

Impact of Physical Activity on Resilience among Teenage Girls during the COVID-19 Pandemic: a Mediation by Self-Esteem

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Abstract

Background: A significant factor associated with well-being and health is to find a method which can increase resilience during the pandemics. The present research aimed to examine the impact of physical activity level on resilience of teenage girls during the COVID-19 pandemic with an emphasis on self-esteem as a mediator.

Methods: The present study utilized a descriptive-correlation approach. The statistical sample included 384 teenage females from Golestan, Iran, in 2020. We employed standard surveys for collecting the data. Statistical methods included Kolmogorov-Smirnov test, Spearman correlation test, and structural relationships through Lisrel.

Results: Physical activity was found to affect resilience ($\beta=0.396$, $T=6.284$) and self-esteem ($\beta=0.628$, $T=11.594$). Furthermore, self-esteem significantly affected resilience ($\beta=0.530$, $T=9.509$). Finally, self-esteem significantly mediated the correlation between physical activity and resilience ($Z=6.780$, $P<0.001$).

Conclusions: Physical activity could be considered as an important factor in coping with severe condition during the COVID-19 pandemic. Therefore, in a pandemic situation, by increasing physical activity, better conditions can be created for children and adolescents, especially girls, to ensure their resilience.

Keywords: Physical activity, Resilience, Self-esteem, Girls, COVID-19

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1. Introduction

With the outbreak of new coronavirus (COVID-19), social isolation and distancing were essential as a comprehensive preventive method to decline its prevalence. Therefore, almost all countries around the world closed educational environments, as a result of which most students stay at home (1). Although the quarantine reduced the spread of the virus and subsequent mortality in the community, it also created problems for children and adolescents; for example, home-schooling constrained the openings for common physical activities at school along with scheduled common relationships with counterparts (2, 3). Evidence has also indicated that social distancing truly changed the engagement of children and youth in physical activity within the COVID-19 isolation (4-9). Moreover, it has been shown that the quarantine increased the risk of mental illnesses in children and adolescents, such as depression and anxiety (10-15). To counteract such detrimental consequences, the WHO suggested that school-aged children and the young do common physical exercises at home to maintain

their health. Parents should also try as hard as possible to provide conditions for children and adolescents to participate in physical activity and sports. Some evidence has shown that physical activity improves students' wellbeing (16-20). However, there are several components that need to be considered regarding the impact of physical activity on health of children and adolescents during the quarantine. One of the issues that can be important in this regard is resilience.

Resilience refers to an individual's capability of withstanding adversity and recovering from difficulties, which can result in better mental and physical health (21, 22). Resilient people are prepared to handle negative feelings and emergencies effectively and are less involved in mental torment; they therefore have a superior mental well-being (23). Evidence showed that physical activity can progress one's level of versatility (21, 24-26). In addition, physical activity could be a basic way to advance strength (26). People with more physical activity are stronger (25, 26). However, the impact of physical activity on resilience within the pandemic has been rarely examined. Therefore, the

primary goal of the current research was to examine the effects of physical activity level on resilience among teenage girls during the COVID-19 pandemic.

Another factor that can possibly affect the correlation between physical activity and resilience is a person's self-esteem. Based on the literature, people with high self-esteem or a high feeling of control will embrace dynamic coping techniques focusing on problems while people with a low self-esteem will receive passive-avoidant adapting styles centered on feelings (27-29). In children and adolescents, high self-esteem has been associated with the level of physical activity and high sense of resilience (28). Some other papers have shown that low self-esteem is related to depression, anxiety, and dysfunctional coping strategies (30). However, this issue has been rarely examined during the COVID-19 pandemic. Hence, the second goal of the current research was to examine whether self-esteem acts as a mediator in the correlation between physical activity and resilience in teenage girls within the COVID-19 pandemic. Overall, we aimed to examine the effects of physical activity on resilience among teenage girls during the COVID-19 pandemic considering self-esteem as a mediator.

2. Methods

The present study applied a descriptive-correlation approach. The ethical considerations of the current research were approved under the code of IR.IAU.AK.REC.1400.001. The female teenagers and their parents signed the informed consent prior to participation in this work.

2.1. Participants

Herein, we enrolled 384 female teenagers with an average age of 15.64 ± 0.82 years, who volunteered to participate. The study was conducted in Golestan, Iran, in 2020. Our sample was chosen through convenience sampling method, based on the guidelines of Krejcie and Morgan (31).

2.2. Measures

2.2.1. Physical Activity: We evaluated physical activity through Physical Activity Behavior in Leisure-Time Scale (20), consisting of three items based on an eight-point Likert scale from zero days (0) to seven days (7). Previous studies showed a high reliability for this scale where Cronbach's alpha coefficient was 0.90 (18, 20). Herein, we evaluated the validity of the Persian

version of this scale through opinions of nine experts, CVI and CVR were both 1.00.

2.2.2. Resilience: To evaluate resilience, we employed the Connor-Davidson Resilience Scale with 25-questions scored on a five-point Likert scale from 0 "never" to 4 "always" (32). The higher the scores, the greater the resilience. The reliability of this survey was affirmed by past research where Cronbach's alpha coefficient was 0.87 (32). In addition, here, reliability of the Persian version of the current survey was affirmed by nine experts (CVI=0.88, CVR=0.78).

2.2.3. Self-Esteem: We used the Rosenberg Self-Esteem Scale (33) to evaluate the teenagers' self-esteem. The survey consisted of 10 four-point Likert questions with scores ranging from strongly disagree (0) to strongly agree (3). The reliability of this questionnaire has been assessed in previous studies where Cronbach's alpha coefficient was 0.92. Furthermore, the reliability of the Persian version of the current survey was assessed by nine experts (CVI=0.88, CVR=0.88).

2.3. Data Analysis

Means and standard deviations were used as descriptive statistics. Spearman correlation test was used to compute the correlations between the research components. Structural associations between the research components were examined through Lisrel. P value was set at $P < 0.05$.

3. Results

3.1. Describing Population

We enrolled 384 female teenagers with an average age of 15.64 ± 0.82 years, who voluntarily participated in this study. The inclusion criteria were teenage girls with no physical or mental disabilities. Anyone out of this age range or with any physical or mental problems was excluded from the study.

Table 1 represents descriptive data. The findings suggested that in general, our sample had a relatively low amount of physical activity. Likewise, self-esteem was below average. However, resilience was above the average. According to Kolmogorov-Smirnov tests, our data did not have normal distribution (all $P < 0.05$).

3.2. Bivariate Correlations

Table 1 also demonstrates the bivariate correlations

Table 1: Means and Standard Deviations and correlation matrix of the research components

	Mean	Standard Deviations (SD)	1	2	3
1. Physical Activity	1.56	0.49	-		
2. Resilience	64.19	12.40	r=0.493 P<0.001	-	
3. Self-Esteem	11.19	2.71	r=0.719 P<0.001	r=0.607 P<0.001	-

Table 2: Results of structural equation modelling

	Path	β	T-value
1	Physical Activity=>Resilience	0.396	6.284
2	Physical Activity=>Self-Esteem	0.628	11.594
3	Self-Esteem=>Resilience	0.530	9.509
		Z	P value
4	Physical Activity=>Self-Esteem=>Resilience	6.780	P<0.001

among physical activity, resilience, and self-esteem. The results revealed significant direct correlations among physical activity and resilience (P<0.001). Moreover, physical activity was positively and significantly related to self-esteem (P<0.001). Finally, self-esteem was directly and significantly associated with resilience (P<0.001).

3.3. Structural Equation Modelling

Table 2 and Figure 1 depict the findings of structural equation modelling. As shown, physical activity significantly affected resilience (T=6.284). Moreover, physical activity significantly affected self-esteem (T=11.594). Furthermore, self-esteem had a significant effect on resilience (T=9.509). Finally, self-esteem significantly mediated the correlation between physical activity and resilience (P<0.001). Table 3 reveals that our model had good fit.

4. Discussion

COVID-19 pandemic has seriously influenced the lifestyle of children and adolescents; for example, some evidence has shown that the pandemic seriously changed physical and psychological health of children and youth. However, little is known about the impact of physical activity on resilience among teenagers within the pandemic. Therefore, we conducted the

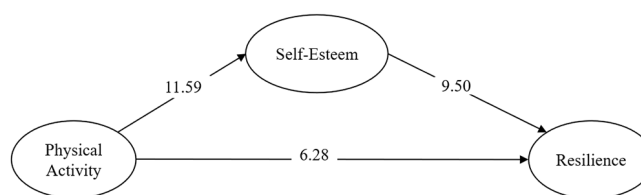


Figure 1: The figure shows structural relationships between the research components.

current research to examine the effects of physical activity on resilience among teenagers within the pandemic situation. Herein, self-esteem was added as a mediator into the research model. The findings showed that physical activity significantly affected resilience and self-esteem among teenage girls within the pandemic. Our results are consistent with those of past papers (21-26). To interpret our findings, we can point to the important role of physical activity on physical and psychological health, including the improvement of depression and mental disorders. Regarding resilience, a common belief is that physical activity has positive effects on depression, anxiety, and mental disorders, and numerous studies have shown significant relationships between physical activity and general well-being and mental well-being. Moreover, it is proposed that physical activity might provide a protective system against mental disorders, stress and other psychological disorders (22, 23).

Regular exercise and physical activity, by making

Table 3: Results of model fit

Index	Optimal Range	Obtained Value	Conclusion
RMSEA	<0.08	0.07	Good fit
X ² / df	<3	2.69	Good fit
RMR	Closer to 0	0.04	Good fit
NFI	>0.9	0.97	Good fit
CFI	>0.9	0.96	Good fit

changes in the level of brain arousal and biochemical and psychological structure of an individual, strengthen and develop social processes, such as self-esteem, independence, and empathy; they also reduce aggression and anxiety. Accordingly, physical activity and exercise enable people to show a higher tolerance threshold in dealing with problems (24, 26). As shown in this study, increasing physical activity improves teenagers' resilience and self-esteem during the COVID-19 pandemic. Therefore, physical activity may be one of the factors affecting certain individual characteristics and virtues that belong to resilience in individuals and improve resilience in individuals during the COVID-19 pandemic.

Some researchers suggested that resilience changes over time and can be induced in individuals and increased through protective agents (24-26). Based on the endogenous model of resilience, Malhi and colleagues (34) indicated that people can maintain and improve endogenous resilience by strengthening resilience. Strengthening resilience includes social support, health care, balance in recreation and entertainment, rest and responsibility. Therefore, during the pandemic, female teenagers also need further social support from parents and important people in order to be able to develop their resilience.

The findings of this study implied that self-esteem significantly affected resilience among teenage girls within the pandemic. Our results are consistent with those of past research (27-30). Self-esteem has been specified numerous times as one of the major components that can buffer the harmful impacts of stress on mental wellbeing; nonetheless, there are very little empirical evidence. Our results are consistent with the findings of past research that detailed negative relationships between self-esteem and day-by-day stress and discouragement in adolescents (27, 28). Self-esteem is the essential indicator for the current study. This clearly indicates that teenagers with a higher self-esteem show higher resilience, which might help them to cope with challenging conditions during the COVID-19 pandemic.

There are certain limitations for this study, to which one must pay attention when interpreting the findings. Primarily, the current research utilized a cross-sectional plan which limits looking at causal impact of physical activity and self-esteem on the resilience of teenagers during the COVID-19 pandemic. Subsequently, the need to assess the social-economic conditions of our sample may be another limitation. Future research

ought to concentrate on longitudinal research designs with emphasis on socio-economic conditions of the subjects.

5. Conclusions

In summary, this study showed that physical activity has significant effects on resilience among teenage girls during the COVID-19 pandemic. Moreover, self-esteem has a significant mediating part in the correlation among physical activity and resilience among teenage girls during the COVID-19 pandemic. These results suggested that physical activity can be considered as an important factor in coping with severe conditions during this period. Hence, in a pandemic situation, by increasing physical activity, better conditions can be created for children and adolescents, especially girls, to ensure their resilience. There are some practical implications for parents during the pandemic. Accordingly, it could be suggested that parents encourage their children to engage in physical activity in order to improve their resilience and self-esteem during the COVID-19 pandemic.

Ethical Approval

The Ethics Review Board of the university approved the present study with the code of IR.IAU.AK.REC.1400.001. Written informed consent was obtained from female teenagers and their parents.

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Conflict of Interest: None declared.

References

1. Cucinotta D, Vanelli M. WHO Declares COVID-19 a Pandemic. *Acta Biomed.* 2020;91(1):157-160. doi: 10.23750/abm.v91i1.9397. PubMed PMID: 32191675; PubMed Central PMCID: PMC7569573.
2. Bedford J, Enria D, Giesecke J, Heymann DL, Ihekweazu C, Kobinger G, et al. COVID-19: Towards Controlling of a Pandemic. *Lancet.* 2020;395(10229):1015-1018. doi: 10.1016/S0140-6736(20)30673-5. PubMed PMID: 32197103; PubMed Central PMCID: PMC7270596.
3. Hammami A, Harrabi B, Mohr M, Krusturup P. Physical Activity and Coronavirus Disease 2019 (COVID-19): Specific Recommendations

- for Home-Based Physical Training. *Managing Sport and Leisure*. 2022;27(1-2):26-31. doi: 10.1080/23750472.2020.1757494.
4. Gul MK, Demirci E. Psychiatric Disorders and Symptoms in Children and Adolescents During the COVID-19 Pandemic: A Review. *EJMO*.2021;5(1):20-36. doi: 10.1016/j.rcpeng.2020.11.003.
 5. Dunton GF, Do B, Wang SD. Early Effects of the COVID-19 Pandemic on Physical Activity and Sedentary Behavior in Children Living in the U.S. *BMC Public Health*. 2020;20(1):1351. doi: 10.1186/s12889-020-09429-3. PubMed PMID: 32887592; PubMed Central PMCID: PMC7472405.
 6. Tulchin-Francis K, Stevens Jr W, Gu X, Zhang T, Roberts H, Keller J, et al. The Impact of the Coronavirus Disease 2019 Pandemic on Physical Activity in US Children. *J Sport Health Sci*. 2021;10(3):323-332. doi: 10.1016/j.jshs.2021.02.005. PubMed PMID: 33657464; PubMed Central PMCID: PMC8167336.
 7. Dana A, Khajehaflaton S, Salehian M, Sarvari S. Effects of an Intervention in Online Physical Education Classes on Motivation, Intention, and Physical Activity of Adolescents during the COVID-19 Pandemic. *Int J School Health*. 2021;8(3):158-166. doi: 10.30476/intjsh.2021.91103.1145.
 8. Ghorbani S, Afshari M, Eckelt M, Dana A, Bund A. Associations between Physical Activity and Mental Health in Iranian Adolescents during the COVID-19 Pandemic: An Accelerometer-Based Study. *Children*. 2021;8(11):1022. doi: 10.3390/children8111022. PubMed PMID: 34828736; PubMed Central PMCID: PMC8618706.
 9. Dana A, Nodeh H, Salehian M, Mokari Saei S, Sarvari S. Smartphone Usage Status, Sleep Pattern, Health-Related Quality of Life, and Physical Activity among Adolescents from before to during the COVID-19 Confinement: A Cross-Sectional Study. *Int J School Health*. 2021;9(1):1-9. doi: 10.30476/intjsh.2021.92822.1178.
 10. Weiner L, Berna F, Nourry N, Severac F, Vidailhet P, Mengin AC. Efficacy of an online cognitive behavioral therapy program developed for healthcare workers during the COVID-19 pandemic: the REduction of STress (REST) study protocol for a randomized controlled trial. *Trials*. 2020;21(1):870. doi: 10.1186/s13063-020-04772-7. PubMed PMID: 33087178; PubMed Central PMCID: PMC7576984.
 11. Palacio-Ortiz JD, Londoño-Herrera JP, Nanclares-Márquez A, Robledo-Rengifo P, Quintero-Cadavid CP. Psychiatric disorders in children and adolescents during the COVID-19 pandemic. *Rev Colom Psiquiatr*. 2020;49(4):279-88. doi: 10.1016/j.rcp.2020.05.006. PubMed PMID: 33328021; PubMed Central PMCID: PMC7366975.
 12. Abawi O, Welling MS, van den Eynde E, van Rossum EFC, Halberstadt J, van den Akker ELT, et al. COVID-19 related anxiety in children and adolescents with severe obesity: A mixed-methods study. *Clin Obes*. 2020;10(6):e12412. doi: 10.1111/cob.12412. PubMed PMID: 32920993; PubMed Central PMCID: PMC7685119.
 13. de Miranda DM, Athanasio BdS, Oliveira ACS, Simoes-e-Silva AC. How is COVID-19 pandemic impacting mental health of children and adolescents? *Int J Disaster Risk Reduct*. 2020;51:101845. doi: 10.1016/j.ijdr.2020.101845. PubMed PMID: 32929399; PubMed Central PMCID: PMC7481176.
 14. Ravens-Sieberer U, Kaman A, Erhart M, Devine J, Schlack R, Otto C. Impact of the COVID-19 pandemic on quality of life and mental health in children and adolescents in Germany. *Eur Child Adolesc Psychiatry*. 2021;1-11. doi: 10.1007/s00787-021-01726-5. PubMed PMID: 33492480; PubMed Central PMCID: PMC7829493.
 15. Zhang Y, Zhang H, Ma X, Di Q. Mental health problems during the COVID-19 pandemics and the mitigation effects of exercise: a longitudinal study of college students in China. *Int J Environ Res Public Health*. 2020;17(10):3722. doi: 10.3390/ijerph17103722. PubMed PMID: 32466163; PubMed Central PMCID: PMC7277113.
 16. Marconcin P, Werneck AO, Peralta M, Ihle A, Gouveia ÉR, Ferrari G, et al. The association between physical activity and mental health during the first year of the COVID-19 pandemic: a systematic review. *BMC Public Health*. 2022;22(1):209. doi: 10.1186/s12889-022-12590-6. PubMed PMID: 35101022; PubMed Central PMCID: PMC8803575.
 17. Hosseini FB, Ghorbani S, Rezaeshirazi R. Effects of Perceived Autonomy Support in the Physical Education on Basic Psychological Needs Satisfaction, Intrinsic Motivation and Intention to Physical Activity in High-School Students. *Int J School Health*. 2020;7(4):39-46. doi: 10.30476/intjsh.2020.88171.1106.
 18. Gholidahaneh MG, Ghorbani S, Esfahaninia A. Effects of Basic Psychological Needs Satisfaction in the Physical Education on Leisure-Time Physical Activity Behavior of Primary School Students: Mediating Role of Autonomous Motivation. *Int J School Health*. 2020;7(2):46-53. doi: 10.30476/

- intjsh.2020.86028.1068.
19. Sfandyari B, Ghorbani S, Rezaeshirazi R, Noohpisheh S. The Effectiveness of an Autonomy-Based Exercise Training on Intrinsic Motivation, Physical Activity Intention, and Health-Related Fitness of Sedentary Students in Middle School. *Int J School Health*. 2020;7(1):40-47. doi: 10.30476/intjsh.2020.84678.1046.
 20. Ghorbani S, Noohpisheh S, Shakki M. Gender Differences in the Relationship Between Perceived Competence and Physical Activity in Middle School Students: Mediating Role of Enjoyment. *Int J School Health*. 2020;7(2):14-20. doi: 10.30476/intjsh.2020.85668.1056.
 21. Antonini Philippe R, Schwab L, Biasutti M. Effects of Physical Activity and Mindfulness on Resilience and Depression During the First Wave of COVID-19 Pandemic. *Front Psychol*. 2021;12:700742. doi: 10.3389/fpsyg.2021.700742. PubMed PMID: 34393936; PubMed Central PMCID: PMC8360111.
 22. Davydov DM, Stewart R, Ritchie K, Chaudieu I. Resilience and mental health. *Clin Psychol Rev*. 2010;30(5):479-95. doi: 10.1016/j.cpr.2010.03.003. PubMed PMID: 20395025.
 23. Erdogan E, Ozdogan O, Erdogan M. University student resilience level: the effect of gender and faculty. *Procedia - Social and Behavioral Sciences*. 2015;186:1262-1267. doi: 10.1016/j.sbspro.2015.04.047.
 24. Reguera-García MM, Liébana-Presa C, Álvarez-Barrio L, Alves Gomes L, Fernández-Martínez E. Physical Activity, Resilience, Sense of Coherence and Coping in People with Multiple Sclerosis in the Situation Derived from COVID-19. *Int J Environ Res Public Health*. 2020;17(21):8202. doi: 10.3390/ijerph17218202. PubMed PMID: 33172022; PubMed Central PMCID: PMC7664264.
 25. C, Edwards P, Bhui K, Viner RM, Taylor S, Stansfeld SA. Physical activity and depressive symptoms in adolescents: a prospective study. *BMC Med*. 2010;8:32. doi: 10.1186/1741-7015-8-32. PubMed PMID: 20509868; PubMed Central PMCID: PMC2895574.
 26. Xu S; Liu Z; Tian S; Ma Z; Jia C; Sun G. Physical Activity and Resilience among College Students: The Mediating Effects of Basic Psychological Needs. *Int J Environ Res Public Health*. 2021;18(7):3722. doi: 10.3390/ijerph18073722. PubMed PMID: 33918303; PubMed Central PMCID: PMC8038173.
 27. Li X, Yu H, Yang N. The mediating role of resilience in the effects of physical exercise on college students' negative emotions during the COVID-19 epidemic. *Sci Rep*. 2021;11(1):24510. doi: 10.1038/s41598-021-04336-y. PubMed PMID: 34972833; PubMed Central PMCID: PMC8720086.
 28. Kim I; Ahn J. The Effect of Changes in Physical Self-Concept through Participation in Exercise on Changes in Self-Esteem and Mental Well-Being. *Int J Environ Res Public Health*. 2021;18(10):5224. doi: 10.3390/ijerph18105224. PubMed PMID: 34069040; PubMed Central PMCID: PMC8157161.
 29. Zamani Sani SH, Fathirezaie Z, Brand S, Pühse U, Holsboer-Trachsler E, Gerber M, Talepasand S. Physical activity and self-esteem: testing direct and indirect relationships associated with psychological and physical mechanisms. *Neuropsychiatr Dis Treat*. 2016;12:2617-2625. doi: 10.2147/NDT.S116811. PubMed PMID: 27789950; PubMed Central PMCID: PMC5068479.
 30. Haugen T, Ommundsen Y, Seiler S. The Relationship Between Physical Activity and Physical Self-Esteem in Adolescents: The Role of Physical Fitness Indices. *Pediatr Exerc Sci*. 2013;25(1):138-53. doi: 10.1123/pes.25.1.138. PubMed PMID: 23406702.
 31. Park K, Yang TC. The Long-term Effects of Self-Esteem on Depression: The Roles of Alcohol and Substance Uses during Young Adulthood. *Sociol Q*. 2017;58(3):429-446. doi: 10.1080/00380253.2017.1331718. PubMed PMID: 28936002; PubMed Central PMCID: PMC5602593.
 32. Krejcie RV, Morgan DW. Determining Sample Size for Research Activities. *Educ Psychol Meas*. 1970;30(3):607-610. doi: 10.1177/001316447003000308.
 33. Davidson S, Passmore R, Brook JF, Truswell AS. *Human nutrition and dietetics*. 7th ed. New York, NY: Churchill Livingstone; 1979.
 34. Rosenberg M. *Society and the Adolescent Self-Image*. Princeton, NJ: Princeton; 1965.
 35. Malhi GS, Das P, Bell E, Mattingly G, Mannie Z. Modelling resilience in adolescence and adversity: a novel framework to inform research and practice. *Transl Psychiatry*. 2019;9(1):316. doi: 10.1038/s41398-019-0651-y. PubMed PMID: 31772187; PubMed Central PMCID: PMC6879584.