

Enhancing Adolescent Psychological Well-Being Through Habitual Physical Activity: Exploring the Mediating Role Of Self-Esteem

***Mohd Azry Abdul Malik¹, Aina Safiera Razali², Nurfadilah Zaiyad³, Nor Azima Ismail⁴, Jasrul Nizam Ghazali⁵, Mohamad Norzamani Sahroni⁶**

^{1,2,3,4}College of Computing, Informatics, and Mathematics, of Education, Universiti Teknologi MARA, UiTM Kelantan, 18500 Machang, Kelantan, Malaysia

^{5,6}Centre of Foundation Studies, Universiti Teknologi MARA, UiTM Selangor, Dengkil Campuses, 43800 Dengkil, Selangor, Malaysia.

*Corresponding author's email: azry056@uitm.edu.my

Submission date: 27 February, 2024

Accepted date: 12 June, 2024

Published date: 15 September, 2024

ABSTRACT

Physical activity is an essential contributor to adolescents' psychological well-being. This research aims to explore the impact of habitual physical activity on the self-confidence and self-esteem of teenagers. Additionally, the study investigates the mediating role of self-esteem in the connection between habitual physical activity and adolescent self-confidence. The sample comprises 286 teenagers from a prominent higher education campus in Kelantan, and data collection is carried out through self-administered questionnaires. Ordinary least squares estimation is used for data analysis. The findings reveal a significant positive effect of habitual physical activity on confidence and self-esteem. Moreover, self-esteem is identified as a significant mediator in the relationship between habitual physical activity and self-confidence. Interestingly, the study does not observe a significant difference in self-confidence levels between genders. The anticipated outcome of this study is to offer valuable insights for the government, higher education administrators, and policymakers to advocate for the active participation of adolescents in physical activities, fostering positive psychological health among them.

Keywords: *Physical activity, Self-confidence, Self-esteem, Psychological Health*

INTRODUCTION

Key psychological elements for individuals include self-confidence and positive self-esteem. Self-confidence involves recognizing one's strengths and capabilities. Those with strong Self-confidence typically display confidence, assertiveness, a clear orientation towards goals, realism, and a constructive approach to criticism. The influence of self-confidence significantly affects how individuals communicate and interact in relationships. Conversely, lacking self-confidence can lead to social isolation or withdrawal from society (Prihadi & Chua, 2012). Adolescents lacking self-confidence often undervalue their thoughts and opinions, focusing more on weaknesses and limitations while neglecting their strengths and potential.

Simultaneously, self-esteem refers to an individual's personal perception of their own worth (Cherry, 2021). The decision-making process, interpersonal relationships, emotional well-being, mental health, and

overall psychological state are significantly influenced by an individual's level of self-esteem (Cherry, 2021). Evaluating self-esteem levels assists adolescents in achieving psychological balance. Within an academic setting, self-esteem plays a pivotal role in enhancing the motivation necessary for teenagers to confront academic challenges, especially at the higher education level (Ferkany, 2008). Students with positive self-esteem demonstrate heightened motivation in tackling academic obstacles (Prihadi & Chua, 2012).

Physical activity encompasses a variety of energy-intensive movements involving the body, including walking, running, jumping, climbing, yoga, weightlifting, exercise, and recreational activities. Habitual physical activity (HPA) entails consistent and repeated participation to enhance fitness and support health over a specific period. HPA is crucial in preventing hypertension, improving mental well-being, enhancing overall quality of life, and contributing to general well-being (Darren, 2006). Moreover, HPA is essential in preventing and managing non-communicable diseases (NCDs) such as heart disease, stroke, and diabetes (WHO, 2022). Changes in transportation habits, increased reliance on technology at work, and cultural values will influence the prevalence of physical inactivity. Physical inactivity is commonly associated with adverse effects on healthcare, the environment, economic development, community well-being, and overall quality of life.

From a psychological perspective, participation in Habitual Physical Activity (HPA) contributes to maintaining self-confidence and healthy self-esteem by reducing symptoms of hopelessness and anxiety (Berbari, 2018; Seyed et al., 2016). Individuals who integrate HPA into their daily routines often experience more consistent emotions and develop positive thought patterns (Richard, 2018). Notably, a specific study observed a significant increase in positive emotions in participants just five minutes after starting physical activity and breaking a sweat (Berbari, 2018). While this surge in endorphins produces beneficial effects, establishing regular physical activity as a habit among teenagers can yield long-lasting benefits for their psychological well-being.

In higher education, adolescents grappling with low self-confidence and self-esteem often encounter challenges in their academic pursuits. Low self-esteem contributes to students' lack of self-confidence (Cherry, 2021). Research indicates that students who partake in Habitual Physical Activity (HPA) typically demonstrate higher self-confidence levels than their less active peers (Aydin & Ulas, 2020). HPA proves advantageous in bolstering self-perception, with most data analyses supporting the positive influence of physical activity on individuals' confidence and self-esteem (Martin & Basset, 2012). Additionally, adolescents engaged in physical activity undergo improvements in both physical and psychological well-being, paving a positive path as they transition into adulthood.

Engaging in Habitual Physical Activity (HPA) is essential for fostering a positive lifestyle and enhancing psychological well-being among teenagers. However, there remains a need for more consistent and comprehensive empirical studies on HPA among teenagers at the higher education level, particularly in Malaysia. Therefore, this study aims to discern the influence of HPA on the self-confidence and self-esteem of teenagers enrolled in institutions of higher learning (IPT). Furthermore, the study seeks to explore the mediating role of self-esteem in the relationship between HPA and self-confidence. The anticipated outcomes of this research aim to offer valuable insights for state governments, higher education administrators, and policymakers, urging them to promote teenage participation in physical activities to support positive psychological health. Recognizing the factors that impact adolescent psychological well-being is crucial for delivering quality education to teenagers at the higher education level.

LITERATURE REVIEW

The Exercise Self-Esteem Model (EXSEM) adopts a multidimensional framework, with Habitual Physical Activity (HPA) recognized as a critical determinant of individual self-esteem levels (Neha et al., 2021). Within the EXSEM model, HPA significantly correlates with cardiovascular fitness and body fat, positively impacting physical self-efficacy and overall self-esteem. The promotion of HPA is rooted in its psychological advantages, which encompass the alleviation of anxiety and depression, enhancement of self-esteem and psychological well-being, and reduction of tension, frustration, and fatigue (Schaefer & Brennan, 2009). Individuals actively involved in HPA tend to achieve higher subjective overall scores, with HPA playing a mediating role in individual emotional well-being by fostering a more positive body image and self-esteem (Shang et al., 2021). Physical fitness, strength, and a positive mindset are crucial to cultivating self-esteem through HPA. Notably, Durai and Anantharaj (2017) observe a significant disparity

in self-motivation and self-confidence between HPA participants and non-participants. Additionally, adolescents engaged in sports before university admission demonstrate a direct correlation with heightened individual self-esteem (Nandini et al., 2018). This contrast between athletic and non-athletic adolescents underscores that athletic youths experience fewer somatic complaints and exhibit greater self-confidence (Ferron et al., 1999).

Self-confidence refers to the trust and belief in one's abilities, qualities, and judgment, reflecting the conviction in one's capability to navigate and control various situations. It is influenced by individuals' beliefs and proactive endeavours towards accomplishing goals (Kohli, 2011). Habitual Physical Activity (HPA) emerges as a pivotal means to help teenagers foster and augment their self-confidence. Beattie et al. (2011) conducted research wherein they developed the Trait-Robustness Self-Confidence Inventory (TROSCI) to assess the resilience of an individual's self-confidence in the face of challenges, serving as a measure of confidence stability. Their study revealed that individuals with athlete status demonstrated high scores on this inventory, indicating heightened confidence and stability and enhanced resilience in confronting challenging situations.

In the academic environment of higher education institutions (IPT), self-esteem has been recognized as a significant intermediary factor between Habitual Physical Activity (HPA) and academic performance, as demonstrated by the study conducted by Sumaira et al. (2018). Students enrolled in higher education institutions (HEI) who actively participate in physical activities tend to display a higher level of self-confidence than their less active counterparts (Aydin & Ulas, 2020). Additionally, there appears to be a gender gap in self-confidence levels, with male students exhibiting higher confidence than their female counterparts, as observed in Ali et al.'s (2010) research on undergraduate students. Interestingly, Kamas and Preston (2012) found no significant gender disparity among students majoring in Science and Technology (STEM) but noted a noticeable difference among students in business schools, attributed to the highly competitive nature of male business majors. The interrelationships among independent, mediating, and dependent variables are further clarified in Table 1, which synthesizes the relevant literature supporting these connections.

Table 1: Supporting Literature

Relationship	Source
There is a significant relationship between HPA and self-confidence.	Aydin and Ulas (2020); Ali et al. (2010) Ferron et al. (1999); Beattie et al. (2011)
There is a significant relationship between HPA and self-confidence indirectly through self-esteem.	Nandini et al. (2018); Sumaira et al. (2018); Shang et al. (2021)
There is a significant difference in students' self-confidence levels among genders.	Ali et al. (2010); Aydin and Ulas (2020)

METHODOLOGY

Ethics Approval and Consent to Participate

This study has received approval from the UiTM Research Ethics Board, as indicated in the ethics approval letter BERC/02/2022 (UG/MR/08).

Study Design, Sample and Instrumentation

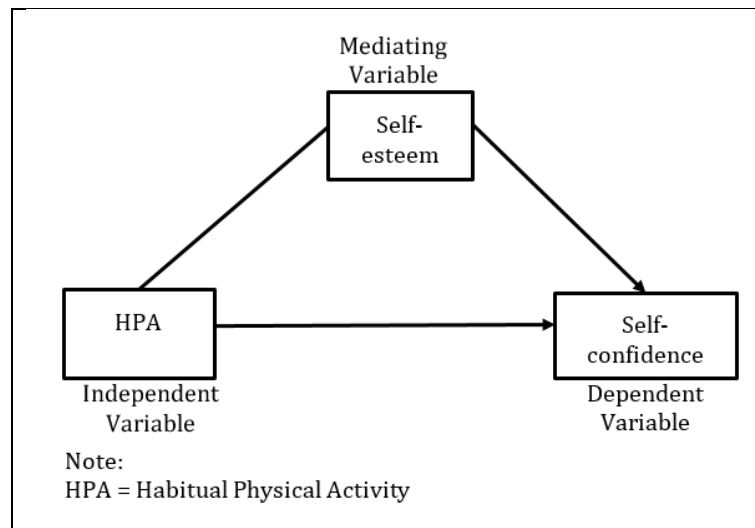
This study employs a cross-sectional design, examining data from a population at a single time point. It encompasses 1114 full-time undergraduate students from one of the largest universities in Kelantan, Malaysia. 286 samples were randomly chosen for the study, maintaining a 95% confidence interval and a 5% margin of error. The questionnaire consists of two parts: Part A focuses on the demographic profile of adolescents, and Part B contains questions related to the dependent and independent variables. Response options range from Strongly Agree (SA) to Strongly Disagree (SD). The Habitual Physical Activity (HPA) variable consists of 14 questions, while the Rosenberg Self-Esteem Scale, a 10-item self-report measure, assesses the self-esteem variable. The Trait-Robustness of Self-Confidence Inventory (TROSCI) is utilized to measure self-confidence. Table 2 summarizes the number of items and instrumentation sources used in the study.

Table 2: Instrumentation

Variables	Number of Items	Source
Habitual Physical Activity (HPA)	14	Alex and Maria (2003)
Self-esteem	10	Renan et al. (2021)
Self-confidence	8	Beattie et al. (2011)

Study Framework

The study framework is depicted in Figure 1, where Habitual Physical Activity (HPA) is the independent variable, self-confidence is the dependent variable, and self-esteem is the mediating variable.

**Figure 1: Theoretical Framework**

Method of Analysis

Descriptive statistics were utilized to characterize the demographic profiles of the respondents, presenting frequencies and percentages. Multiple Linear Regression (MLR) was employed to investigate the direct impact of Habitual Physical Activity (HPA) on adolescent self-confidence within institutions of higher learning (IPT). The Hayes macro process was applied to evaluate the mediating influence of self-esteem on the relationship between HPA and self-confidence. Additionally, the Independent T-test was conducted to explore differences in self-confidence levels among teenagers based on gender.

RESULT

Demographic profile

Table 3 depicts that most respondents are female, and among the 286 responses, teenagers' ages range from 20 to 26 years. The largest proportion of students, accounting for 40.20%, falls within the age group of 22, followed by those aged 23, constituting 37.10%. Regarding the distribution of students across programs, the BA242 program has the highest representation at 26.20%, followed by CS241 with 21.10%. Additionally, 19.90% belong to BA249, 17.50% to BA250, 14.30% to BA240, and 1% to CS291. Furthermore, the data indicates that 96.50% of students engage in regular physical activity, while 3.5% do not. Among the participants, 245 out of 286 students allocate 1 to 4 hours daily for habitual physical activity.

Table 3: Demographic information of respondents

Characteristics	Group	Frequency	Percentage(%)
Gender	Male	82	28.70
	Female	204	71.30
Age (Years)	20	3	1.00
	21	29	10.10
	22	115	40.20
	23	106	37.10
	24	24	8.40
	25	7	2.40
	26	1	0.30
Course	BA240	41	14.30
	BA242	75	26.20
	BA249	57	19.90
	BA250	50	17.50
	CS241	60	21.10
	CS291	3	1.0
Have you done the habitual physical activity?	Yes	276	96.50
	No	10	3.50
How many hours (in a day) do you usually do the habitual physical activity?	1-4	245	85.70
	5-8	29	10.1
	9-12	9	3.10
	13-16	1	0.30
	17-20	1	0.30
	21-24	1	0.30

Multiple Linear Regression

This study uses multiple linear regression (MLR) to clarify the relationship between the independent and dependent variables. It is crucial to meet the assumptions concerning errors to ensure the validity of the regression analysis.

Normality of Residuals

Using a probability plot is a reliable approach for evaluating the normality of collected data. Upon reviewing the plots depicted in Figures 2 and 3, it is apparent that most points closely adhere to straight lines, with none displaying significant deviation from the diagonal line on the graph. This observation affirms that the assumption of normally distributed errors is met.

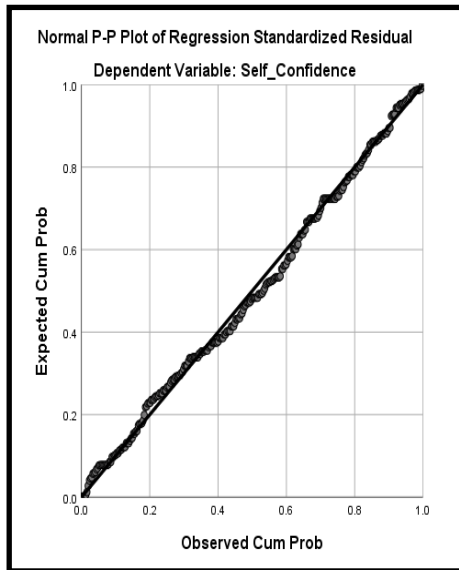


Figure 2: Residuals normal probability plot for self-confidence

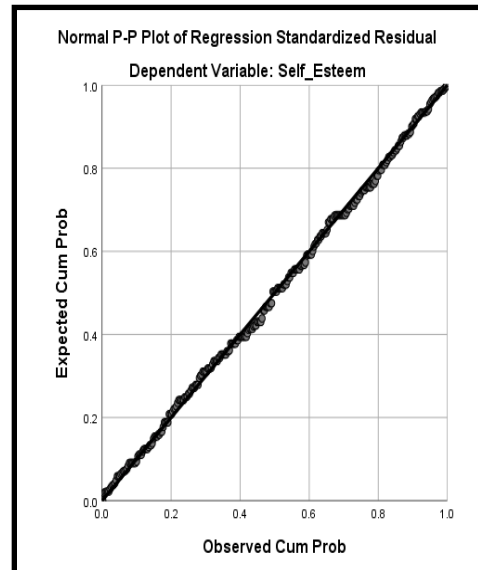


Figure 3: Residuals normal probability plot for self-esteem

Homoscedasticity

Homoscedasticity occurs when the variance of errors remains consistent and the average error is close to zero. Figures 4 and 5 demonstrate a random pattern in the plot, illustrating the relationship between standard prediction and regression error values. Meeting the homoscedasticity assumption suggests that the regression model is appropriate for investigating both the direct and indirect impacts of Habitual Physical Activity (HPA) on adolescent self-confidence.

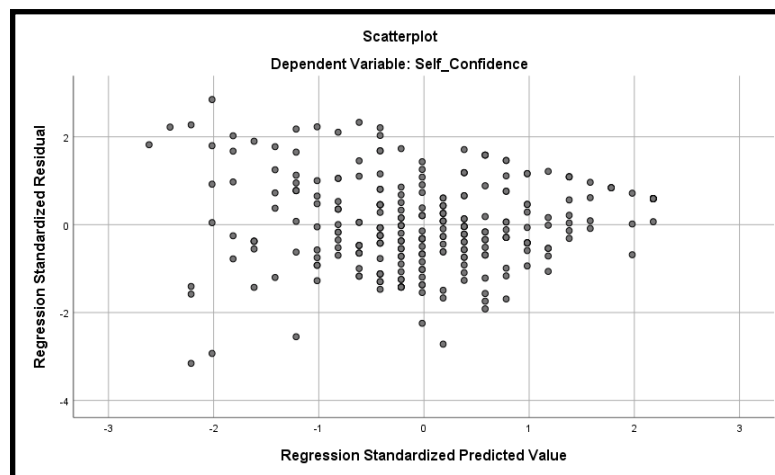


Figure 4: Plot for Self-Confidence

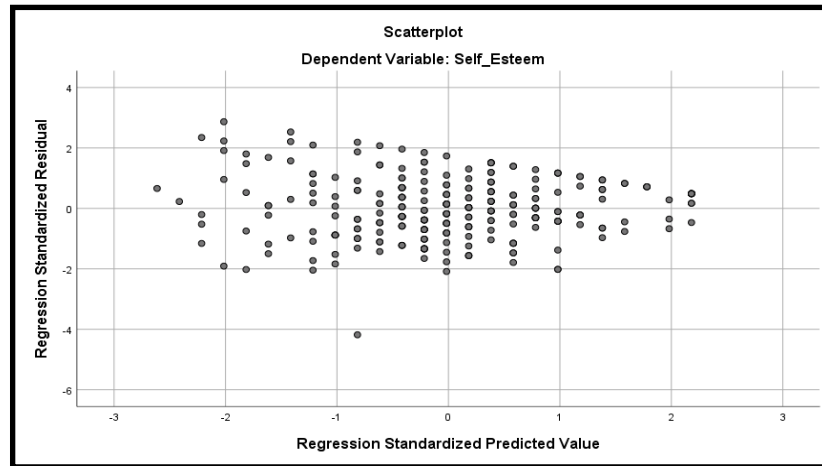


Figure 5: Plot for Self-Confidence

Multicollinearity

Multicollinearity concerns are absent in this model, as indicated by Variance Inflation Factor (VIF) values below 10 and Tolerance (TOL) values exceeding 0.10 for the independent variables.

Multiple Coefficient of Determination

The determination coefficient (R^2) indicates the percentage of the variance in the dependent variable explained by the variance in the independent variable. As shown in Table 4, the independent variable HPA accounts for 27.9% of the variability in adolescent self-confidence and 24.4% of the variability in student self-esteem.

Table 4: Summary of regression model fit

Dependent Variable	Model	R Square
Self-confidence	1	0.279
Self-esteem	2	0.244

Direct effects of HPA on Self-Confidence

Table 5 reveals an ANOVA F-value of 109.994, with a p-value below the significance level of 0.05. This indicates the significance of the regression model, particularly concerning the direct influence of Habitual Physical Activity (HPA) on adolescent self-confidence variables. HPA, as an independent variable, exhibits a positive and significant direct effect on enhancing students' self-confidence ($\beta=0.425$, $p\text{-value} < 0.05$).

Table 5: ANOVA and regression coefficients for self-confidence as a dependent variable

	Unstandardized, B	Coefficients Std. Error	t	Sig.	ANOVA (p-value)
(Constant)	2.536	0.133	19.020	0.000	109.994
HPA	0.425	0.041	10.488	0.000	(0.000)

Indirect Effects of HPA on Self-Confidence Through the Mediation of Self-Esteem

The indirect effect analysis employed the mediation model from Process v4.1 by Andrew F. Hayes. Figure 6 depicts that Habitual Physical Activity (HPA) significantly influences both self-esteem and self-confidence. Moreover, self-esteem significantly impacts students' self-confidence. The Bootstrap intervals in Table 6 display values above zero, indicating a noteworthy mediating effect of self-esteem on the relationship between the independent variable (HPA) and the dependent variable (self-confidence). The computed indirect effect of HPA on self-confidence, mediated by self-esteem, is 0.2341. Meanwhile, the HPA variable's and self-esteem's total effect on the self-confidence variable is 0.3969, as illustrated in Table 7. The direct impact of HPA on the formation of adolescent self-confidence represents 41.02% of

the total effect, while the indirect influence through the mediating variable of self-esteem accounts for 58.98% of the total effect.

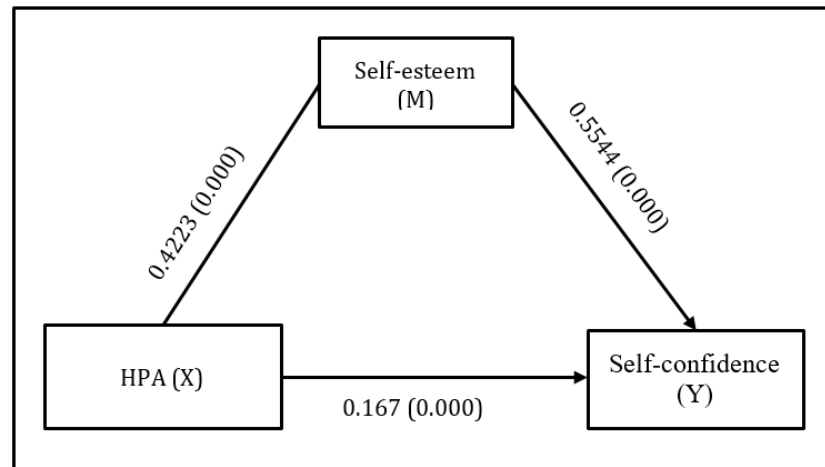


Figure 6: Direct and indirect effect

Table 6: Indirect effects of HPA on Confidence through self-esteem

	Indirect Effect	BootSE	BootLLCI	BootULCI
Self-esteem	0.2341	0.0351	0.1685	0.3070

Table 7. Total effects on self-confidence

Total effect	se	t	p	LLCI	ULCI	c_cs
0.3969	0.0412	9.6299	0.000	0.3157	0.4780	0.4961

Independent t-test

An independent t-test was utilized to examine differences in student self-confidence between adolescent boys and girls, commonly employed to compare means between two groups. As shown in Table 8, the p-value (0.504) exceeds the significance level α of 0.05, indicating consistent variance of the error term for both males and females. The independent t-test results indicate a non-significant disparity in the level of adolescent self-confidence between male and female students, with a p-value of 0.432. The average self-confidence level for teenage girls is 3.8686, whereas for boys, it is 3.9378.

Table 8. Independent T-test

	Levene's Test		Group	T-test for Equality of Means		
	F	Sig.		Mean	t-statistics	Sig.
Self-confidence	0.448	0.504	Male	3.9378	0.787	0.432
			Female	3.8686		

Summary of Analysis Results

In summary, the collected data was analyzed to extract demographic profile information and evaluate the respondents' levels of self-confidence or self-esteem. The study effectively met its objectives through three inferential analyses: Multiple Linear Regression (MLR), Mediation Model Analysis, and Independent T-Test. Table 9 offers a brief summary of the study's findings.

Table 9. Summary of Analysis Results

Objectives	Hypothesis	Outcome
Identifying the relationship between habitual physical activity (HPA) and adolescent self-confidence.	There is a significant positive relationship between HPA and adolescent self-confidence.	Significant
Identifying the mediating effect of self-esteem on the relationship between HPA and adolescent self-confidence.	There is a significant mediating effect between HPA and self-confidence through adolescent self-esteem.	Significant
Identifying the significant differences in the level of self-confidence of teenagers among different genders.	There is a significant difference in the level of self-confidence between male and female teenagers.	Not Significant

CONCLUSION

According to the results of Multiple Linear Regression (MLR), a significant and positive correlation exists between Habitual Physical Activity (HPA) and adolescent self-confidence. This observation is consistent with the findings of Aydin and Ulas (2020), Ali et al. (2010), Ferron et al. (1999), and Beattie et al. (2011), highlighting the substantial influence of physical activity norms on individual self-confidence. The Mediation Model Analysis further indicates the presence of a mediating effect of self-esteem on the relationship between HPA and self-confidence, aligning with the results of studies by Nandini et al. (2018), Sumaira et al. (2018), and Shang et al. (2021). However, the outcomes of the Independent T-Test in this study differ from those reported by Ali et al. (2010) and Aydin and Ulas (2020), revealing no significant difference in the level of adolescent self-confidence between different genders.

Based on these findings, the study recommends enhancing teenagers' self-confidence and self-esteem. Teens can improve their self-confidence and self-esteem by acknowledging positive aspects about themselves. Additionally, maintaining good physical health is crucial for enhancing self-confidence and self-esteem. Cultivating high self-confidence becomes more achievable when the body and mind are in good shape. Engaging in regular physical activity is identified as a beneficial practice for fostering positive adolescent psychology.

SUGGESTIONS

To replicate this study, it is advised to contemplate utilizing a longitudinal research design as an alternative method to comprehensively explore factors impacting adolescents' psychological health. Employing a longitudinal research design would allow researchers to collect more relevant and insightful data. Additionally, it is recommended to incorporate a broader range of independent variables for future inquiries. This suggestion arises from recognizing that students' self-confidence and self-esteem are influenced not solely by regular physical activity but also by many other factors.

CO-AUTHOR CONTRIBUTION

The authors declare no competing interests. Author 1 conceptualized, analyzed, interpreted, and wrote the manuscript. Author 2 conducted fieldwork and data collection. Author 3 contributed to data collection. Author 4 contributed to writing and reviewing the methodology. Author 5 contributed to writing and reviewing the literature. Author 6 handled data entry and reviewed the literature.

CONFLICT OF INTEREST

The authors report no conflicts of interest. This research was carried out and written with complete impartiality, free from any financial or personal influences that might affect the results or conclusions.

ACKNOWLEDGEMENT

The authors would like to thank Universiti Teknologi MARA (UiTM) Kelantan for their invaluable research and support throughout the manuscript's publication process.

REFERENCES

- Alex, A., F. and Maria, R., D. (2003). Validation and reliability of the Baecke questionnaire for the evaluation of habitual physical activity in adult men. *Revista Brasileira de Medicina Do Esporte*, 9(3), 129–135. <https://doi.org/10.1590/s1517-86922003000300002>
- Ali, H., A., Ramazan, A., & Abdullah, A. (2010). Analyzing undergraduate students' self-confidence levels in terms of some variables. *Procedia-Social and Behavioral Sciences*, 5, 1205-1209. <https://doi.org/10.1016/j.sbspro.2010.07.262>
- Aydın İlhan, & Ulaş Bardakçı, Sadık. (2020). Analysis on the self-confidence of university students according to physical activity participation. <https://doi.org/10.30918/AERJ.8S1.20.017>.
- Beattie, S., Hardy, L., Savage, J., Woodman, T., and Callow, N. (2011). Development and validation of a trait measure of robustness of self-confidence. *Psychol. Sport Exerc.* 12, 184-191. <https://doi.org/10.1016/j.psychsport.2010.09.008>
- Berbari, G. (2018, March 22). How Working Out Makes You a More Confident Person, According to Science. *Elite Daily*. <https://www.elitedaily.com/p/how-working-out-makes-you-more-confident-from-the-inside-out-according-to-science-8565734>
- Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., ... & Willumsen, J. F. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British journal of sports medicine*, 54(24), 1451-1462. <https://doi.org/10.1136/bjsports-2020-102955>
- Cherry, K. (2021). 11 Signs of Low Self-Esteem. *Very Well Mind*. <https://www.verywellmind.com/signs-of-low-self-esteem-5185978>
- Durai, C., and Anantharaj G. (2017). Comparison of self-motivation and self-confidence between sportsman and non-sportsman. *International Journal of Advance Research and Innovative Ideas in Education* 3(5), 1894-1897
- Ferkany, M. (2008). The educational importance of self-esteem. *Journal of Philosophy of Education*, 42(1), 119-132. <https://doi.org/10.1111/j.1467-9752.2008.00610.x>
- Ferron, C., Naring, F., Caudey, M., and Michaud, P., A. (1999). Sport activity in adolescence: associations with health perceptions and experimental behaviours. *Health Education Research*, 14(2), 225–233. <https://doi.org/10.1093/her/14.2.225>
- Ginis, K. M., Bassett-Gunter, R. L., & Conlin, C. (2012). Body image and exercise. *Oxford handbook of exercise psychology*, 55-75. <https://doi.org/10.1093/oxfordhb/9780195394313.013.0004>
- Ilhan, A., & Bardakci, U. S. (2020). Analysis of the Self-Confidence of University Students According to Physical Activity Participation. *African Educational Research Journal*, 8(1), 111-114.
- Kamas. L. & Preston. A. (2012). The Importance of Being Confidence; Gender, career choice and willingness to compete. *Journal of Economic Behavior and Organization*, 83(1), 82-97. <https://doi.org/10.1016/j.jebo.2011.06.013>
- Kohli, M. (2011, November 20). How Exercise Boosts Confidence. *India Times*.
- Lawrence, D. (1973). Improving Reading through Counselling. London: Ward Lock. [https://doi.org/10.1002/1520-6807\(197610\)13:4<493::aid-pits2310130431>3.0.co;2-4](https://doi.org/10.1002/1520-6807(197610)13:4<493::aid-pits2310130431>3.0.co;2-4)
- Nandini, M., C., Fred, C., Stephen, B., & John, B. (2018). Effects of Early Sport Participation on Self-esteem and Happiness. *The Sport Journal*.
- Neha, P., G., Erlenbach, E. and Engels, H., J. (2021, January 19). Exercise and self-esteem model: Validity in a sample of healthy female adolescents. *Current Psychology*, 1-9. <https://doi.org/10.1007/s12144-021-01390-7>
- Prihadi K, Chua M. (2012). Students' Self-Esteem at School: The Risk, the Challenge, and the Cure. *Journal of Education and Learning*, 6 (1), 1-14. <https://doi.org/10.11591/edulearn.v6i1.185>

- Renan, P., M., Gabriel, L., H., C., Paul, H., P., H., Emerson, D., M. and Philip, D., G., S. (2021). The efficient assessment of self-esteem: proposing the brief Rosenberg self-esteem scale. *Applied Research in Quality of Life*, 17(2), 931-947. <https://doi.org/10.1007/s11482-021-09936-4>
- Richard D. O, K. L.-B. (2018). Physical Activity. U.S. Department of Health and Human Services, 23-24.
- Schaefer, P., & Brennan, J. (2009). Psychological benefits of exercise. *The Ohio Family Physician*, 30-32. [https://doi.org/10.1016/s0300-7073\(09\)70735-2](https://doi.org/10.1016/s0300-7073(09)70735-2)
- Seyed Hojjat Zamani Sani, Z. F.-T. (2016). Physical activity and self-esteem: testing direct and indirect relationships associated with psychological and physical mechanisms. *Neuropsychiatric disease and treatment*, 2617-2625. <https://doi.org/10.2147/ndt.s116811>
- Shang, Y., Xie, H. D., & Yang, S. Y. (2021). The relationship between physical exercise and subjective well-being in college students: The mediating effect of body image and self-esteem. *Frontiers in Psychology*, 12, 658935. <https://doi.org/10.3389/fpsyg.2021.658935>
- Sumaira, K., Tayyaba, K., Jin, W., Sanchez, M., L., Z., Saima, K. and Haroona, Q. (2018). Physical Activity and Academic Performance: The Mediating Effect of Self-Esteem and Depression. *Sustainability*, 10(10), 3633. <https://doi.org/10.3390/su10103633>