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ARTICLE

The Effect of Aerobic Exercise on Self-esteem and Mental Health of Adolescent Girls in Orphanages

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ABSTRACT: : The study aimed to investigate the effect of aerobic exercise on self-esteem and mental health of adolescent girls in orphanages in Mashhad. This quasi-experimental study was a pretest-posttest with a control group. The participants included 30 adolescent girls from orphanages, aged 17 to 25, who voluntarily participated in the research. Aerobic exercises were performed for 8 weeks, three 45-minute sessions per week. Shapiro-Wilk, ANCOVA, and Sidak tests were used to analyze the data. The results showed that aerobic exercise has a significant effect on increasing self-esteem and improving mental health of adolescent girls in orphanages. These findings indicate that aerobic exercise as an effective intervention can help improve mental health and self-esteem in vulnerable groups such as adolescents in orphanages. The findings are also consistent with previous domestic and international research and emphasize the importance of including physical activity in adolescent support and empowerment programs.
KEYWORDS: Aerobic exercises, self-esteem, mental health, adolescent girls in orphanages.

1 Introduction

Adolescence is a transitional stage of human physical and psychological development that occurs between childhood and youth. During adolescence, a person undergoes cognitive, physical, psychological, and sexual changes (Abasian et al., 2020). According to the World Health Organization, a person aged 17 to 25 is considered an adolescent, and this period is the most sensitive period of life for the individual (Karimi et al., 2016). Also, humans go through different stages during their development, each stage being accompanied by specific opportunities and needs. One of these stages is adolescence, which involves significant changes. Given the sensitivity of this period, the importance of this issue is doubly high for a group of people who are deprived of the blessings of a family for various reasons. This group is the group of unaccompanied children and adolescents, who are considered the most vulnerable people in society (Karimi et al., 2016) and are more exposed to emotional and mental crises than people who were raised in the family

circle. The growth center is vital for the life of every family member, because it provides emotional, psychological, and educational support. This is while unaccompanied children and adolescents who live in welfare centers due to the death of their parents, physical and mental problems, parental divorce, family and financial problems, parental remarriage, poverty, or terminal illness of their parents are deprived of it. Also, grief due to the loss of family exposes the person to psychological and emotional harm (Karimi et al., 2016).

In environments such as orphanages, children and adolescents face psychological, emotional, and social communication problems. In fact, what can be recognized as the core of the losses and problems in such environments are the perceptions, interpretations, and misinterpretations of unaccompanied adolescents about their living conditions, which ultimately lead to emotional distress, including mental disorders and reduced self-esteem (Tadayoni et al., 2023). On the other hand, girls in orphanages face challenges and issues such as abandonment, depressed mood, behavioral problems and injuries, discharge and its problems, problems with group life, worries about the future, social stigma, and deficiencies such as lack of family and emotional deficiencies (Bolshideh et al., 2024).

Also, due to lack of self-esteem and self-confidence, these people feel inadequate and unworthy about themselves, which causes them to have problems with social skills. Due to the above-mentioned issues, these people are unable to establish social interactions (Bavi & Khodabakhshi- Kolaei, 2015). Another issue is that orphaned girls face many internal and external emotional and social problems. External problems include extroverted behaviors such as physical aggression, irritability, anger, and self-will, and internal problems include depression, anxiety, social isolation, sadness, fear, and difficulty in accepting society (Ameri et al., 2022). The aforementioned external and internal problems can have harmful effects on individuals and society, causing changes in behavior, desires, needs, sensitivity, and outbursts in the individual. With the loss of parents in these individuals, a state has arisen that in psychology is called a critical stage. The severity of this damage in individuals of different age groups varies. In adolescents, due to the sensitivity of adolescence and the changes that occur in the biological characteristics of the individual, it causes anxiety, aggression, depression, and psychological stress in adolescents (Abasian et al., 2020).

In this regard, in the Oxford dictionary, the definition of self-esteem is confidence in one's own values and abilities. Also, in social psychology, it is considered a self-concept through which we think about ourselves. Research indicates that the self-esteem of unaccompanied adolescents is lower than that of ordinary people and there is a difference between these two groups of people. Unaccompanied adolescents suffer from psychological damage, including lack of self-confidence and self-esteem, due to the lack of safe relationships such as the warm family center where safe relationships prevail among members, and their internal thinking about themselves is that they are ineffective people. Although the orphanage officials are compassionate in their efforts to meet the emotional and psychological needs of the unaccompanied children and adolescents who are cared for in these centers, they cannot act like parents and provide them with sufficient attention and affection. In various schools of psychology, it has been repeatedly discussed that self-esteem is a central and fundamental factor in social adaptation and individual development (Karimi et al., 2016). High self-esteem is equal to the balance between self-concept and ideal self, and when the balance of these two components is disrupted, a weakness in self-esteem occurs. Among the characteristics of people with high and low self-esteem, it can be noted that people with high self-esteem try to pay more attention to their strengths, while people with low self-esteem focus on their weaknesses and suffer from self-satisfaction, the formation of contradictory attitudes, psychological trauma, social problems, and risky behaviors (Naderi-Lordejani et al., 2019).

On the other hand, in today's society, neglect of health, mental health, and lack of psychological security are among the major problems of children and adolescents, and in various fields of psychology, there has been a great deal of emphasis on the necessity and importance of personality formation during this period. If children and adolescents are educated with targeted education, they can take a big step towards their mental health in the future. Also, they will not have difficulty making decisions when dealing with different situations (Ameri et al., 2022). According to the definition of the World Health Organization, mental health includes psychological well-being, perceived self-efficacy, autonomy, empowerment, intergenerational dependence, self-actualization, logical and emotional thoughts of the individual, etc. Also, according to the definition of the World Health Organization, mental health does not mean the absence of disease or illness, but rather a state in which the individual is in a desirable physical, mental and social state. According to psychologists, among the things that affect the mental health of individuals, we can mention individual characteristics, psychological and environmental pressures, the socio-economic status of the family, failure to achieve life goals, and lack of motivation (Bavi & Khodabakhshi-Kolaei, 2015).

In this regard, many solutions have been proposed for the psychological problems of adolescents in foster care, one of which is physical activity such as aerobic exercise. Aerobic exercise has a significant impact on mental health. These exercises increase the level of happy hormones, improve concentration and memory, reduce stress and anxiety, improve sleep, and increase self-confidence. In addition, aerobic exercise can help increase energy, reduce symptoms of depression, improve positive thinking and sensitivity, reduce anger, and improve mood (Qasemi et al., 2023). Aerobic exercises are a type of exercise that aims to improve the oxygen consumption system. These types of exercises are low or high intensity physical exercises that mainly depend on the process of aerobic energy production, and neglecting them can have significant detrimental effects on human well-being. Aerobic exercises are an appropriate method for preventing diseases of the heart and circulatory system, improving the respiratory system, and preventing fatigue (Khosravi et al. 2012). Also, various studies have shown that physical exercises and sports are used to strengthen psychological and physiological functions, and the level of mental health in athletes is higher than in people who do not care about physical activity. As a result, one of the most basic elements of a healthy lifestyle is sports, which can be used as a behavioral model throughout life to prevent physical and mental diseases and control and treat them. According to studies, sports and physical activities improve, train people to handle stressful life situations and adapt to all social strategies, and as a result, reduce anxiety and depression in people, so that during the studies conducted, sports activities and mental health in children and adolescents have a direct relationship with each other. As a result, a decrease in depression and a decrease in the rate of mental disorders can be observed through physical activities in this group (Abasian et al., 2020). According to review studies, researchers concluded that aerobic physical exercise for three sessions per week at an appropriate intensity for at least 9 weeks is effective for the treatment of depression (Tang et al., 2017). Also, Firth et al. (2016) showed that exercise is effective in the care of a variety of mental disorders and there is a strong need to develop physical activity during mental illness. In general, aerobic exercise has many positive effects on mental health, including reducing stress and anxiety, increasing energy and calmness, reducing depression, increasing self-confidence, improving concentration and attention, relieving mental pain, and improving sleep and rest. These effects generally help to increase the quality of life and mental well-being of each individual. On the other hand, by increasing the secretion of happy hormones such as endorphins, serotonin, and dopamine, aerobic exercise can help reduce stress and anxiety, increase feelings of happiness and satisfaction, and relieve psychological pain such as anxiety and depression. Also, increasing self-confidence and trust in others, improving concentration and attention, and

improving sleep and rest are other positive effects of aerobic exercise on mental health. In general, aerobic exercise creates a significant improvement in the quality of life and psychological satisfaction of individuals (Abdi, 2023).

In the following, we can mention a few studies that are close to the subject of the present study. Saatchian et al. (2024) state that the use of physical and sports activities for young people can help to improve and reduce the level of negative emotional states such as depression, anxiety, and stress in these people and even strengthen positive emotions in them. Also, Saatchian et al. (2023) state that the way adolescent girls spend their leisure time, especially by engaging in sports activities, can have positive effects on their psychological characteristics. Seddighian et al. (2020), by examining the effect of an aerobic exercise program on mental health and body image concerns of women with obesity stigma, concluded that an aerobic exercise program leads to increased mental health and reduced body image concerns of women with obesity stigma. Naderi-Lordejani et al. (2019), concluded that there is a relationship between self-esteem and mental health in adolescents, and the higher a person's self-esteem, the better their mental health will be. Sabzevari et al. (2019), by examining the relationship between health-related physical fitness and adolescents' body self-concept, stated that specific educational programs should be prepared to improve health-related physical fitness for both sexes, because improving physical fitness increases the mental health and psychological factors of adolescents. For example, school educational programs should place more emphasis on improving muscular strength and endurance, as well as cardiovascular endurance in girls. Rezaie et al. (2018), by comparing risky behaviors, communication skills, and self-efficacy in adolescents from orphanages, alternative and normal families in Bandar Abbas city, stated that there is a significant difference between adolescents from normal and alternative families and adolescents from orphanages in risky behaviors, communication skills, and self-efficacy. Saadati et al. (2017), by examining the effect of exercise on the self-esteem, happiness, and quality of life of male adolescents aged 15 to 18 in Tehran, found that the results indicated the effectiveness of exercise and a significant increase in the scores of self-esteem, happiness, and quality of life and their components in male adolescents in the post-test. Hassanpour et al. (2014), by examining the effect of aerobic exercise on the self-esteem of adolescent girls under welfare coverage, found that aerobic exercise improved the self-esteem of adolescent girls in the experimental group in the post-test stage. Tejvani et al. (2016), by examining the effect of yoga on anxiety, depression, and self-esteem of adolescents in orphanages, stated that practicing yoga reduced anxiety and depression and improved the self-esteem of adolescents in orphanages. Çaman & Özcebe (2011), by examining psychological symptoms, physical activity levels and related factors: Adolescents in orphanages in Ankara, stated that the prevalence of psychological symptoms in adolescents in orphanages is higher than in normal adolescents. Mental health indicators of adolescents in orphanages who engage in physical activity have improved. Ruiz-Ranz & Asín-Izquierdo (2025), by examining physical activity, exercise and mental health in healthy adolescents: A review of the past 5 years, stated that some physical activity interventions seem to improve subjective well-being, self-esteem, physical and mental well-being, anxiety, lifestyle, emotional intelligence, depressed mood, and perceived benefit and trust in healthy adolescents. It is important to design an effective and appropriate physical exercise program that is feasible for adolescents to have significant effects on their mental health. Also, studies that did not implement an appropriate exercise program to improve adolescents' physical fitness did not show any changes in psychological variables.

Due to the different conditions they have compared to their peers and the importance of puberty, which is highly sensitive, adolescents in foster care are subject to many psychological pressures, including the fear of continuing life without financial and emotional resources, which can lead to psychological problems

such as anxiety, depression, aggression, and lack of self-esteem and self-confidence (Karimi et al., 2016). Also, research shows that most adolescents are suspected of having mental disorders, and among them, female adolescents have a higher share (Abasian et al., 2020). During the studies conducted, it was found that physical activities have a beneficial effect on improving and promoting the mental health of individuals (Carter et al., 2016). But the main question is whether this also applies to unaccompanied children and adolescents who suffer from deeper psychological problems? On the other hand, cost-effective, non-invasive, and minimally adverse preventive and therapeutic measures that ensure the mental health of individuals in these situations seem necessary and essential. Knowing that the lack of attention to mental health in unaccompanied adolescents leads to mental disorders with long-term consequences throughout life and reduces the safety of communities, this issue seems worrying and should be further investigated. Also, based on the studies conducted, it was found that the issue of children and adolescents in orphanages who must enter society with appropriate mental health has been examined in fewer cases in domestic research and past research has also been accompanied by deficiencies; in a sense, children and adolescents are considered the pulse of the future of society and healthy children, as social capital of a society, can have a significant impact on the development of the structures of that society. According to the researcher's studies and the lack of finding similar research, the research gap is clearly visible and therefore the main question of the present study is whether it is possible to influence the self-esteem and mental health of adolescent girls in orphanages through aerobic exercises in order to take steps towards solving the problems that these children are facing?

2 Methods

2.1. Participants and Procedure

Adolescent girls in orphanages aged 17 to 25 voluntarily participated in this study. All participants were fully aware of the purposes of the study and anonymous data collection. They were randomly divided into two groups: the aerobic exercise group (15 people) and the control group (15 people). The design of the present study was a pre-test-post-test with a control group.

Participants were eligible for the present study if they met the following inclusion criteria: 1) Adolescent girls; 2) Age 17–25 years; 3) Absence of specific respiratory or musculoskeletal disorders; and 4) Scores below average on self-esteem and mental health scales.

Exclusion criteria were: 1) Mental disorders, such as substance use disorder, major depressive disorder (MDD), posttraumatic stress disorder (PTSD), neurological disorders, such as seizures, multiple sclerosis (MS), visual impairment; and 2) Participation in less than 80% of aerobic exercise sessions. A total of 30 adolescent girls from orphanages met the inclusion criteria and were able to comply with the study conditions.

2.2. Sample Size Calculations

A power analysis (using G*Power 3.1 software) indicated to detect an effect of moderate magnitude (f = 0.25; alfa-error = 0.05, power = 0.8, groups= 2, number of measurements= 2.00, correlation among repeated measures= 0.50) in one-way analysis of covariance (ANCOVA), at least 28 participants were required to conduct this study (14 per group).

2.3. Randomization

For this random group assignment, a computer-generated random-number sequence was prepared in advance and sealed in opaque, consecutively numbered envelopes by an independent researcher. Once the envelope was drawn, it was put aside and not returned to the ballot box again.

2.4. Outcome measures

2-4-1. Self-esteem Scale

The self-esteem scale was used to assess participants' self-esteem. This questionnaire consists of 58 items that describe a person's feelings, opinions, or reactions, and the subject must answer these items by checking four boxes: "Similar to me (yes)" or "Not similar to me (no)". This scale includes 5 components: a 26-item general scale, an 8-item social scale, an 8-item family scale, an 8-item school scale, and an 8-item lie scale (Coopersmith, 1981). Studies conducted in Iran and abroad show that this test has acceptable validity and reliability. Herz and Gulen (1999) reported an alpha coefficient of 0.88 for the total score of this test. Edmonson et al. (2006) also reported an internal consistency coefficient of 0.86 to 0.90 for the Coopersmith Self-Esteem Test. The reliability of the self-esteem questionnaire was obtained by Cronbach's alpha coefficient in the present study at 0.89.

2-4-2. Mental Health Scale (GHQ-28)

This scale has 28 items and examines mental health in four dimensions: physical health (items 1 to 7), absence of anxiety and sleep disorders (items 8 to 14), social functioning (items 15 to 21), and absence of depression (items 22 to 28) (Sterling, 2011). In a study, Taghavi (2001) found the reliability of the questionnaire to be 0.9 using Cronbach's alpha coefficient and its validity to be 0.78 using the content method. The reliability of the mental health questionnaire using Cronbach's alpha coefficient in the present study was 0.85.

2.4.3. Intervention: the aerobic exercise protocol

The duration of the exercise program was 8 weeks, consisting of 3 sessions per week (total of 24 sessions), each session lasting 45 minutes, including 10 minutes of warm-up, 30 minutes of walking and running, and 5 minutes of cool-down. The exercise intensity was gradually increased every two weeks, starting at 65% of maximum heart rate in the first two weeks and increasing by 5% every two weeks, until the exercise intensity reached 80% of maximum heart rate in the final two weeks. The formula (age - 220) was used to calculate maximum heart rate.

2.4.4. Control Condition

During the study, the control group was allowed to talk to each other. In addition, they were asked to maintain their current level of daily physical activity and refrain from additional exercise during the 8-week intervention period. During this period, it was ensured that none of the participants in the control group participated in the aerobic exercise program. It is worth noting that there were no restrictions or changes in the daily routine of the participants in these two groups during the study. They were able to continue with their previous regular activities and personal life plans.

2.5. Data Analysis

All calculations were done by the SPSS software version 24. After data collection, the Shapiro-Wilk test was conducted to check the normality of data distribution. Then, using Levene's test, the homogeneity of the variables was investigated in the two groups. One-way analysis of covariance (ANCOVA) was performed to identify and compare the effects of the aerobic exercise program on each dependent variable, given that the influence of pre-intervention values on post-intervention ones was controlled in this study. In all the statistical tests, a P-value of 0.05 was considered indicative of significance. The effect size for ANCOVA was calculated using partial eta square (ηp2), with $0.01 \geq \eta p2 \geq 0.059$ indicating small effect, $0.06 \geq \eta p2 \geq 0.139$ indicating medium effect, and $\eta p2 \geq 0.14$ indicating large effect sizes (Lakens, 2013).

3 Results

Table 1. Mean and SD of self-esteem and mental health in the experimental and control groups in the pre-test and post-test

Group	Test	Self-esteem M/SD	Mental health M/SD
Experimental	pre-test	41.5 ± 0.29	36.3 ± 0.69
	post-test	79.8 ± 0.39	68.6 ± 0.79
Control	pre-test	42.3 ± 0.78	37.9 ± 1.21
	post-test	45.6 ± 0.63	40.1 ± 0.58

Legend: M = Mean; SD = Standard Deviation

As can be seen in Table 1, the mean of self-esteem and mental health in the experimental group improved significantly in the post-test. The mean of self-esteem and mental health in the control group also improved in the post-test, but this improvement was not significant.

Table 2. ANCOVA for self-esteem and mental health between the groups at the different stage of the study

Variables	Source of changes	Sum of squares	DF	F	Sig.	ES
Self-esteem	pre-test	2.223	1	2.023	0.01	0.153
	group	3.562	1	3.432	0.03	0.178
Mental health	pre-test	3.063	1	1.987	0.001	0.166
	group	4.696	1	1.234	0.02	0.182

Legend: DF = Degree of freedom; F = Fischer; Sig. = p-value; ES = Effect Size

The ANCOVA results in Table 2 show that aerobic exercises had a significant effect on improving self-esteem ($P<0.05$) and mental health ($P<0.05$) in adolescent girls in orphanages. Also, as can be seen in the pre-test, the assumption of linear correlation between the covariate (control) and the independent variable has been met ($P<0.05$).

Table 3. Results of the Sidak test to examine the difference in self-esteem and mental health in the two experimental and control groups in the post-test

Variables	Group	MD	Standard Error	Sig.
Self-esteem	Experimental Control	34.2	0.68	0.003
Mental health	Experimental Control	28.5	0.73	0.02

Legend: MD = Mean Difference; Sig. = p-value

According to Table 3, the results of the Sidak test show that there is a significant difference in the mean of self-esteem and mental health between the experimental and control groups ($P<0.05$). Therefore, it can be said that aerobic exercises had a significant effect on improving self-esteem and mental health in adolescent girls in orphanages.

4. Discussion and Conclusion

The present study was conducted to investigate the effect of aerobic exercise on the self-esteem and mental health of adolescent girls in orphanages. The results showed that aerobic exercise has a significant effect on the self-esteem of adolescent girls in orphanages, and also, the difference in the mean of self-esteem before and after aerobic exercise in the experimental and control groups was significant. Therefore, it can be concluded that aerobic exercise can be used as an effective intervention to improve the self-esteem of adolescent girls in orphanages.

This finding is consistent with previous research findings. In a study conducted by Abasian et al. (2020) showed a positive effect of aerobic exercise on psychological indicators, especially self-esteem, in different groups. This study confirms that regular physical activities, including aerobic exercise, can significantly improve self-esteem in vulnerable groups, including adolescents in orphanages. The consistency of the results of this study with the aforementioned research strengthens the validity of the findings and emphasizes the importance of using aerobic exercise as an effective method in psychological interventions.

It was also found that aerobic exercise had a significant effect on the mental health of adolescent girls in orphanages, and the findings indicated a significant difference between the mean mental health scores of the control and experimental groups, with the experimental group showing significant improvement in mental health after aerobic exercise. The findings of the study confirm that aerobic exercise can be used as an effective intervention to improve the mental health of adolescents in orphanages. This significant difference highlights the positive role of physical activity in reducing stress and mental problems and enhancing mental health. The findings of the study indicate that implementing aerobic exercise programs, especially in orphanage settings, can lead to increased mental health in adolescents. This clearly demonstrates the importance of including physical activity in support and empowerment programs for adolescents in orphanages and highlights the need to design and implement such programs.

This finding is consistent with previous research. Based on the findings of various studies, aerobic exercise has been recognized as an effective intervention in improving mental health and reducing mental problems in different population groups. This has also been emphasized in the research of Bonanno (2004), Castro & Graham (2022), Coffey & Warren (2020), Dey & Beena Daliya (2019), Fredrickson et al. (2003), and Hidayah et al. (2023) that physical activities can reduce stress, improve mood, and enhance mental health. These results are also consistent with domestic research. For example, the study of Sabzevari et al. (2019) showed that sports activities can affect the mental health of adolescents. Soufi & Behzadpoor (2020) also state that environmental support and physical exercise can improve mental health. Also, the findings of Sinaei et al. (2019) emphasize the positive effect of aerobic exercise on improving mental health. Therefore, the results of this study clearly support the positive effect of aerobic exercise on improving the mental health of adolescents in orphanages and are consistent with the findings of other studies.

The results of this study not only highlight the importance of aerobic exercise in improving the mental health and self-esteem of adolescents in foster care, but also clearly demonstrate the need to include these

activities in empowerment and psychological support programs for these vulnerable groups. The use of aerobic exercise as an effective intervention in foster care settings can significantly contribute to improving the mental health of these individuals and can be considered as an efficient tool in treatment and prevention programs to reduce mental problems in these adolescents.

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