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Association of Physical Activity and Psychological Distress in Adolescents

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ABSTRACT

Background: Adolescence is a critical period for the development of health-related behaviors and the onset of psychological distress, including anxiety, depression, and stress. Physical activity has been associated with improved mental health, but its specific relationship with psychological distress in adolescents remains unclear.

Objective: To evaluate the association between physical activity levels and psychological distress (stress, anxiety, and depression) in adolescents.

Methods: A cross-sectional study was conducted on 109 adolescents aged 14-19 years from the University of Lahore and Beacon House School System, Valencia Campus, Lahore. Participants were recruited through non-probability convenience sampling. Psychological distress was assessed using the DASS-21, and physical activity levels were measured with the PAQ-A. Data were analyzed using Spearman's rank correlation and Chi-square tests via SPSS version 23.

Results: Significant but weak negative correlations were found between physical activity and stress (Spearman's rho = -0.236, p = 0.013) and depression (Spearman's rho = -0.219, p = 0.022). The association with anxiety was not significant (p = 0.075).

Conclusion: Higher physical activity levels were associated with lower stress and depression among adolescents, suggesting potential mental health benefits of regular exercise.

INTRODUCTION

Adolescence is a developmental stage characterized by significant physical, psychological, and social changes that influence health behaviors and disease risk. This period, spanning from childhood to adulthood, is marked by the establishment of health-related behaviors that can have long-lasting impacts on an individual's overall well-being. Psychological distress during adolescence often manifests as anxiety, depression, and other somatic symptoms, which are common yet concerning mental health issues (1). Concurrently, physical activity plays a critical role in promoting overall health and wellness, influencing numerous bodily systems, energy balance, and psychological health (2). Physical activity is not only vital for maintaining a healthy body composition but also for enhancing cardiorespiratory fitness, reducing fat mass, and elevating non-exercise activity thermogenesis, thereby boosting resting metabolic rates (3). Despite the well-recognized benefits, a significant number of individuals, including adolescents, engage in insufficient physical activity, predisposing them to a range of health conditions, including cardiovascular diseases, diabetes, cancer, and psychological disorders such as depression and anxiety (4). The relationship between physical activity and psychological health has been extensively studied in various populations, demonstrating that physical activity can significantly influence mental health outcomes. Children and adolescents with higher levels of stress and depressive symptoms often exhibit lower fitness levels and reduced participation in physical activities of low to moderate intensity (5). Developed countries have increasingly recognized the value of physical activity in promoting mental health and preventing mental illnesses, particularly in adolescents who are at a critical juncture for establishing lifelong health behaviors. During this transitional period, adolescents gain greater autonomy over their leisure time activities, which can significantly influence their psychological well-being (6). To effectively assess the relationship between physical activity and psychological health, reliable and age-appropriate assessment tools are necessary, including physiological markers, laboratory procedures, and self-reported questionnaires, which, despite some limitations, offer practical and cost-effective means for large-scale evaluations (7).

Research has shown varying degrees of association between physical activity and psychological symptoms among adolescents. For instance, adolescents with psychiatric disorders have been observed to engage in physical activities less frequently, despite potentially higher overall activity levels, highlighting a complex interplay between mental health status, physical activity patterns, and participation in organized sports (8). Furthermore, socio-economic status, age, and sex have been found to intersect with depressive symptoms, influencing adolescents' engagement in team sports and other physical

activities (8). The psychosocial issues prevalent in adolescents not only affect their mental health but also have broader implications, including academic performance, social skills, and healthcare utilization (9). Although physical activity is widely recognized as a protective factor against psychosocial problems in both adults and children, the evidence is not uniformly consistent across studies, necessitating further exploration into specific contexts and populations (9).

In the context of mental health disorders, emotional and behavioral issues are among the most prevalent in adolescents, significantly impacting individuals, families, and society at large. Although numerous studies have demonstrated the beneficial effects of physical activity on mental health in adults, less is known about these effects in adolescents, particularly regarding the nuances of how varying levels of physical activity interact with symptoms of anxiety, depression, and stress (10). This study aims to fill this gap by investigating the association between physical activity levels and psychological distress among adolescents. By understanding these relationships, it may be possible to inform interventions that encourage physical activity as a means of improving mental health outcomes in this vulnerable population. The current research explores the hypothesis that higher physical activity levels are associated with reduced psychological distress, thus contributing to the broader understanding of how lifestyle factors can mitigate mental health risks during adolescence.

MATERIAL AND METHODS

In this cross-sectional study, adolescents aged 14-19 years were recruited from the University of Lahore and Beacon House School System, Valencia Campus, Lahore, between May and December 2023. The study targeted this specific age group, defined as adolescents by the World Health Organization (WHO) (11). Participants were included based on the absence of any pre-existing mental conditions, chronic physical illnesses, major stressful life events, or prior use of medications that could confound the study results. Ethical approval was obtained from the Ethical Review Committee of Akhtar Saeed Medical and Dental College, Lahore, and all procedures were conducted following the ethical principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants before their inclusion in the study.

The sample size was calculated using the formula n=N1+Ne2n = \frac{N}{1 + Ne^2}n=1+Ne2N, ensuring adequate representation of the population (12). Participants were selected through non-probability convenience sampling. Data collection involved administering the Depression Anxiety Stress Scales-21 (DASS-21) and the Physical Activity Questionnaire for Adolescents (PAQ-A) to assess psychological distress and physical activity levels, respectively. The DASS-21 is a widely recognized tool that measures three dimensions of psychological distress: depression, anxiety, and stress, classifying each into categories ranging from normal to extremely severe (13). The PAQ-A assesses physical activity levels over the previous week and categorizes the levels into low, mild, moderate, and slightly high based on the mean scores of responses to its questions (14).

The students of SSC/O-levels and first-semester BS programs were approached after obtaining permission from their respective institutions. The study procedures, including the purpose and content of the questionnaires, were explained in detail to the participants. The questionnaires were read aloud, and any questions or ambiguities were clarified before distribution. Participants completed the questionnaires independently, and assistance was provided as needed. The responses were manually scored according to the scoring keys of the DASS-21 and PAQ-A, ensuring accuracy in the classification of psychological distress and physical activity levels.

Data were analyzed using SPSS version 23. Quantitative variables were presented as means, standard deviations, and ranges, while categorical variables, such as physical activity and psychological distress, were presented as frequencies and percentages. The association between physical activity levels and psychological distress variables (depression, anxiety, and stress) was examined using Spearman's rank correlation coefficient, as the data involved ranked variables. Spearman's rho was used to assess the strength and direction of correlations between the levels of physical activity and psychological distress. A p-value of 0.05 or less was considered statistically significant (15). Cross-tabulations and graphical representations, including histograms, bar charts, and pie charts, were utilized to visualize the data distribution and relationships between variables.

This comprehensive approach ensured that the study accurately captured the associations between physical activity levels and psychological distress among adolescents, contributing valuable insights into the role of physical activity in mental health during this critical developmental period.

RESULTS

The study included 109 participants aged 14 to 19 years, with a majority (67.0%) falling in the 18-19 age range. The sample comprised 71 males (65.1%) and 38 females (34.9%). Participants were either studying in SSC/O-levels or were first-semester BS students, with 75 (68.8%) at the BS level. Depression and physical activity demonstrated a significant but weak negative correlation (Spearman's rho = -0.219, p = 0.022). However, the overall association between physical activity and depression was not statistically significant (p = 0.089). Overall, the study found significant yet weak negative correlations between physical activity levels and both stress and depression, indicating that higher physical activity is associated with lower levels of these psychological distress factors. No significant correlations were found between physical activity and anxiety. The findings suggest that increasing physical activity may have a modest positive impact on reducing stress and depression.

Stress and physical activity showed a significant but weak negative correlation (Spearman's rho = -0.236, p = 0.013),

Table 1: Association and Correlation between Physical Activity and Stress

Stress Level	Low	Mild	Moderate	Slightly High	Total		
Normal (0-14)	6	8	5	7	26	**Chi-Square**	17.15
Mild (15-18)	6	5	4	2	17	**P-Value**	0.144
Moderate (19-25)	5	11	8	1	25	**Spearman Correlation**	-0.236
Severe (26-33)	7	12	4	3	26	**P-Value**	0.013
Extremely Severe (34+)	8	6	1	0	15		
Total	32	42	22	13	109		

Table 2: Association and Correlation between Physical Activity and Anxiety

Anxiety Level	Low	Mild	Moderate	Slightly High	Total		
Normal (0-7)	5	4	2	5	16	**Chi-Square**	14.54
Mild (8-9)	0	0	1	1	2	**P-Value**	0.268
Moderate (10-14)	1	4	2	1	8	**Spearman Correlation**	-0.172
Severe (15-19)	6	7	5	2	20	**P-Value**	0.075
Extremely Severe (20+)	20	27	12	4	63		
Total	32	42	22	13	109		

though the overall association was not statistically significant (p = 0.144). Anxiety and physical activity were not significantly correlated (Spearman's rho = -0.172, p = 0.075), and the overall association was not significant (p = 0.268). The findings suggest that increasing physical activity may have a modest positive impact on reducing stress and depression among adolescents, although further investigation is needed to explore these relationships in more depth.

Table 3: Association and Correlation between Physical Activity and Depression

Depression Level	Low	Mild	Moderate	Slightly High	Total		
Normal (0-9)	5	4	3	6	18	**Chi-Square**	18.99
Mild (10-13)	1	5	2	1	9	**P-Value**	0.089
Moderate (14-20)	7	7	9	2	25	**Spearman Correlation**	-0.219
Severe (21-27)	6	12	4	1	23	**P-Value**	0.022
Extremely Severe (28+)	13	14	4	3	34		
Total	32	42	22	13	109		

DISCUSSION

This study explored the association between physical activity levels and psychological distress, specifically focusing on stress, anxiety, and depression among adolescents aged 14 to 19 years. The findings revealed significant but weak negative correlations between physical activity and both stress and depression, while no significant association was observed with anxiety. These results align with previous studies that have demonstrated the beneficial effects of physical activity on mental health outcomes in adolescents, although the strength of the associations varies. For instance, Chekroud et al. found that regular exercise was significantly linked to fewer days of poor mental health, with a notable reduction in stress and depression levels among those who engaged in physical activity compared to those who did not (16). Similarly, Wu et al. reported that higher physical activity levels were associated with a reduction in psychological symptoms, though their study also noted significant interactions with screen time, highlighting the complex interplay of lifestyle factors on mental health (17).

The present study's findings are consistent with the broader literature suggesting that physical activity can serve as a protective factor against mental health issues in adolescents. However, the weak correlations observed in this study indicate that while physical activity may play a role in mitigating stress and depression, other factors likely contribute to psychological distress in this population. This aligns with McMahon et al.'s research, which found that moderate physical activity was associated with improved well-being and lower symptoms of anxiety and depression, but only up to a certain threshold, beyond which the benefits plateaued (18). The current study's inability to find a significant association with anxiety may reflect the nuanced nature of this relationship, as anxiety may be influenced by a broader range of psychosocial factors not fully captured by physical activity levels alone (19).

One strength of this study is its focus on a critical developmental period, adolescence, when individuals are particularly vulnerable to psychological distress. The use of established, validated instruments such as the DASS-21 and PAQ-A provided reliable measures of psychological distress and physical activity, enhancing the study's credibility. However, several limitations must be acknowledged. The cross-sectional design precludes any causal inferences about the relationship between physical activity and psychological distress, and the reliance on self-reported measures may have introduced bias due to social desirability or recall inaccuracies. Additionally, the non-probability convenience sampling limits the generalizability

of the findings, as the sample may not be representative of the broader adolescent population.

Furthermore, the study was conducted in specific educational settings, which may not fully capture the diversity of adolescents' experiences across different socio-economic or cultural contexts. Variations in physical activity patterns and mental health outcomes may also be influenced by environmental factors such as access to recreational facilities, parental support, and academic pressures, which were not controlled for in this study. Future research should consider longitudinal designs to better understand the directionality of these associations and explore potential mediators and moderators that could explain the relationship between physical activity and psychological distress.

In terms of practical implications, the findings suggest that interventions aimed at increasing physical activity among adolescents could contribute to modest reductions in stress and depression. Schools and community programs should prioritize opportunities for regular physical activity, particularly activities that adolescents find enjoyable and sustainable. Given the observed lack of association with anxiety, future interventions should also incorporate other strategies, such as cognitive-behavioral approaches or mindfulness, to address the full spectrum of psychological distress in this age group.

CONCLUSION

Overall, while the study provides valuable insights into the association between physical activity and psychological distress in adolescents, it underscores the need for a multifaceted approach to mental health promotion that goes beyond physical activity alone. Addressing psychological distress in adolescents requires a comprehensive strategy that integrates physical, psychological, and social interventions tailored to the unique needs and circumstances of young people.

REFERENCES

1. Li Y, Sun Q, Sun M, Sun P, Sun Q, Xia X. Physical Exercise and Psychological Distress: The Mediating Roles of Problematic Mobile Phone Use and Learning Burnout Among Adolescents. Int J Environ Res Public Health. 2021;18(17):9261.
2. Awick EA, Ehlers DK, Aguiñaga S, Daugherty AM, Kramer AF, McAuley E. Effects of a Randomized Exercise Trial on Physical Activity, Psychological Distress and Quality of Life in Older Adults. Gen Hosp Psychiatry. 2017;49:44-50.
3. Adams SA, Matthews CE, Ebbeling CB, Moore CG, Cunningham JE, Fulton J, et al. The Effect of Social Desirability and Social Approval on Self-Reports of Physical Activity. Am J Epidemiol. 2005;161(4):389-98.
4. Warburton DE, Nicol CW, Bredin SS. Health Benefits of Physical Activity: The Evidence. CMAJ. 2006;174(6):801-9.
5. Olive LS, Telford R, Byrne D, Abhayaratna WP, Telford RD. Psychological Distress Leads to Reduced Physical Activity and Fitness in Children: The Australian Longitudinal LOOK Study. J Behav Med. 2016;39:587-98.
6. Kleppang AL, Thurston M, Hartz I, Hagquist C. Psychological Distress Among Norwegian Adolescents: Changes Between 2001 and 2009 and Associations With Leisure Time Physical Activity and Screen-Based Sedentary Behavior. Scand J Public Health. 2019;47(2):166-73.
7. Copeland JL, Kowalski KC, Donen RM, Tremblay MS. Convergent Validity of the Physical Activity Questionnaire for Adults: The New Member of the PAQ Family. J Phys Act Health. 2005;2(2):216-29.
8. Mangerud WL, Bjerkeset O, Lydersen S, Indredavik MS. Physical Activity in Adolescents With Psychiatric Disorders and the General Population. Child Adolesc Psychiatry Ment Health. 2014;8(1):1-10.
9. Kuiper J, Broer J, Van Der Wouden J. Association Between Physical Exercise and Psychosocial Problems in 96 617 Dutch Adolescents in Secondary Education: A Cross-Sectional Study. Eur J Public Health. 2018;28(3):468-73.
10. Bell SL, Audrey S, Gunnell D, Cooper A, Campbell R. The Relationship Between Physical Activity, Mental Wellbeing and Symptoms of Mental Health Disorder in Adolescents: A Cohort Study. Int J Behav Nutr Phys Act. 2019;16:1-12.
11. Aaron DJ, Storti KL, Robertson RJ, Kriska AM, LaPorte RE. Longitudinal Study of the Number and Choice of Leisure Time Physical Activities From Mid to Late Adolescence: Implications for School Curricula and Community Recreation Programs. Arch Pediatr Adolesc Med. 2002;156(11):1075-80.
12. Abebe H, Fetene G, Gebeyehu E, Tamene S, Yimer T. Assessing Teenager's Engagement in Regular Physical Exercise: A Case Study in Selected Town Administrations of North Shoa Zone. Afri J. 2023;4(2).
13. McMullen M, Lau PK, Taylor S, McTigue J, Cook A, Bamblett M, Hasani A, Johnson CE. Factors Associated With Psychological Distress Amongst Outpatient Chemotherapy Patients: An Analysis of Depression, Anxiety and Stress Using the DASS-21. Appl Nurs Res. 2018;40:45-50.
14. Kowalski KC, Crocker PR, Donen RM. The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) Manual. College of Kinesiology, University of Saskatchewan. 2004;87(1):1-38.
15. MacFarland TW, Yates JM. Spearman's Rank-Difference Coefficient of Correlation. Introduction to Nonparametric Statistics for the Biological Sciences Using R. 2016:249-97.
16. Chekroud SR, Gueorguieva R, Zheutlin AB, Paulus M, Krumholz HM, Krystal JH, et al. Association Between Physical Exercise and Mental Health in 1.2 Million Individuals in the USA Between 2011 and 2015: A Cross-Sectional Study. Lancet Psychiatry. 2018;5(9):739-46.
17. Wu X, Tao S, Zhang Y, Zhang S, Tao F. 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. 2015;10(3)

18. McMahon EM, Corcoran P, O'Regan G, Keeley H, Cannon M, Carli V, et al. Physical Activity in European Adolescents and Associations With Anxiety, Depression, and Well-Being. Eur Child Adolesc Psychiatry. 2017;26:111-22.
19. Chi X, Liang K, Chen S-T, Huang Q, Huang L, Yu Q, et al. Mental Health Problems Among Chinese Adolescents During the COVID-19: The Importance of Nutrition and Physical Activity.
20. Bélair M-A, Kohen DE, Kingsbury M, Colman I. Relationship Between Leisure Time Physical Activity, Sedentary Behavior and Symptoms of Depression and Anxiety: Evidence From a Population-Based Sample of Canadian Adolescents. BMJ Open. 2018;8(10).
21. Khan BA, Hassandra MA. Interaction of Physical Activity, Mental Health and Quality of Life: A Study on University Students in Pakistan. J Phys Educ Res. 2016;3(2):01-10.