks any obvious pattern. Therefore, it shows homoscedasticity, implying a constant error variance.

(iv) Detecting multicollinearity

Table 8. Coefficients for collinearity statistics

	Tolerance	**VIF**
Sleep Quality (X1)	0.514	1.945
Physical Activity (X2)	0.585	1.711
Diet Quality (X3)	0.433	2.311
Screen Time (X4)	0.772	1.295

Based on the collinearity statistics output in Table 8, the VIF value for all variables is less than 10. Furthermore, the TOL value is greater than 0.2 for all variables. Thus, it is assumed that there is no multicollinearity between the variables.

(v) Independence of error terms

Table 9. Durbin Watson value in model summary

Model	**Durbin-Watson**
1	1.739

From the SPSS output in the model summary, the value for Durbin-Watson is d = 1.739. Since the value is less than 2, it is assumed that the residuals are positively correlated.

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(vi) Presence of outlier

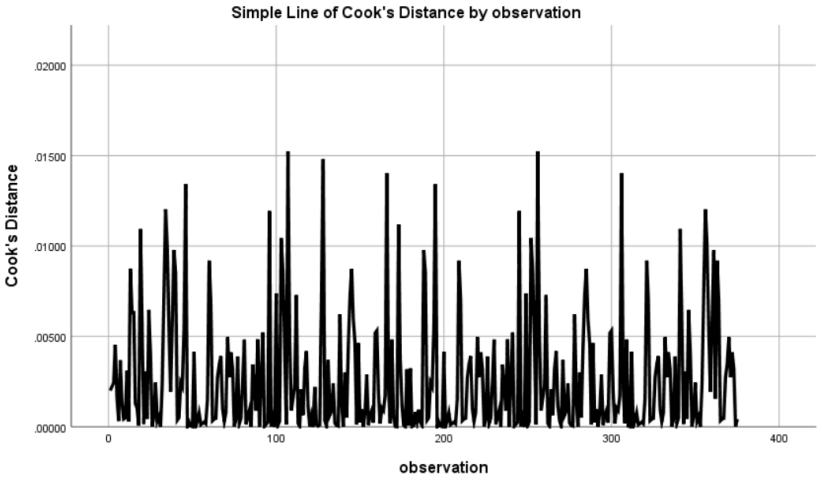

Fig. 9. Simple line of Cook's distance by observation

Based on Fig. 9, the simple line of Cook's Distance by Observation portrays that the Cook's Distance values range from 0 to about 0.02. Since it is relatively low, this suggests that no single observation has an extreme influence on the regression model. To avoid overfitting or loss of important variation in the data, further removal is not done.

3.4 Multiple linear regression model validation

3.4.1 The Standard Error of Estimate (S_e)

Table 10. Standard error of estimates

	Before Remove Outlier	After Remove Outlier
Standard Error of Estimate	0.4770	0.4366

For the standard error of estimate, the smaller the value of S_e , the better the model. In this study, the Table 10 shows that the standard error for the data after remove outlier = 0.4366 is smaller than the standard error for the original data = 0.4770. In conclusion, the data after remove outlier is the best model for this data set.

3.4.2 Testing the validity of the regression model

a) Before remove outlier

Table 11. ANOVA table for original data

Source of variation	Sum of Squares (SS)	Degree of Freedom (df)	Mean Sum of Squares (MS)	F	Sig.
Regression	124.025	4	31.006	136.253	.000
Error	84.199	370	0.228		
Total	208.224	374			

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Based on Table 11, the F-statistic for the original data is 136.253 with a significance value of 0.000. It indicates that the model is statistically significant.

b) After remove outlier

Table 12. ANOVA table

Source of variation	Sum of Squares (SS)	Degree of Freedom (df)	Mean Sum of Squares (MS)	F	Sig.
Regression	126.913	4	31.728	166.439	.000
Error	67.673	355	0.191		
Total	194.587	359			

Based on Table 12, the F-statistic increases to 166.439 compared to the original data, with a significance value of 0.000.

3.4.3 Testing The Significance of Each of The Independent Models

a) Before remove outlier

Table 13. Parameter estimates before remove outlier

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	p-value
Constant	0.068	0.184		0.370	.711
Sleep Quality (X1)	0.225	0.038	0.266	6.008	.000
Physical Activity (X2)	0.348	0.043	0.353	8.176	.000
Diet Quality (X3)	0.182	0.051	0.179	3.606	.000
Screen Time (X4)	0.205	0.046	0.167	4.456	.000

To check the significance of each independent variable, the p-value column is referred from Table 13. The table shows that all variables are significant since the p-value is less than 0.05 for each variable.

b) After remove outlier

Table 14. Parameter estimates after remove outlier

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	p-value
Constant	-.028	0.177		-0.157	.876
Sleep Quality (X1)	0.290	0.037	0.346	7.931	.000
Physical Activity (X2)	0.362	0.042	0.353	8.633	.000
Diet Quality (X3)	0.137	0.048	0.135	2.831	.000
Screen Time (X4)	0.204	0.044	0.166	4.654	.000

Table 14 is used to check the significance of each variable after removing the outliers. This table shows that all variables are significant since the p-value is less than 0.05 for all variables. This result concludes that all variables are significant, even before and after removing outliers.

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3.4.4 Selection of predictor variable

Table 15. Selecting predictor variable

Model	R-Square	Adjusted R-Square	C(p)	MSE	Variables in Model
1	0.482	0.480	172.98	0.2819	X_1
2	0.614	0.612	39.56	0.2101	X_1, X_2
3	0.644	0.641	11.24	0.1944	X_1, X_2, X_4
4	0.652	0.648	4.47	0.1906	X_1, X_2, X_3, X_4

One technique for choosing which variables to include in a multiple regression model is stepwise regression (Michael Olusegun, 2015). The variables that appear in the final equation of stepwise regression indicate the optimal set of independent variables for predicting the dependent variable (Wang et al., 2016). To determine the best combinations of predictors for the multiple linear regression model, four variable selection methods were used: R^2, Adjusted R^2, Mallow's C_p, and MSE. Every method offers a different viewpoint for determining the most effective and efficient combination of variables.

The criterion of the coefficient of multiple determination R^2 is used to identify several good combinations of X variables for which R^2 is high. R_p^2 indicates that there are p parameters. Based on Table 15, the highest R^2 value among these four models is the model with all four predictors, which is model 4. The R^2 value for the model is 0.652. It means that about 65.2% of the variance in classroom concentration was explained.

The adjusted R^2 is accounted for the number of predictors in the model to help prevent overfitting. Based on Table 15, Model 4 has the highest $R_{a,p}^2$ value, which is 0.648. This model included all four independent variables. This suggests that including sleep quality (X_1), physical activity (X_2), diet quality (X_3), and screen time (X_4) provides the optimal balance between model complexity and explanatory power. Alternative models with fewer variables exhibit marginally lower adjusted R^2 values, confirming that the full model is the most appropriate. $R_{a,p}^2$ only increases if MSE_p decreases. Refer to the MSE column in Table 4.14, the lowest MSE_p value is Model 4. Thus, the maximum $R_{a,p}^2$ occurs when all variables are selected.

In addition, Mallow's C_p criterion is to identify the combination of X variables for which the C_p value is small and near p. Based on Table 15, subsets with small C_p value and also near p is Model 4 which the value is 4.47. Additionally, the chosen model has a low total mean squared error, indicating a low regression model bias. Based on all these criteria, the variables that should be selected for the model are sleep quality (X_1), physical activity (X_2), diet quality (X_3), and screen time (X_4).

3.4.5 Coefficient of multiple determination and the adjusted coefficient of multiple determination

Table 16. R-Square and adjusted R-Square

R	R-Square	Adjusted R-Square
0.808	0.652	0.648

Based on Table 16, the R^2 value is 0.652, which also suggests that approximately 65.2% of the variation in classroom concentration can be explained by lifestyle factors, including sleep quality (X_1), physical activity (X_2), diet quality (X_3), and screen time (X_4). Whereas the balance 34.8% is explained by other factors. Additionally, after considering the sample size, the adjusted R^2 value of 0.648 implies that about

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64.8% of the total variation in classroom concentration by sleep quality (X_1), physical activity (X_2), diet quality (X_3), and screen time (X_4).

3.5 Final multiple linear regression model

Upon confirming that all assumptions of regression were fulfilled and determining the best model through selection methods, the final multiple linear regression model was created using all four lifestyle factors as predictors. The values of unstandardized coefficients from the SPSS output were used to construct the final regression equation. The model is expressed in the predictive equation below.

$$\hat{Y} = -0.028 + 0.290X_1 + 0.362X_2 + 0.204X_3 + 0.137X_4$$

Where:

$\hat{Y}$ = Classroom concentration

X_1 = Sleep quality

X_2 = Physical activity

X_3 = Diet quality

X_4 = Screen time

Equation above presents the model used to predict students' classroom concentration based on lifestyle factors. Assuming all other variables remain constant, each coefficient for continuous variables represent the expected change in the dependent variable for a one-unit increase in the related predictor (Castro & Ferreira, 2023). The intercept value $\beta_0 = -0.028$ represents the predicted classroom concentration score when all four predictors are equal to zero. The predictive model indicates that all independent variables have positive coefficients. The coefficient for sleep quality (X_1) is $\beta_1 = 0.290$. A one-unit increase in sleep quality is associated with a 0.290 unit increase in classroom concentration. This suggests that better sleep quality contributes positively to students' ability to stay concentrated in class. Next, the coefficient for physical activity (X_2) is $\beta_2 = 0.362$. When there is a one-unit increase in physical activity, there is a 0.362 unit increase in classroom concentration. Then, the coefficient for the third variable, diet quality (X_3) is $\beta_3 = 0.204$. A one-unit improvement in diet quality corresponds to a 0.204 unit increase in classroom concentration. It indicates that healthier eating habits are beneficial for sustained attention. In addition, the last predictor screen time (X_4) has coefficient $\beta_4 = 0.137$. A one-unit increase in screen time is associated with a 0.137 unit increase in classroom concentration. Therefore, all four predictors show positive relationships with classroom concentration.

4. CONCLUSION

This study aimed to investigate the relationship between lifestyle factors which are sleep quality, physical activity, diet quality and screen time, and classroom concentration among students especially in UiTM Seremban 3. Additionally, the multiple linear regression analysis used in this research, got to develop a multiple linear regression model to predict students' classroom concentration based on four lifestyle factors mentioned earlier. After analyzing the data from 360 respondents, the research objective was successfully achieved.

Furthermore, the multiple linear regression analysis conducted in this study produced the following predicted model:

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$$\hat{Y} = -0.028 + 0.290X_1 + 0.362X_2 + 0.204X_3 + 0.137X_4$$

where $\hat{Y}$ represents classroom concentration, X_1 denotes sleep quality, X_2 denotes physical activity, X_3 diet quality, and X_4 denotes screen time. The results of the regression analysis indicate that all four lifestyle factors contribute positively to classroom concentration. Among all the predictors, physical activity ($\beta_2 = 0.362$) emerged as the strongest predictor, suggesting that students who engage in regular physical activity are more likely to demonstrate higher levels of concentration in class. Attention spans, active working memory, and classroom concentration are among the core cognitive processing areas that are significantly improved by physical activity (Haapala, 2012). Students that lead active lifestyles are able to keep concentrate during long lecture times because of this biological upregulation. Moreover, sleep quality $\beta_1 = 0.290$ and diet quality $\beta_3 = 0.204$ also showed a meaningful positive effect, reinforcing the importance of adequate rest and healthy eating habits in supporting cognitive performance. Among university cohorts, poor or fragmented sleep schedules severely degrade basic attentiveness, hormone regulation, emotional control, and overall executive function (Nakie et al., 2024). On the other hand, sleep deprivation impairs brain connection, which leads to heightened "cognitive failure" characterized by a reduced capacity to maintain focus, slower response velocities, and elevated performance variability during attention-demanding activities in the classroom (Jaffri et al., 2024). Additionally, diet quality acts as the primary chemical fuel required for optimal brain performance. Nutritional choices directly dictate the body's baseline neurotransmitter synthesis, demonstrating a strong correlation between general eating habits and academic performance and cognitive durability (Burrows et al., 2017). In addition, screen time $\beta_4 = 0.137$ was found to have a small but positive association with concentration. In a modern higher education landscape, screen exposure is often a proxy for academic engagement, occurring via digital textbooks, online video lectures, and interactive e-learning portals. Overall, the regression model demonstrates that improvements in lifestyle factors are associated with better classroom concentration, thereby supporting the study's hypothesis that play a significant role in academic engagement.

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6. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

7. AUTHORS' CONTRIBUTIONS

Elis Adrina Nadlon: Conceptualisation, methodology, formal analysis, investigation and writing-original draft; **Nurkhairany Amyra Mokhtar**: Conceptualisation, supervision, writing- review and editing, and validation.

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