



Consequences of Screen-Based lifestyle Among University Students: An Empirical Study Based on Moderated Mediation Model in Pakistan

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Abstract: Due to tremendous advancement in digital technology and devices the usage of screen devices is growing rapidly among students. As a result, screen-based life style has drastic effects on the mental health patterns of students and is also causing serious psychological and mental health problems among them. In the light of Social learning theory this study develops a moderated mediation model to see how university students perceive their mental health patterns in relation to their screen-based lifestyle. In this regard, 127 students of different universities of Islamabad were selected using convenience sampling. The results revealed that screen-based lifestyle is negatively related to mental health patterns and physical activity status mediated the negative relationship. Moreover, the self-efficacy potentially moderated the negative relationship between screen-based lifestyle, physical activity status and mental health patterns. Thus, by providing empirical evidence this study contributes in testing social learning theory from the perspectives of students in a developing country Pakistan.

Keywords: Screen Based lifestyle, Self-Efficacy, Physical Activity Status, Mental Health Patterns

1. Introduction

Nowadays, mental health issues like depression, anxiety are of great concern especially in the youth (Holliday et al., 2020; Karim, Manzoor, Rahman, & Yousaf, 2023). In current technology based world, several scholars are focusing and highlighting the impact of screen devices on people's physical and mental health (Santos et al., 2023; Smith et al., 2020; Tang, Werner-Seidler, Torok, Mackinnon, & Christensen, 2021; Zhang et al., 2022). Mental health problems depend on the tendency, frequency and types of screen devices, such as the kind of screen activities, how long they last, the content, and each person's unique qualities. Mental health concerns, especially among young people, have been recognized globally as an important public health issue. Various factors, including academic pressures, social media use, economic uncertainties, and other stressors, can contribute to mental health patterns (Abbas, Wang, Su, & Ziapour, 2021; Draženović, Vukušić Rukavina, & Machala Poplašen, 2023; Godinić & Obrenovic, 2020; Shah, Mohammad, Qureshi, Abbas, & Aleem, 2021). The WHO and other health organizations have been actively working to address and raise awareness about mental health issues on a global scale. Sedentary behaviour, defined as sitting for long periods of time or engaging in low-energy activities, is also increasing among young people. Technological progress, especially in the field of electronic devices, could be the main reason for

this tendency (Gao & Lee, 2019; Saunders et al., 2020; Zhu & Owen, 2017). Obesity, cardiovascular disease, and mental health disorders are associated with sedentary behavior (Dempsey et al., 2020; Park, Moon, Kim, Kong, & Oh, 2020). To improve overall health, it is important to encourage teenagers to engage in moderate physical activities and less screens. Healthcare and education environments often provide guidelines for limiting screen time, encouraging physical activities, and maintaining a lifestyle towards better health (Bull et al., 2020; Chaput et al., 2020; Messing et al., 2019). Similarly, individuals having less focus on their physical activities might be affected with mental health problems in future. In result, consistency in physical activities always leads towards numerous benefits related to physical as well as mental health of individuals. And in comparison, screen-based lifestyles always put individuals into mental health problems (Dempsey et al., 2020). It has also proved that regularity in physical activities has a significant impact on human mood and depression (Bailey, Hetrick, Rosenbaum, Purcell, & Parker, 2018; Knapen, Vancampfort, Moriën, & Marchal, 2015; Philippot et al., 2022). Endorphins release from the human body due to physical activities (Kumar & Singh, 2023), which come from the brain and act as natural painkillers and mood elevators in the human body. Indeed, a large number of scholars in the world supports this school of thought that physical activities can significantly influence the mental health of individuals and can reduce mental health problems (Cocca, Espino Verdugo, Ródenas Cuenca, & Cocca, 2020). Like physical activity, self-efficacy is also considered as a key element for mental health (Cao et al., 2011; Holliday et al., 2020; Zhou, Yue, Zhang, Shanguan, & Zhang, 2021). Self-efficacy refers to the belief of successfully accomplishing goals and tasks by individuals (Schunk, 1995). So, self-efficacy has great influence on mental health of individuals and also a key part of Albert Bandura's social cognition theory (Bandura, 2001). Higher levels of self-efficacy always moves towards positive mental health patterns (Bakan & Inci, 2021; Galindo-Domínguez & Bezanilla, 2021; Schönfeld, Preusser, & Margraf, 2017). Stress's detrimental might be lessened in difficult situations with self-confidence. Conversely, higher levels of self-efficacy is significantly linked to mental health patterns, particularly when paired with physical activity (Grøtan, Sund, & Bjerkeset, 2019; Paxton, Motl, Aylward, & Nigg, 2010).

Based on the above discussion, the current study focuses on significant contributions for society and scholars towards positive mental health patterns of individuals. Firstly, previous studies have indicated that screen based activities have significant impact on mental health patterns (Frei et al., 2023; Vizcaino, Buman, DesRoches, & Wharton, 2020; Weatherson et al., 2020; Zink, Belcher, Imm, & Leventhal, 2020) also previous studies have highlighted physical activity as potential mediator between screen-based lifestyle and mental health patterns. Secondly, no other studies have examined the moderating role of self-efficacy in the relation described above according to the author's knowledge. Thirdly, earlier research studies (Harrington et al., 2021; Holliday et al., 2020; Vizcaino et al., 2020), were mostly focused on the healthcare industry and were carried out in the developed world. However, study on university students in developing nations like Pakistan is currently being carried out to find out how students' screen-based lifestyle impacts their mental health and how physical activities and self-efficacy could help to improve their mental health issues.

1.1 Research Question

What is the impact of screen-based lifestyle on physical activity status?
What is the impact of screen-based lifestyle on mental health patterns?
What is the impact of physical activity status on mental health patterns?
Does physical activity status mediate the relationship between screen-based lifestyle and mental health patterns?
Does self-efficacy moderate the relationship between screen-based lifestyle and physical activity status?
Does self-efficacy moderate the relationship between screen-based lifestyle and mental health patterns?

1.2 Research Objectives

To determine the impact of screen-based lifestyle on physical activity status.
To determine the impact of screen-based lifestyle on mental health patterns.
To determine the impact of physical activity status on mental health patterns.

To determine the mediation effect of physical activity status between screen-based lifestyle and mental health patterns.

To determine the moderation effect of self-efficacy between screen-based lifestyle and physical activity status.

To determine the moderation effect of self-efficacy between screen-based lifestyle and mental health patterns.

2. Theoretical Lens and Hypothesis Development

The current study develops the framework based on social learning theory (Bandura & McClelland, 1977). This theory explains the connection between the behavioural patterns of humans and the physical environment, for example, people tend to develop behaviour according to the nearby environment instead of instinctual moods (Akers & Jennings, 2016; Bandura & McClelland, 1977). In terms of moods, a reduction in the self-efficacy levels leads to mental health patterns like depression, anxiety but higher level of self-efficacy along with the physical activity level leads to improved mental health patterns (Parto, 2011; Tahmassian & Jalali Moghadam, 2011; Thompson & Gomez, 2014a; Zhou et al., 2021). Previous studies have examined the relationship between screen-based lifestyle and mental health patterns and found mixed results (Oswald, Rumbold, Kedzior, & Moore, 2020; Tahmassian & Jalali Moghadam, 2011), for example the study of Oswald et al. (2020) gave evidence that screen based lifestyle is negatively related to physical activity and which further leads to mental health issues, however some authors like Taveras et al. (2007) founds no relationship between these two constructs. Nevertheless, some authors (Asare & Danquah, 2015; Cao et al., 2011; Lin, Yeh, Chen, & Huang, 2010) indicate that physical activity status can be used as mediator between the relationship of screen based lifestyle and mental health patterns. They believe that individual's engagement in physical activities lead towards healthy lifestyle as well as better mental health patterns. Still there is an ambiguity in the results that whether the screen-based lifestyle has relationship with mental health, but lack of physical activity and how this relationship works. And some authors have employ self-efficacy as moderator and mediator in different context with different constructs (Chamanabad, Mirdoraghi, & Pakmehr, 2011; Thompson & Gomez, 2014b; Zhou et al., 2021). For instance, previous studies have found that self-efficacy mediates the relationship between screen based lifestyle and job stress (McKinley & Ruppel, 2014; Zhou et al., 2021). According to Thompson and Gomez (2014b), screen based lifestyle and mental health pattern is negatively correlated in the context of psychological distress. Additionally, some studies (Asare & Danquah, 2015; Campbell, Kelly-Weber, & Lavalley, 2020) in Ghana, have found that screen-based lifestyle is negatively correlated to physical activity.

The primary objective of this current study is to identify the key role of self-efficacy in the relationship of screen-based lifestyle, physical activity status and mental health patterns. Whether self-efficacy moderates the negative relationship between screen-based lifestyle and physical activity status is yet not examined. Moreover, the research employs physical activity status as a mediator in the correlation between screen-based lifestyle and mental health patterns, which aligns with previous empirical studies. Therefore, based on social learning theory (Akers & Jennings, 2016; Bandura & McClelland, 1977) and previous empirical works (Asare & Danquah, 2015; Lin et al., 2010; McKinley & Ruppel, 2014; Parto, 2011; Tahmassian & Jalali Moghadam, 2011) the current study develops the following hypothesis.

Hypothesis 1: The effect of screen-based life style on physical activity status is negative

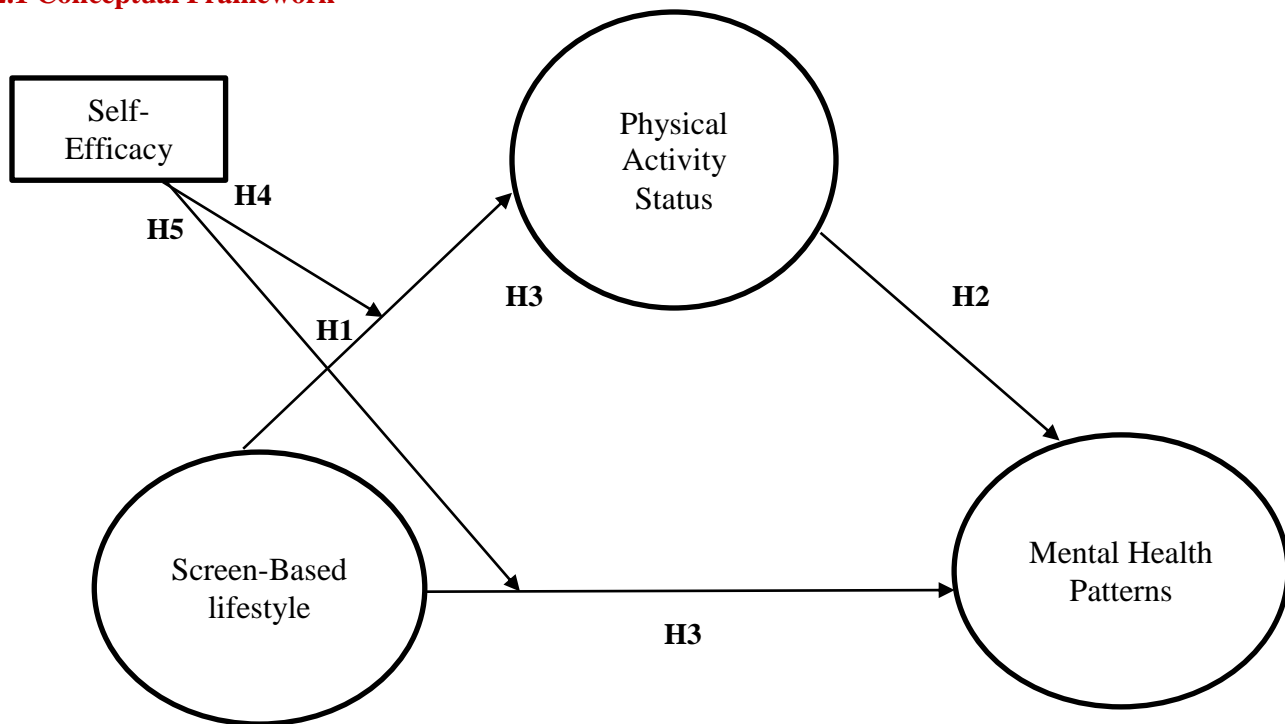
Hypothesis 2: The effect of physical activity status on mental health patterns is negative

Hypothesis 3: The physical activity status mediates the relationship between screen-based life style and mental health patterns

Hypothesis 4: Self efficacy moderates the relationship between screen-based life style such that the association is weaker at higher level of self-efficacy

Hypothesis 5: Self efficacy moderates the mediated relationship between screen-based life style and mental health patterns such that association is weaker at higher level of self-efficacy.

2.1 Conceptual Framework



3. Research Methodology

In this study, students from different universities of Islamabad were taken as a unit of analysis. Convenience sampling technique was applied to obtain the responses. The convenience sampling technique allows researchers to collect data in less time and also comparatively flexible sampling technique as compared to other sampling techniques (Etikan, Musa, & Alkassim, 2016). The questionnaire was based on two sections. Section one was related to the general information of the respondents. And section two was related to the variables used in the study (screen-based lifestyle, self-efficacy, physical activity status, mental health patterns). The instruments were distributed to the students of different universities in Islamabad to show their perceptions regarding the variables on the Likert scale from 1-5. On this Likert scale the 5 meant “strongly agree” and 1 meant “strongly disagree”. Moreover regarding the operationalization of the constructs screen based life style was measured using the scale of (Hardy, Booth, & Okely, 2007), self-efficacy construct was measured with scale of (Schwarzer, 1993), physical activity status construct was measured with scale of (Godin & Shephard, 1985) and for mental health patterns the scale of (Berwick et al., 1991) was used. The justification of measuring the variables based on the scale given by these scholars is that they are all the pioneer scholars in the field of mental health patterns issues and represent real world scenarios in relation to mental health patterns of the students.

3.1. Data Examination

The data was examined using the SPSS process Macro version 23 proposed by (Hayes, 2013b; Preacher & Hayes, 2008) along with hierarchical regression and bootstraps procedures of moderated mediation model.

4. Results

4.1 Descriptive Profiles

The data was collected from the students of different universities of Islamabad Pakistan including Quaid E Azam University, International Islamic University, COMSATS and National University of Modern Languages. A total of 200 questionnaires were distributed among students, out of those 127 students completely filled the questionnaire. The male students were 73, while the female students were 54. And the age group of the students were 20 to 28 years old.

Table 1: Descriptive Profiles

Gender	Percentage	Frequency
Male Students	58	73
Female Students	42	54
Age	-	-
20 to 22	40	52
22 to 24	36	45
24 to 28	24	30
Total	100	127

4.2 Internal Consistency and Multicollinearity Check

The internal consistency reflects the reliability of the variables used in the study through the alpha value. A Cronbach Alpha value of more than 70 percent shows that the data is reliable enough to test the hypothesis (Hair Jr, Hult, Ringle, & Sarstedt, 2016; Hayes, 2013a). Moreover, the multicollinearity can also lead to normality issues and can impact the beta values of the variables, therefore the variance inflation factor was calculated as a check to see the multicollinearity. The inflation factor values of less than 10 reveal that all the predictor variables reflect no multicollinearity (Hair, Black, Babin, Anderson, & Tatham, 2006; Hair, Celsi, Ortinau, & Bush, 2010). According to Table 2, Cronbach Alpha value of all four constructs is greater than 70 percent which is in acceptable range. And the VIF value of all four constructs is also less than 10 which is also in acceptable range.

Table 2: Cronbach Alpha and Variance Inflation Factor

Variables	Cronbach Alpha	Variance Inflation Factor
Screen Based Life Style	0.76	1.3
Self-Efficacy	0.81	1.1
Physical Activity Status	0.78	1.2
Mental Health Patterns	0.82	-

4.3 Correlation among Constructs, Mean values and Standard Deviation

The table 3 below shows the correlation values among the variables under study. The variable screen-based life style was negatively correlated with physical activity status ($r = -0.39$, $p < 0.01$) and mental health patterns ($r = -0.52$, $p < 0.01$) thus providing an initial support to the proposed hypothesis

Table 3: Correlation

Constructs	Mean	SD	1	2	3	4	5	6
Gender	1.13	0.37	1					
Age	1.73	0.82	0.0045	1				
SBLS	3.95	0.87	-.307**	-.265*	1			
PAS	3.58	0.81	-.099	-.149	-.39**	1		
MHP	3.71	0.79	.065	-.088	-.34**	-.52**	1	
SE	3.91	0.95	-0.106	-0.117	.61**	.67**	.57**	1

* $P < 0.05$; ** $P < 0.01$

Note: SBLS: Screen Based lifestyle, PA: Physical Activity Status, MHP: Mental Health Patterns, SE: Self-Efficacy

4.4 Hypothesis Testing

Hypothesis confirmation was conducted using model 8 of the SPSS Hayes Process for moderated mediation (Hayes, 2013a) linking screen-based lifestyle with mental health patterns. The advantage of the latest SPSS process Macro is that it determines the direct and indirect effects of the constructs using ordinary least square technique (Hayes, 2013b; Preacher & Hayes, 2008). According to the results, there is a negative relationship between screen-based lifestyle and physical activity status. Therefore, H1 is accepted. And according to the results, there is a negative relationship between physical activity status and mental health patterns. Therefore, H2 is accepted. In addition to this, the mediating effect was performed using the bootstrap method because it's a non-parametric method which does not consider the assumption of data normality thus providing very reliable results. The table below shows the indirect effect of physical activity status on the relationship between screen-based lifestyle and mental health patterns. The total effect of screen-based lifestyle on mental health patterns was negative having beta coefficient of -1.599 and p value less than 0.05, but with the insertion of the mediating variable, the beta value of the total effect was reduced to -0.6895 with no change in the p value and this decrease in the beta value shows that physical activity mediates the negative relationship between screen-based lifestyle and mental health patterns. Therefore, H3 was accepted.

Similarly, to test the moderating effect of self-efficacy, the interacting effect (Screen based life style X Self-efficacy) created after mean centering both the constructs. The interacting effect was found to predict physical activity significantly with beta value of 0.205 and p value < 0.05 with 2.5 percent variance in the and the R square change value 0.024 thus H4 was accepted. The indirect effect of physical activity status in the relationship between screen-based lifestyle was depending upon the degree of self-efficacy of the respondents. In the same stream, the moderated mediation model was statistically significant therefore H5 was also supported.

Table 4: Mediation Effect Physical Activity Status

Effects	Point Estimation	SE	P value	BC 95 % Confidence Interval	
				Lower	Upper
Total effect of SBLS on MHP	-1.1599	0.1449	0.0000	0.910	1.430
Direct effect of SBLS on MHP	-0.6855	0.1157	0.0000	0.4578	0.9076
Effect of SBLS on PAS	-0.4044	0.0976	0.0000	0.2934	0.6873
Effect of PAS on MHP	-0.4190	0.487	0.0000	0.0956	0.2805
Indirect Effects	-	-	-	-	-
SBLS → PAS → MHP	-0.4044x0.4190=0.169	0.0407	0.0000	0.1504	0.3623
Total Indirect Effect	0.4773	0.1113	0.0000	0.2772	0.7160

Note: SBLS: Screen Based lifestyle, PAS: Physical Activity Status, MHP: Mental Health Patterns, SE: Self-Efficacy, BC: bias corrected, SE: standard error, P: probability value, Number of bootstraps samples for percentile bootstrap confidence intervals: 5000, *P<0.05; **P<0.01

Table 5: Moderating Effect of Self Efficacy

Variables	Beta value	R ²	Change in R ²	F-value	Adjusted R ²
Screen-Based lifestyle	0.320, P<0.01	0.219	0.219	23.66, P< 0.01	0.209
Self-Efficacy	0.269, P<0.01	-	-	-	-
Moderated effect (SBLS)X(SE)	0.205, P<0.01	0.243	0.0024	5.33, P<0.01	0.229

Table6: Moderated Mediation Index

Mediator	Self-Efficacy	Effect	Standard Error	Bootstrapping Bias Corrected 95% confidence interval	
				Lower	Upper
Physical Activity Status	-0.746	0.195	0.112	-0.0347	0.4427
Physical Activity Status	-0.0004	0.411	0.113	0.2017	0.6094
Physical Activity Status	0.746	0.627	0.117	0.2986	1.0116
Moderated Mediation Model 8 Physical Activity Status		0.285	0.143	0.025	0.594

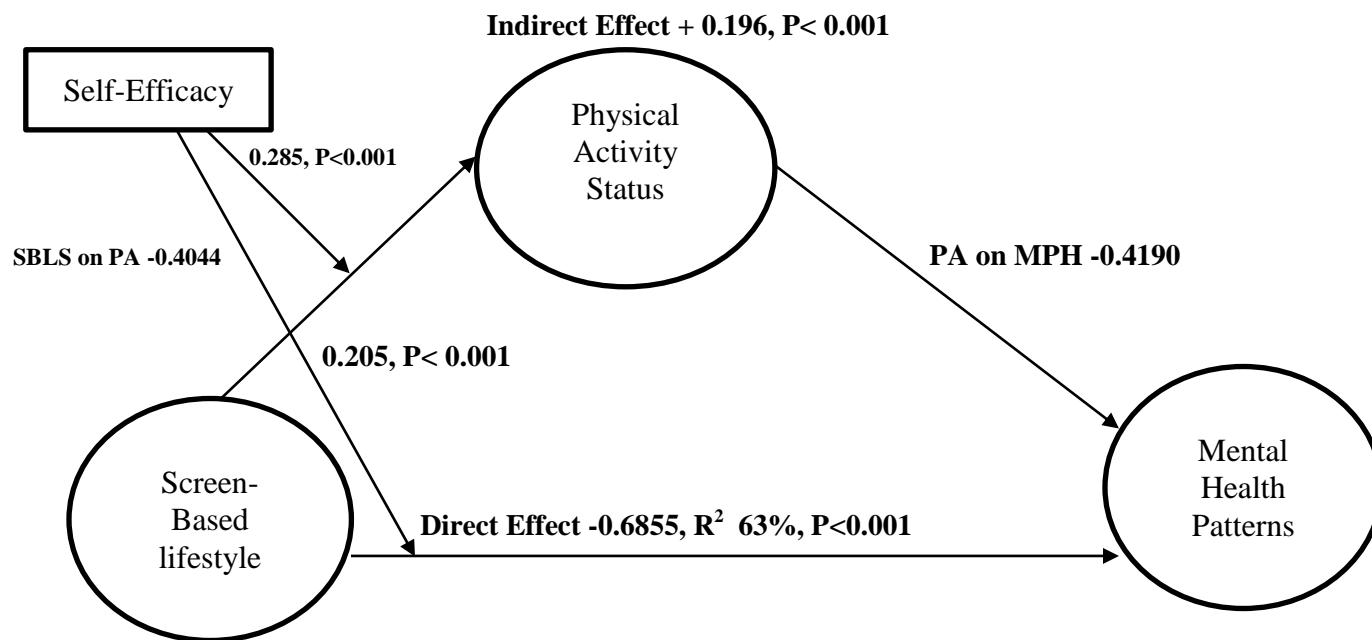


Table 7: Hypothesis Results

Hypothesis	Accepted/Not Accepted
Hypothesis 1: <i>The effect of screen-based lifestyle on physical activity is negative</i>	Accepted
Hypothesis 2: <i>The effect of physical activity Status on mental health patterns is negative</i>	Accepted
Hypothesis 3 <i>The physical activity Status mediates the relationship between screen-based life style and mental health patterns</i>	Accepted
Hypothesis 4: <i>Self efficacy moderates the negative relationship between screen-based lifestyle such that the association is weaker at higher level of self-efficacy</i>	Accepted
Hypothesis 5: <i>Self efficacy moderates the mediated relationship between screen-based lifestyle and mental health patterns such that association is weaker at higher level of self-efficacy</i>	Accepted

5.1 Discussion

It has found that screen-based lifestyle has a negative impact on physical activity status and mental health patterns among university students in Pakistan. According to the findings, it is strongly recommended that students' need to focus on physical activities rather than screen-based activities in order to improve their mental health and educational performance. Because due to lack of physical fitness, people suffer from mental illness and lower performance in their work environment. And current study findings are similar to (Chekroud et al., 2018; Cohn-Schwartz, 2020) findings that physical activity practices have a negative impact on mental health patterns. Similarly, it has also concluded that screen-based lifestyle has a negative impact on mental health patterns of people (Santos et al., 2023; Silva et al., 2018). Moreover, research has demonstrated that among university students, self-efficacy negatively moderates the association between screen-based lifestyle and physical activity status. And self-efficacy also negatively moderates the relationship between screen-based lifestyle and mental health patterns. It has already showed in previous studies that self-efficacy has impact on screen based lifestyle and mental health patterns (DaLomba, Mansur, Bonsaksen, & Greer, 2021; De Lepeleere, De Bourdeaudhuij, Cardon, & Verloigne, 2017; Zhou et al., 2021). Ultimately, based on above findings, it has concluded that regularity in physical activities and higher levels of self-efficacy can improve mental health and also can prevent mental and physical diseases.

5.2 Theoretical and Practical Contribution

This study looked at how screen-based lifestyle relates to physical activity status and mental health patterns of students. A greater knowledge of the causes of the mental health disorder, may affect from higher level of screen-based lifestyle and lower level of physical activity status. By identifying which factors have a greater impact on mental health negatively, this study contributes to the social learning theory in another way. The study is also one of the initial ones that confirms the correlation between screen-based activities and physical activity status and mental health patterns. Additionally, this study also contributes that self-efficacy moderates the relationship between screen-based lifestyle, physical activity status and mental health patterns.

5.3 Limitations and Future Research

Current study also has few limitations. Firstly, the current study was based on cross sectional data. Secondly, the sample size of the current study was small and cannot be generalized by the whole population. Thirdly, the current study was conducted in Pakistan and data was collected only from university students. Future studies should employ different research designs to gain a better knowledge of constructs in different cultures. Future researchers can replicate this study in a different sector and can use a larger sample size to overcome sample size limitation in order to gain a deeper knowledge of the problem.

References

- Akers, R. L., & Jennings, W. G. (2016). Social learning theory. *The handbook of criminological theory*, 230-240.
- Asare, M., & Danquah, S. A. (2015). The relationship between physical activity, sedentary behaviour and mental health in Ghanaian adolescents. *Child and adolescent psychiatry and mental health*, 9(1), 11. doi:10.1186/s13034-015-0043-x
- Asare, M., & Danquah, S. A. (2015). The relationship between physical activity, sedentary behaviour and mental health in Ghanaian adolescents. *Child and adolescent psychiatry and mental health*, 9(1), 1-8.
- Bandura, A., & McClelland, D. C. (1977). *Social learning theory* (Vol. 1): Englewood cliffs Prentice Hall.
- Berwick, D. M., Murphy, J. M., Goldman, P. A., Ware, J. E., Jr., Barsky, A. J., & Weinstein, M. C. (1991). Performance of a Five-Item Mental Health Screening Test. *Medical Care*, 29(2). Retrieved from https://journals.lww.com/lww-medicalcare/Fulltext/1991/02000/Performance_of_a_Five_Item_Mental_Health_Screening.8.aspx
- Campbell, A. C., Kelly-Weber, E., & Lavalley, C. (2020). University teaching and citizenship education as sustainable development in Ghana and Nigeria: insight from international scholarship program alumni. *Higher Education*. doi:10.1007/s10734-019-00484-3
- Cao, H., Qian, Q., Weng, T., Yuan, C., Sun, Y., Wang, H., & Tao, F. (2011). Screen time, physical activity and mental health among urban adolescents in China. *Preventive medicine*, 53(4), 316-320. doi:<https://doi.org/10.1016/j.ypmed.2011.09.002>
- Chamanabad, A. G., Mirdoraghi, F., & Pakmehr, H. (2011). The Relationship of M.A. Students' Metacognitive and Self-efficacy Beliefs with Their Mental Health. *Procedia - Social and Behavioral Sciences*, 15, 3050-3055. doi:<https://doi.org/10.1016/j.sbspro.2011.04.243>
- DaLomba, E., Mansur, S., Bonsaksen, T., & Greer, M. J. (2021). Exploring graduate occupational and physical therapy students' approaches to studying, self-efficacy, and positive mental health. *BMC Medical Education*, 21(1), 1-8.
- deJonge, M. L., Omran, J., Faulkner, G. E., & Sabiston, C. M. (2020). University students' and clinicians' beliefs and attitudes towards physical activity for mental health. *Mental Health and Physical Activity*, 18, 100316.
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, 5(1), 1-4. Retrieved from file:///C:/Users/User/Downloads/Comparison_of_Convenience_Sampling_and_Purposive_S.pdf
- Frei, E., Jaholkowski, P. P., Parekh, P., Frei, O., Shadrin, A. A., Refsum Bakken, N., . . . Smeland, O. B. (2023). The relationship between screen-based behaviors and adolescent mental health: a phenotypic and genetic analysis. *medRxiv*, 2023.2009.2014.23295537.
- Godin, G., & Shephard, R. (1985). A simple method to assess exercise behavior in the community. *Can J Appl Sport Sci*, 10(3), 141-146.

- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. (2006). *Multivariate data analysis*. Uppersaddle River. In: NJ: Pearson Prentice Hall.
- Hair, J. F., Celsi, M., Ortinau, D. J., & Bush, R. P. (2010). *Essentials of marketing research* (Vol. 2): McGraw-Hill/Irwin New York, NY.
- Hair Jr, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*: Sage publications.
- Hardy, L. L., Booth, M. L., & Okely, A. D. (2007). The reliability of the adolescent sedentary activity questionnaire (ASAQ). *Preventive medicine*, 45(1), 71-74.
- Harrington, D. M., Ioannidou, E., Davies, M. J., Edwardson, C. L., Gorely, T., Rowlands, A. V., . . . Staiano, A. E. (2021). Concurrent screen use and cross-sectional association with lifestyle behaviours and psychosocial health in adolescent females. *Acta Paediatrica*, 110(7), 2164-2170.
- Hayes, A. F. (2013a). Mediation, moderation, and conditional process analysis. Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach. In: New York: Guilford Publications.
- Hayes, A. F. (2013b). Methodology in the social sciences. In: Springer.
- Holliday, L., Carter, T., Reddy, H., Clarke, L., Pearson, M., & Felton, A. (2020). Shared learning to improve the care for young people and mental health within nurse education (SHYNE). Improving attitudes, confidence and self-efficacy. *Nurse Education in Practice*, 46, 102793. doi:<https://doi.org/10.1016/j.nepr.2020.102793>
- Huang, Q., Wang, X., Ge, Y., & Cai, D. (2023). Relationship between self-efficacy, social rhythm, and mental health among college students: A 3-year longitudinal study. *Current Psychology*, 42(11), 9053-9062.
- Karim, Y., Manzoor, W., Rahman, A. U., & Yousaf, D. (2023). The Conceptual Review on Consequences of Screen Based Lifestyle Among University Students in Pakistan. *International Journal of Social Science Archives (IJSSA)*, 6(2), 245-250.
- Knowlden, A. P., Hackman, C. L., & Sharma, M. (2016). Lifestyle and mental health correlates of psychological distress in college students. *Health Education Journal*, 75(3), 370-382.
- Lin, Y.-C., Yeh, M. C., Chen, Y.-M., & Huang, L.-H. (2010). Physical Activity Status and Gender Differences in Community-Dwelling Older Adults With Chronic Diseases. *Journal of Nursing Research*, 18(2). Retrieved from https://journals.lww.com/jnr-twna/Fulltext/2010/06000/Physical_Activity_Status_and_Gender_Differences_in.4.aspx
- Ma, Z., Wang, J., Li, J., & Jia, Y. (2021). The association between obesity and problematic smartphone use among school-age children and adolescents: a cross-sectional study in Shanghai. *BMC public health*, 21, 1-11.
- McKinley, C. J., & Ruppel, E. K. (2014). Exploring how perceived threat and self-efficacy contribute to college students' use and perceptions of online mental health resources. *Computers in Human Behavior*, 34, 101-109. doi:<https://doi.org/10.1016/j.chb.2014.01.038>
- Oswald, T. K., Rumbold, A. R., Kedzior, S. G., & Moore, V. M. (2020). Psychological impacts of “screen time” and “green time” for children and adolescents: A systematic scoping review. *PLoS one*, 15(9), e0237725.
- Parto, M. (2011). Problem solving, self-efficacy, and mental health in adolescents: Assessing the mediating role of assertiveness. *Procedia-Social and Behavioral Sciences*, 30, 644-648.
- Parto, M., & Besharat, M. A. (2011). The direct and indirect effects of self- efficacy and problem solving on mental health in adolescents: Assessing the role of coping strategies as mediating mechanism. *Procedia - Social and Behavioral Sciences*, 30, 639-643. doi:<https://doi.org/10.1016/j.sbspro.2011.10.124>
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40(3), 879-891. doi:10.3758/BRM.40.3.879
- Rey-López, J. P., Vicente-Rodríguez, G., Ortega, F. B., Ruiz, J. R., Martínez-Gómez, D., De Henauw, S., . . . Verloigne, M. (2010). Sedentary patterns and media availability in European adolescents: The HELENA study. *Preventive medicine*, 51(1), 50-55.
- Rodríguez-Romo, G., Acebes-Sánchez, J., García-Merino, S., Garrido-Muñoz, M., Blanco-García, C., & Díez-Vega, I. (2022). Physical Activity and Mental Health in Undergraduate Students. *International Journal of Environmental Research and Public Health*, 20(1), 195.

- Salmon, J., Koorts, H., Arundell, L., & Timperio, A. (2023). Specific interventions targeting sedentary behaviour in children and adolescents. In *Sedentary behaviour epidemiology* (pp. 521-537): Springer.
- Schwarzer, R. (1993). Measurement of perceived self-efficacy. *Forschung an der Freien*.
- Silva, D. R., Werneck, A. O., Tomeleri, C. M., Fernandes, R. A., Ronque, E. R., & Cyrino, E. S. (2018). Screen-based sedentary behaviors, mental health, and social relationships among adolescents. *Motriz: Revista de Educação Física*, 23.
- Tahmassian, K., & Jalali Moghadam, N. (2011). Relationship between self-efficacy and symptoms of anxiety, depression, worry and social avoidance in a normal sample of students. *Iranian journal of psychiatry and behavioral sciences*, 5(2), 91-98. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/24644452> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3939966/>
- Taveras, E. M., Field, A. E., Berkey, C. S., Rifas-Shiman, S. L., Frazier, A. L., Colditz, G. A., & Gillman, M. W. (2007). Longitudinal relationship between television viewing and leisure-time physical activity during adolescence. *Pediatrics*, 119(2), e314-e319.
- Thompson, J., & Gomez, R. (2014a). The role of self-esteem and self-efficacy in moderating the effect of workplace stress on depression, anxiety and stress. *The Australasian Journal of Organisational Psychology*, 7.
- Thompson, J., & Gomez, R. (2014b). The Role of Self-Esteem and Self-Efficacy in Moderating the Effect of Workplace Stress on Depression, Anxiety and Stress. *Australasian Journal of Organisational Psychology*, 7, e2. doi:10.1017/orp.2014.2
- Vizcaino, M., Buman, M., DesRoches, T., & Wharton, C. (2020). From TVs to tablets: the relation between device-specific screen time and health-related behaviors and characteristics. *BMC public health*, 20(1), 1-10.
- Wang, X., Li, Y., & Fan, H. (2019). The associations between screen time-based sedentary behavior and depression: a systematic review and meta-analysis. *BMC public health*, 19(1), 1-9.
- Weatherson, K., Gierc, M., Patte, K., Qian, W., Leatherdale, S., & Faulkner, G. (2020). Complete mental health status and associations with physical activity, screen time, and sleep in youth. *Mental Health and Physical Activity*, 19, 100354.
- Wu, X., Tao, S., Zhang, Y., Zhang, S., & Tao, F. (2015). Low physical activity and high screen time can increase the risks of mental health problems and poor sleep quality among Chinese college students. *PloS one*, 10(3), e0119607.
- Xiang, M., Liu, Y., Yamamoto, S., Mizoue, T., & Kuwahara, K. (2022). Association of Changes of lifestyle behaviors before and during the COVID-19 pandemic with mental health: a longitudinal study in children and adolescents. *International Journal of Behavioral Nutrition and Physical Activity*, 19(1), 92.
- Zhou, C., Yue, X. D., Zhang, X., Shangguan, F., & Zhang, X. Y. (2021). Self-efficacy and mental health problems during COVID-19 pandemic: A multiple mediation model based on the Health Belief Model. *Personality and Individual Differences*, 179, 110893.
- Zink, J., Belcher, B. R., Imm, K., & Leventhal, A. M. (2020). The relationship between screen-based sedentary behaviors and symptoms of depression and anxiety in youth: a systematic review of moderating variables. *BMC public health*, 20, 1-37.