Physical Activity in Children
ISSN: 2783-5391

Original Article

Impact of a Cognitive-Behavioral Training on Physical Activity, Psychological Well-being and Resilience among Adolescent Girls

Najmeh Parhizmeymandi *

Assistant Professor, Department of Sports Sciences, Faculty of Humanities and Social Sciences, Ardakan University, Ardakan, Iran.

* *Corresponding Author:* Najmeh Parhizmeymandi, Assistant Professor, Department of Sports Sciences, Faculty of Humanities and Social Sciences, Ardakan University, Ardakan, Iran. Email: n.parhizmeymandi@ardakan.ac.ir

Received: 10 August, 2025; **Revised:** 07 September, 2025; **Accepted:** 06 October, 2025; **Published**: 11 October, 2025.

Abstract

Introduction: Research indicates that CBT is effective in various settings, including individual, couple, and family therapy. However, there has been a notable lack of investigation into its influence on the engagement of adolescent girls in physical activity and exercise as well as psychological health.
Objective: This study seeks to examine how CBT affects adolescent girls' participation in exercise, their perceived psychological well-being, and their resilience.
Methods: This study employed a quasi-experimental design, featuring both pre-test and post-test assessments along with a control group. It targeted adolescent girls aged 15 to 18 years old. A convenience sampling method was used to recruit 40 participants, who were randomly divided to either the intervention or control groups. A contemporary accelerometer, the short-form Ryff's Psychological Well-Being Scale (RPWBS) and the Davidson & Conner Resilience Questionnaire were administered to evaluate the variables. The intervention consisted of an eight-session CBT program. Data analysis was performed using ANCOVA via SPSS version 27.
Results: The findings indicate a significant increase in physical activity among participants of the intervention group following involvement in the CBT program (36.97±5.39 vs. 45.96±6.45, F=20.638, P<0.001). Additionally, participants of the intervention group reported an increase in perceived psychological well-being (49.82±8.47 vs. 69.87±10.47, F=22.481, P<0.001). Finally, participants of the intervention group reported an increase in resilience (63.54±8.45 vs. 89.87±12.47, F=30.774, P<0.001).
Conclusion: CBT has proven effective in alleviating psychological symptoms and increasing resilience and physical activity among adolescent girls. Consequently, it is recommended that physical education instructors incorporate this training into their curriculum to bolster both the psychological and physical health of adolescent girls.

Keywords: CBT, Exercise, Depression, Resilience, Adolescent

How to Cite: Parhizmeymandi N. Impact of a Cognitive-Behavioral Training on Physical Activity, Psychological Well-being and Resilience among Adolescent Girls. Phys. Act. Child. 2025;2(1):67-72. doi: 10.22034/pach.2025.540509.1066

1. Introduction

Adolescence is broadly defined as the transitional phase between childhood and adulthood, typically occurring between the ages of 12 and 18 (1). This period aligns with the onset of puberty, characterized by significant hormonal changes that lead to the development of secondary sexual characteristics and alterations in body composition (2). Adolescence is marked by heightened risk-taking behaviors and increased emotional sensitivity, often coinciding with shifts in social dynamics, such as reduced parental involvement and greater peer interaction, alongside a growing sense of autonomy (3). These behavioral transformations are shaped by a complex interplay of external environmental influences and internal developmental factors. Rather than being a fixed timeframe, adolescence should be viewed as a dynamic developmental stage, reflecting considerable variability in both behavior and development (4).

Young individuals aged 12 to 18 represent 18% of the global population, encompassing younger adolescents (12-14 years) and older adolescents (15-18 years) (4,5). It is emphasized that investing in the health and well-being of adolescents can provide a "triple benefit" that extends into adulthood and positively impacts future generations. Although adolescence is typically viewed as a healthy stage of life, it is also a critical period for the development of modifiable risk behaviors, such as smoking, poor dietary habits, and insufficient physical activity, which can lead to non-communicable diseases (NCDs) later on (5,6). Recent global trends indicate a decline in the overall disease burden among adolescents in many regions over the past 25 years; however, nearly one in five adolescents worldwide—approximately 324 million—are now classified as overweight or obese, alongside a rising incidence of mental health disorders, including depression and anxiety (7). Furthermore, an estimated 962.8 million adolescents, or 53% of the global adolescent population, reside in multi-burden countries, facing a "triple burden" of health challenges that includes infectious diseases, injuries, and NCDs (8,9). This situation underscores the urgent need for enhanced

understanding and innovative solutions to address adolescent health and well-being.

Physical inactivity is linked to numerous NCDs and incurs significant economic burdens worldwide. It is estimated to contribute to approximately 5.3 million deaths annually and results in direct healthcare costs exceeding $54 billion, with $31 billion borne by the public sector (10,11). While physical inactivity is acknowledged as a global pandemic, much of the research has focused on adults, where the impact on NCDs is more evident. Recent studies, however, indicate a troubling rise in the prevalence of NCDs, such as type 2 diabetes, and associated risk factors like hypertension and obesity among adolescents (12,13). Despite the well-documented health risks associated with physical inactivity throughout life and the concerningly low levels of physical activity among youth, no indicators related to physical activity were included in the commission's framework (13-15). This oversight suggests that physical activity is not prioritized in adolescent health initiatives, highlighting the urgent need to realign global prevention strategies to incorporate physical activity for this demographic. Hence, it is essential to enhance our understanding of physical activity among adolescents to facilitate the implementation of effective strategies.

Adolescence is marked by significant psychological transformations, including the development of future-oriented thinking, the ability to evaluate different options, and enhanced introspection and reasoning skills (6,16). This stage also introduces new levels of autonomy and assertiveness, alongside evolving cognitive and sexual capabilities. However, adolescents often navigate these changes within challenging social contexts characterized by family and peer pressures, cultural expectations, and societal demands, which can lead to an extended period of adolescence and delays in assuming adult responsibilities (17,18). During this critical phase, various psychological and psychiatric issues may arise, exacerbated by factors such as violence, poverty, stigma, and deprivation, all of which can adversely impact mental well-being. The repercussions of neglecting adolescent mental health can persist into adulthood, affecting both physical and psychological health. Consequently, psychological well-being emerges as a crucial factor during adolescence, as defined by the World Health Organization, which emphasizes that mental health encompasses more than just the absence of illness; it involves realizing one's potential, managing life's stresses, and contributing positively to the community (17,19). Globally, approximately one in seven individuals aged 10 to 18 suffers from a mental disorder, which represents 15% of the overall disease burden in this demographic. Among adolescents, depression, anxiety, and behavioral disorders are significant contributors to illness and disability. Furthermore, suicide ranks as the third leading cause of death among adolescents (17,18,20). The repercussions of neglecting adolescent mental health issues can persist into adulthood, adversely affecting both physical and mental well-being and restricting the potential for a fulfilling life. Therefore, it is essential to enhance our understanding of psychological well-being among adolescents to facilitate the implementation of effective strategies.

Adolescents often face significant challenges, including interpersonal conflicts and academic pressures, which can heighten their susceptibility to negative experiences, resulting in increased anxiety, depression, stress, and feelings of isolation (21-23). Despite many young people encountering similar difficulties, individual responses can vary widely, prompting an exploration of why some adolescents demonstrate resilience while others struggle (23,24). We propose that certain students exhibit a higher degree of personal resilience, which equips them to navigate adverse situations more effectively (25,26). Hence, it is essential to enhance our understanding of resilience among adolescents to facilitate the implementation of effective strategies.

In contemporary psychological discourse, a variety of methods aimed at enhancing mental health and psychological well-being have been explored, with several demonstrating notable effectiveness (27,28). Among these, cognitive-behavioral therapy (CBT) stands out as a particularly impactful intervention for managing mental health issues such as depression, anxiety disorders, obsessive-compulsive disorder, eating disorders, and borderline personality disorder (28-30). Notably, CBT is also employed to enhance the functioning of individuals without diagnosed psychological conditions. This therapeutic approach is grounded in the premise that maladaptive beliefs, ineffective coping strategies, and negative emotional states significantly contribute to the emergence and persistence of various psychological challenges (31-33). CBT utilizes a structured psychoeducational framework, emphasizing the importance of homework assignments. Its distinctive features encompass cognitive strategies like identifying cognitive distortions, fostering a positive self-concept, cognitive restructuring, and enhancing self-talk, alongside behavioral strategies that include modeling, exposure therapy, play therapy, muscle relaxation techniques, and skills training, all aimed at bolstering coping abilities and fostering self-confidence and self-efficacy (33-35). Research indicates that CBT effectively lowers stress levels in patients. Additionally, this approach has proven beneficial in addressing various mental health issues, including generalized anxiety, stress, obsessive-compulsive disorder, phobias, depression, and behavioral challenges (33,35,36). Evidence also supports the efficacy of CBT in individual, couple, and family contexts (35,37). However, there has been limited focus on its impact on psychological well-being and participation of adolescents in physical activity and exercise. Consequently, this study aims to explore the effects of CBT on physical activity, psychological well-being and resilience among adolescent girls.

2. Methods

2.1. Design and Participants

This quasi-experimental study utilized pre-tests and post-tests alongside a control group to assess the impact of an intervention on adolescent girls aged 15 to 18. A total of 40 participants were recruited through convenience sampling and randomly assigned to either the intervention or control group, with each group consisting of 20 individuals. The sample size was calculated using G*Power software, which established a significance level of 0.05 and a power of 0.95. Participants had to meet specific inclusion criteria, including being female adolescents, providing written

informed consent, and not being on psychiatric medication. Exclusion criteria included missing more than two sessions, expressing dissatisfaction with participation, and failing to complete assigned tasks.

2.2. Measurements

A contemporary accelerometer, known for its high validity and reliability, was utilized to evaluate physical activity. This device was securely fastened to the right thigh for a duration of seven days, with the exception of periods spent sleeping, bathing, or engaging in activities that could potentially harm the device. It is capable of measuring various levels of physical activity, encompassing light, moderate, and vigorous intensities. In this study, moderate-to-vigorous physical activity (MVPA) was used as an indicator of physical activity.

The short-form Ryff's Psychological Well-Being Scale (RPWBS) (38), comprising 18 items, was utilized to evaluate psychological well-being. Participants responded using a six-point Likert scale, where 1 represented complete disagreement and 6 indicated complete agreement. Higher scores reflect enhanced psychological well-being. In this study, the validity of this instrument has been confirmed by nine experts, yielding a CVI of 0.94 and a CVR of 0.95. Moreover, this scale exhibited strong internal consistency, evidenced by a Cronbach's alpha of 0.92.

The resilience assessment utilized the Davidson & Conner Resilience Questionnaire (39), which consists of 25 items rated on a Likert scale ranging from 0 (completely false) to 5 (always true). This scoring framework produces a total score between 0 and 100, where higher scores indicate greater resilience. In this study, the validity of this instrument has been confirmed by nine experts, yielding a CVI of 0.96 and a CVR of 0.94. Moreover, the scale demonstrated robust internal consistency, as indicated by a Cronbach's alpha coefficient of α=0.93.

2.3 Procedure

The research commenced with the necessary approvals from the Department of Education. Before the study began, a briefing session was held to outline the study's goals and methods, highlighting the significance of physical activity for adolescents' physical and mental health, as well as the role of CBT in enhancing their exercise participation. A physician conducted health assessments, and participants received a consent form detailing their involvement, which required signatures from both them and their parents if they agreed to participate. A pre-test was administered to assess their exercise habits, psychological well-being, and resilience. Subsequently, the intervention group engaged in an eight-session group CBT program (33,35), while the control group did not receive any specific training. The CBT intervention encompassed a range of components aimed at enhancing understanding of the interplay between thoughts, emotions, and behaviors. It involved clarifying the distinctions among these elements, addressing dysfunctional thinking patterns, and identifying common cognitive errors. Participants were provided with worksheets to aid in reconstructing their thoughts, alongside guidance on essential steps for this process, which included recognizing, evaluating, and altering thoughts, as well as assessing the impact of these modified thoughts. The intervention also highlighted the significance of understanding behavioral chains, differentiating between passive, aggressive, and assertive behaviors, and offered strategies to elevate mood and incorporate enjoyable activities. Additionally, it covered concepts related to stress, stressors, and effective stress management techniques, while also presenting methods to enhance self-esteem. At the end of the intervention, all participants completed a post-test under the same conditions as the pre-test.

2.4. Data Analysis

The research variables were characterized using the mean and standard deviation (SD). To assess the normality of the data distribution, the Kolmogorov-Smirnov test was applied. An independent t-test was utilized to compare the baseline data (pretest) between groups. Furthermore, an analysis of covariance (ANCOVA) was conducted to evaluate the differences between groups from pretest to posttest. All statistical analyses were carried out using SPSS version 27, with a significance level set at 0.05.

3. Results

The demographic analysis of the study groups revealed that the intervention group had a mean age of 16.89 years (±1.52), while the control group had a mean age of 17.04 years (±1.48), with no statistically significant difference between the two (P=0.785). The body mass index (BMI) analysis also indicated no significant variation between the intervention and control groups (P=0.529).

Table 1 displays the mean and standard deviation for MVPA, psychological well-being, and resilience assessed during both the pretest and posttest phases. The findings indicate that the intervention group had an average MVPA of 36.97 minutes per day, while the control group recorded 37.80 minutes per day, highlighting a generally low level of physical activity among female adolescents. Statistical analysis showed no significant differences between the two groups in the pretest phase (P=0.927). Regarding psychological well-being, the intervention group's mean score was 49.82, compared to 50.21 for the control group, with both scores reflecting low psychological well-being and no significant differences noted in the pretest (P=0.952). For resilience, the intervention group achieved a mean score of 63.54, while the control group scored 62.47, indicating a medium level of resilience, yet again, no significant differences were found in the pretest (P=0.897). These results suggest that both groups had similar baseline characteristics across the measured variables.

Table 1. Mean and SD of Research Variables in the Pre-test and Post-test.

	Intervention		Control	
	Pre-test	Post-test	Pre-test	Post-test
MVPA	36.97 ± 5.39	45.96 ± 6.45	37.80 ± 4.88	38.04 ± 5.22
Psychological Well-Being	49.82 ± 8.47	69.87 ± 10.47	50.21 ± 8.87	49.76 ± 8.94
Resilience	63.54 ± 8.45	89.87 ± 12.47	62.47 ± 8.69	61.74 ± 7.85

Table 2 illustrates the effects of the intervention on MVPA, psychological well-being, and resilience. The analysis conducted at the conclusion of the intervention revealed significant differences among groups regarding these parameters, with a p-value of less than 0.001. These results indicate that the CBT intervention effectively improved physical activity, psychological well-being, and resilience in female adolescents.

Table 2. Comparison of Pre-test-Post-test.

	SS	df	MS	F	P-Value	η^2
MVPA	5.647	1	2.84	20.638	<0.001	0.293
Psychological well-being	6.958	1	3.485	22.481	<0.001	0.305
Resilience	8.964	1	4.875	30.774	<0.001	0.455

4. Discussion

Research demonstrates that cognitive-behavioral therapy (CBT) significantly reduces stress levels in patients and is effective in treating a range of mental health conditions, such as generalized anxiety, obsessive-compulsive disorder, phobias, depression, and behavioral issues. Despite its proven efficacy, there has been insufficient investigation into its effects on the psychological well-being and physical activity engagement of adolescents. This study seeks to examine the influence of CBT on physical activity, psychological well-being, and resilience specifically among adolescent girls. The findings revealed notable differences in posttest results across groups, suggesting that the CBT intervention successfully enhanced physical activity, psychological well-being, and resilience in this demographic.

To interpret these findings, it can be stated that CBT has been demonstrated to effectively enhance physical activity levels and diminish perceived stress by altering individuals' perceptions and responses to stress, which are influenced by their past experiences, current situations, and learned behaviors (33). This therapeutic approach equips individuals with new cognitive and behavioral strategies that promote the replacement of negative self-images and bleak outlooks on life. By recognizing stress-inducing scenarios and applying appropriate coping mechanisms, CBT helps individuals identify and transform negative thoughts into more rational and objective viewpoints (34,35). These techniques not only bolster mental resilience through behavioral practices and relaxation exercises but also improve anxiety management, potentially resulting in reduced anxiety levels. Moreover, there exists a significant relationship between an individual's beliefs, self-esteem, and their environment, all of which affect their coping skills, overall quality of life, and satisfaction (34). By challenging and reframing beliefs, CBT can significantly enhance an individual's thought processes and overall well-being. Research supports that this approach effectively reduces stress and anxiety while improving life quality. Additionally, older women participating in this study found group therapy beneficial, as it created a sense of community among peers facing similar challenges (35,37).

Sharing experiences with others not only promotes the exchange of information but also helps alleviate concerns. CBT emphasizes the significant role of cognition in shaping emotions and behaviors, suggesting that individuals respond more to their perceptions of events than to the events themselves (34). Self-awareness, which includes an understanding of one's traits, needs, strengths, weaknesses, desires, fears, emotions, values, and identity, is essential for nurturing effective and empathetic social interactions (36,37). A deficiency in self-awareness can result in psychosocial challenges such as feelings of inferiority, low self-esteem, communication barriers, loneliness, and substance abuse. CBT posits that thoughts have a profound influence on emotions, and by addressing maladaptive thinking patterns and managing behaviors, individuals can alleviate stress and improve their psychological well-being (33,34). Familiarity with cognitive behavioral principles and awareness of typical stress and anxiety responses can enhance self-awareness, empowering individuals to take greater control over their actions and adopt more constructive responses in various situations.

Adaptive strategies, including acceptance, strategic planning, and perspective-taking, positively influence an individual's social functioning and facilitate cognitive restructuring, ultimately enhancing mental health (32). CBT specifically targets negative thought patterns, such as self-blame, and encourages the adoption of rational, positive appraisals that individuals are guided to practice and reinforce (24,25). This approach significantly improves cognitive emotion regulation by diminishing negative aspects of emotional self-regulation, such as blaming others and catastrophic thinking, while simultaneously fostering positive elements like constructive attention and appraisal. Furthermore, CBT has been shown to reduce irritability, indicating its effectiveness in managing emotions and alleviating irritability, particularly in older adults (27,28).

CBT serves as a structured method to enhance an individual's self-regulation by promoting relaxation, modifying cognitive patterns, and fostering awareness of thoughts and beliefs. This approach significantly aids individuals in accepting their current realities (32). Within CBT, participants are encouraged to embrace their emotions rather than avoid them, to concentrate on their cognitive processes, and to connect these thoughts to meaningful activities (33). Consequently, therapy sessions introduce the concept of desire as a substitute for control, accompanied by relevant exercises aimed at improving self-regulation, a key factor in alleviating psychological distress among older adults. This therapeutic framework encourages individuals to pursue their goals and values while remaining present, thereby fostering a sense of purpose and commitment among older adults (31).

This study encountered several limitations that should be acknowledged. Primarily, its concentration on female adolescents may restrict the applicability of the results to other demographics, including younger children and males, indicating a need for future research to encompass these groups. Conversely, the research demonstrated notable strengths, especially in its investigation of physical activity through the use of

modern technology, an aspect that has been insufficiently explored in earlier studies.

4.1. Conclusions

CBT has proven effective in alleviating psychological symptoms and increasing resilience and exercise among adolescent girls. This approach not only fosters improved psychological well-being but also promotes mental resilience and a greater level of physical activity. Consequently, it is recommended that physical education instructors incorporate this training into their curriculum to bolster both the psychological and physical health of adolescent girls. Furthermore, additional research is warranted to explore the effectiveness of such interventions across diverse demographic groups.

Acknowledgments

The authors is grateful to all the participants who participated in this research.

Footnotes

Authors' Contribution: This study was carried out solely by the corresponding author.

Conflicts of Interest

Non to declare.

Data Availability: The data that support the findings of this study are openly available upon request from the corresponding author.

Ethical Approval: The author confirms that all steps and requirements of this study comply with ethical guidelines. Participants were informed about the characteristics of the study and gave written informed consent.

Funding Support

This study received no grant.

Informed Consent: Informed written consent was obtained from all participants

Supplementary information accompanies this paper at doi: 10.22034/pach.2025.540509.1066

ORCID iD

Najmeh Parhizmeymandi https://orcid.org/0000-0001-9312-2434

References

1. Mastorci F, Lazzeri MFL, Vassalle C, Pingitore A. The Transition from Childhood to Adolescence: Between Health and Vulnerability. Children (Basel). 2024;**11**(8):989. [PubMed ID: 39201923]. [PubMed Central ID: PMC11352511]. https://doi.org/10.3390/children11080989
2. Chaku N, Davis-Kean PE. Positioning adolescence in the developmental timeline. J Res Adolesc. 2024;**34**(4):1191-1200. [PubMed ID: 38752795]. [PubMed Central ID: PMC11606252]. https://doi.org/10.1111/jora.12928
3. Branje S, de Moor EL, Spitzer J, Becht AI. Dynamics of Identity Development in Adolescence: A Decade in Review. J Res Adolesc. 2021;**31**(4):908-927. [PubMed ID: 34820948]. [PubMed Central ID: PMC9298910]. https://doi.org/10.1111/jora.12678
4. Bie F, Yan X, Xing J, Wang L, Xu Y, Wang G, Wang Q, Guo J, Qiao J, Rao Z. Rising global burden of anxiety disorders among adolescents and young adults: trends, risk factors, and the impact of socioeconomic disparities and COVID-19 from 1990 to 2021. Front Psychiatry. 2024;**15**:1489427. [PubMed ID: 39691785]. [PubMed Central ID: PMC11651023]. https://doi.org/10.3389/fpsyt.2024.1489427
5. Alhassan AR, Wepeba TW, Abdulai K, Iddrisu R, Aninanya GA. Prevalence and Associated Factors of Adolescent (15-19 Years) Childbearing in Ghana. Biomed Res Int. 2024;**2024**:3237882. [PubMed ID: 39149697]. [PubMed Central ID: PMC11325008]. https://doi.org/10.1155/2024/3237882
6. Kapadia F. Adolescent Mental Health and Well-Being: A Public Health of Consequence, February 2024. Am J Public Health. 2024;**114**(2):158-160. [PubMed ID: 38335487]. [PubMed Central ID: PMC10862208]. https://doi.org/10.2105/ajph.2023.307543
7. Lu B, Lin L, Su X. Global burden of depression or depressive symptoms in children and adolescents: A systematic review and meta-analysis. J Affect Disord. 2024;**354**:553-562. [PubMed ID: 38490591]. https://doi.org/10.1016/j.jad.2024.03.074
8. Zhang X, Liu J, Ni Y, Yi C, Fang Y, Ning Q, Shen B, Zhang K, Liu Y, Yang L, Li K, Liu Y, Huang R, Li Z. Global Prevalence of Overweight and Obesity in Children and Adolescents: A Systematic Review and Meta-Analysis. JAMA Pediatr. 2024 Aug 1;**178**(8):800-813. [PubMed ID: 38856986]. [PubMed Central ID: PMC11165417]. https://doi.org/10.1001/jamapediatrics.2024.1576
9. Borodovsky JT, Squeglia LM, Mewton L, Marsch LA. Longitudinal Use Patterns of Technology Subtypes During the Transition Into Early Adolescence: Results From the Adolescent Brain Cognitive Development Study. J Adolesc Health. 2024;**75**(5):809-818. [PubMed ID: 39140927]. [PubMed Central ID: PMC11490364]. https://doi.org/10.1016/j.jadohealth.2024.06.020
10. Laurier C, Pascuzzo K, Jubinville V, Lemieux A. Physical activity and its benefits on adolescents' mental health through self-esteem. Front Child Adolesc Psychiatry. 2024;**3**:1503920. [PubMed ID: 39816571]. [PubMed Central ID: PMC11732102]. https://doi.org/10.3389/frcha.2024.1503920
11. Simpson A, Teague S, Kramer B, Lin A, Thornton AL, Budden T, Furzer B, Jeftic I, Dimmock J, Rosenberg M, Jackson B. Physical activity interventions for the promotion of mental health outcomes in at-risk children and adolescents: a systematic review. Health Psychol Rev. 2024;**18**(4):899-933. [PubMed ID: 39162060]. https://doi.org/10.1080/17437199.2024.2391787
12. Ruiz-Ranz E, Asín-Izquierdo I. Physical activity, exercise, and mental health of healthy adolescents: A review of the last 5 years. Sports Med Health Sci. 2024;**7**(3):161-172. [PubMed ID: 39991129]. [PubMed Central ID: PMC11846438]. https://doi.org/10.1016/j.smhs.2024.10.003.
13. Liu C, Liang X, Yang Y, Liu R, Arbour-Nicitopoulos K, Sit CH. Mechanisms Linking Physical Activity With Mental Health in Children and Adolescents With Neurodevelopmental Disorders: A Systematic Review. Am J Prev Med. 2024;**67**(4):592-605. [PubMed ID: 38844148]. https://doi.org/10.1016/j.amepre.2024.05.022
14. Haapala EA, Leppänen MH, Skog H, Lubans DR, Viitasalo A, Lintu N, Jalanko P, Määttä S, Lakka TA. Childhood Physical Fitness as a Predictor of Cognition and Mental Health in Adolescence: The PANIC Study. Sports Med. 2025;**55**(2):487-497. [PubMed ID: 39251523]. [PubMed Central ID: PMC11947037]. https://doi.org/10.1007/s40279-024-02107-z
15. Fu Q, Li L, Li Q, Wang J. The effects of physical activity on the mental health of typically developing children and adolescents: a systematic review and meta-analysis. BMC Public Health. 2025;**25**(1):1514. [PubMed ID: 40269876]. [PubMed Central ID: PMC12016293]. https://doi.org/10.1186/s12889-025-22690-8
16. Stevens GWJM. Editorial: Adolescent mental health in a rapidly changing world. J Child Psychol Psychiatry. 2024;**65**(12):1551-1553. [PubMed ID: 39539246]. https://doi.org/10.1111/jcpp.14065
17. Lin J, Guo W. The Research on Risk Factors for Adolescents' Mental Health. Behav Sci (Basel). 2024;**14**(4):263. [PubMed ID: 38667059]. [PubMed Central ID: PMC11047495]. https://doi.org/10.3390/bs14040263
18. Viksveen P, Cardenas NE, Berg SH, Salamonsen A, Game JR, Bjønness S. Adolescents' involvement in mental health treatment and service design: a systematic review. BMC Health Serv Res. 2024;**24**(1):1502. [PubMed ID: 39609818]. [PubMed Central ID: PMC11606120]. https://doi.org/10.1186/s12913-024-11892-2
19. Hart C, Norris SA. Adolescent mental health in sub-Saharan Africa: crisis? What crisis? Solution? What solution? Glob Health Action. 2024;**17**(1):2437883. [PubMed ID: 39819418]. [PubMed Central ID: PMC11749116]. https://doi.org/10.1080/16549716.2024.2437883
20. Borg ME, Heffer T, Willoughby T. Generational Shifts in Adolescent Mental Health: A Longitudinal Time-Lag Study. J Youth Adolesc. 2025;**54**(4):837-848. [PubMed ID: 39395919]. [PubMed Central ID: PMC11933222]. https://doi.org/10.1007/s10964-024-02095-3
21. Li X, Wang J, Yu H, Liu Y, Xu X, Lin J, Yang N. How does physical activity improve adolescent resilience? Serial indirect effects *via* self-efficacy and basic psychological needs. PeerJ. 2024;**12**:e17059. [PubMed ID: 38436018]. [PubMed Central ID: PMC10909365]. https://doi.org/10.7717/peerj.17059
22. Rachmayanti RD, Dewi FST, Setiyawati D, Megatsari H, Diana R, Vinarti R. Using Digital Media to Improve Adolescent Resilience and Prevent Mental Health Problems: Protocol for a Scoping Review. JMIR Res Protoc. 2024;**13**:e58681. [PubMed ID: 39413373]. [PubMed Central ID: PMC11525077]. https://doi.org/10.2196/58681. Erratum in: JMIR Res Protoc. 2024;**13**:e67759. https://doi.org/10.2196/67759
23. Danpho W, Thommachot P. Factors related to resilience of adolescents living in out-of-home care settings in Bangkok. BMJ

Paediatr Open. 2025;**9**(1):e003238. [PubMed ID: 40316406]. [PubMed Central ID: PMC12049981]. https://doi.org/10.1136/bmjpo-2024-003238
24. Rudolph KD, Troop-Gordon W, Skymba HV, Modi HH, Ye Z, Clapham RB, Dodson J, Finnegan M, Heller W. Cultivating emotional resilience in adolescent girls: Effects of a growth emotion mindset lesson. Child Dev. 2025;**96**(1):389-406. [PubMed ID: 39367719]. [PubMed Central ID: PMC11693836]. https://doi.org/10.1111/cdev.14175
25. Turgut Atak N, Bebiş H. Risk Factors Affecting the Psychological Resilience of Adolescents in Institutional Care: A Systematic Review. Psychiatry Clin Psychopharmacol. 2024;**34**(3):252-264. [PubMed ID: 39464696]. [PubMed Central ID: PMC11500448]. https://doi.org/10.5152/pcp.2024.23782
26. Tannenbaum K, McMaster HS. The Study of Adolescent Resilience (SOAR): a research protocol. Front Child Adolesc Psychiatry. 2024;**3**:1346726. [PubMed ID: 39816611]. [PubMed Central ID: PMC11731603]. https://doi.org/10.3389/frcha.2024.1346726
27. Tang W, Kreindler D. Supporting Homework Compliance in Cognitive Behavioural Therapy: Essential Features of Mobile Apps. JMIR Ment Health. 2017;**4**(2):e20. [PubMed ID: 28596145]. [PubMed Central ID: PMC5481663]. https://doi.org/10.2196/mental.5283
28. Sahranavard S, Esmaeili A, Dastjerdi R, Salehiniya H. The effectiveness of stress-management-based cognitive-behavioral treatments on anxiety sensitivity, positive and negative affect and hope. Biomedicine (Taipei). 2018;**8**(4):23. [PubMed ID: 30474604]. [PubMed Central ID: PMC6254097]. https://doi.org/10.1051/bmdcn/2018080423
29. Toosang MA, Pasha R, Safarzadeh S. The Effect of Cognitive-Behavioral Therapy Training on Resilience and Psychological Hardiness in Students during COVID-19 Pandemic Situation. Int J School Health. 2021;**8**(4):247-256. https://doi.org/10.30476/intjsh.2021.93392.1191
30. Badami R. Impact of Exergaming on Intention to Physical Activity, Self-Efficacy and Physical Self-Concept in Adolescents with Obesity. Phys Act Child. 2025;**2**(1):1-6. https://doi.org/10.22034/PACH.2025.504940.1043
31. Harris KM, Gaffey AE, Schwartz JE, Krantz DS, Burg MM. The Perceived Stress Scale as a Measure of Stress: Decomposing Score Variance in Longitudinal Behavioral Medicine Studies. Ann Behav Med. 2023;**57**(10):846-854. [PubMed ID: 37084792]. [PubMed Central ID: PMC10498818]. https://doi.org/10.1093/abm/kaad015
32. Ilkim M. Associations between Resilience and the Rehabilitation's Beliefs among Injured Student-Athletes: Mediating Role of Social Support. Phys Act Child. 2024;**1**(2):55-60. https://doi.org/10.61186/pach.2024.486723.1036
33. Abdoshahi M. Effects of an Intervention Based on Cognitive-Behavioral Therapy on Emotional Well-being of Athletic Adolescents with Injuries. Phys Act Child. 2024;**1**(2):61-68. https://doi.org/10.61186/pach.2024.488934.1038
34. Gotlib IH, Joormann J. Cognition and depression: current status and future directions. Annu Rev Clin Psychol. 2010;**6**:285-312. [PubMed ID: 20192795]. [PubMed Central ID: PMC2845726]. https://doi.org/10.1146/annurev.clinpsy.121208.131305
35. Curtiss JE, Levine DS, Ander I, Baker AW. Cognitive-Behavioral Treatments for Anxiety and Stress-Related Disorders. Focus (Am Psychiatr Publ). 2021;**19**(2):184-189. [PubMed ID: 34690581]. [PubMed Central ID: PMC8475916]. https://doi.org/10.1176/appi.focus.20200045
36. Stanisławski K. The Coping Circumplex Model: An Integrative Model of the Structure of Coping with Stress. Front Psychol. 2019;**10**:694. [PubMed ID: 31040802]. [PubMed Central ID: PMC6476932]. https://doi.org/10.3389/fpsyg.2019.00694
37. Kuribayashi K, Takano A, Inagaki A, Imamura K, Kawakami N. Effect of stress management based on cognitive-behavioural therapy on nurses as a universal prevention in the workplace: a systematic review and meta-analysis protocol. BMJ Open. 2022;**12**(9):e062516. [PubMed ID: 36123105]. [PubMed Central ID: PMC9486364]. https://doi.org/10.1136/bmjopen-2022-062516
38. Stavraki M, García-Márquez R, Bajo M, Callejas-Albiñana AI, Paredes B, Díaz D. Brief Version of the Ryff Psychological Well-Being Scales for Children and Adolescents: Evidence of Validity. Psicothema. 2022;**34**(2):316-322. [PubMed ID: 35485546]. https://doi.org/10.7334/psicothema2021.235
39. Connor KM, Davidson JR. Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC). Depress Anxiety. 2003;**18**(2):76-82. [PubMed ID: 12964174]. https://doi.org/10.1002/da.10113