



The effect of physical exercise on anxiety among the victims of child abuse

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Abstract

Background The victims of child abuse show more maladaptive behaviors compared to the normal children due to the behavioral problems such as anxiety and isolation consistent with their conditions.

Aims The present study was conducted with the aim of investigating the effect of physical exercise on anxiety among the victims of child abuse.

Methods The research method was quasi-experimental of pretest–posttest type with a control group. The statistical population of this research included all the students who were the victims of child abuse in Tehran during 2017–2018. Among them, 22 individuals were selected through random cluster sampling method and were randomly assigned into test (experimental) and control group. A pre-test was performed for both groups and then the physical exercise was applied for 8 weeks on the test group; while the control group did not receive any intervention. In the end, a post-test was performed for both groups. Data collection was conducted using State-Trait Anxiety Inventory (STAI) and Childhood Trauma Questionnaire (CTQ). Analysis of covariance (ANCOVA) along with using SPSS software was used to analyze the data.

Results The results indicated that physical exercise has reduced anxiety among the victims of child abuse ($p < 0.01$).

Conclusion Therefore, consistent with the findings that confirm the effect of physical exercise on anxiety reduction among children who were victims of child abuse, it is recommended to design and implement physical exercise and extracurricular sport activities in order to reduce anxiety of these people.

Keywords Physical exercise · Anxiety · Child abuse · Violence · Neglect

Introduction

Child abuse refers to any act or neglect that harms the child physically and mentally or threatens him/her seriously [1]. According to Article 1 of the Convention on the Rights of the Child (1989), “a child means every human being below the age of 18 years unless under the law applicable to the child, majority is attained earlier”. Annually, millions of

children are abused physically, sexually, emotionally, and economically all over the world. Child abuse exists in most countries around the world including the developed and developing countries; however, its rate is high in crime-prone societies compared to other societies. In the societies with high organized violence such as war, various social harms, and social inequalities as well as in the societies where violence is acceptable at the level of society, media, and communications and there are no particular and effective regulations on defending the rights of children, the rate of child abuse is extremely higher than the societies with lower rate of violence [2]. According to the report published by the United Nations International Children’s Emergency Fund (UNICEF) in November 2017 entitled “A FAMILIAR FACE: Violence in the lives of children and adolescents”, millions of children are exposed to physical violence and sexual abuse. In its last report, UNICEF has stated that millions of children around the world are abused. The statistics includes children at different ages. The greatest number of

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child abuse occurs within the house. According to the report data, one child or adolescent is killed every 7 min due to acts of violence. World Health Organization (WHO) has published a report in 2017 entitled “Child Maltreatment” and stated that all around the world, one in every four children has suffered physical violence. This report has emphasized that 23% of these children have been exposed to physical violence such as shaking and assaulting. According to this report, 36% of children have experienced abuses such as threatening, humiliating, rebuking, exerting emotional pressure, etc. In 2017, 26% of children around the world who had been abused, were sexually abused as well that 18% of victims of sexual abuse are girls and 8% are boys [3].

Most of the abused children try to conceal the issue due to embarrassment and humiliation. Therefore, the more doctors, staff of health and treatment centers, social workers, kindergarten instructors, teachers and those who deal with children be familiar with this issue, the more they can find out in this regard leading to genuineness of the related statistics. In Iran, there is no accurate statistics on the prevalence rate of child abuse due to cultural issues. Although no comprehensive and broad research has been conducted on child abuse and child maltreatment, the field-related studies indicate a high rate and a wide variety of violence against Iranian children [4] and a high prevalence of these behaviors in Iranian families [5]. One of the causes for the growth and prevalence of child abuse in Iran is lack of the related statutes (positive law). However, the bill of child support was introduced to the parliament in 2012 aimed at supporting all people under 18 and preventing crime and violence against them, which has not been passed yet. The article 9 of law which was passed in 2002 has not imposed severe punishment with regard to violence against children unfortunately; thus, criminals are not scared of the punishment and commit the crime fearlessly. In addition to the legal gaps, enforcing the available rules is faced with problems and defects. Not confronting truly with criminals, not supporting the abused children seriously, and not adopting long-term decisions and mechanisms in the child abuse field are the most important factors causing various problems. Therefore, passing comprehensive rules on children rights field, creating structures and focusing on criminalization in relation to child abuse, as well as strong and efficient management to develop culture and train in this field can be considered as effective solutions to control and reduce such social harms.

It is obvious that child abuse has negative consequences on victims' quality of life [6] and their physical, mental, and behavioral health [7]. Child abuse is also associated with failing to achieve educational and economic successes [5], drug abuse [8], and increase in misbehaving, crime [9, 10] and especially anxiety in the future [11]. The above-mentioned problems, especially anxiety can interfere with children's daily life, impede their educational progress, influence

their self-confidence, prevent friendly relationships, and in some cases lead to serious problems such as drug abuse, alcohol abuse, depression, etc.

Anxiety has been one of the most important subjects of research in different sciences during the recent decades. Anxiety is the intensified state of emotional stimulus that includes worry or fear, usually perceives the source of threat ambiguously or imprecisely, and refers to a reaction to a non-existent danger. Morbid anxiety is a painful feeling which is associated with physical pretense. This feeling is the experience of an ambiguous fear in the absence of danger with an external intersection. The people with anxious personality are more susceptible to anxiety neurosis. These people are usually nervous, susceptible to worry, and excessively conservative. In terms of clinical manifestations, the patient is upset and fearful, unable to concentrate, is forgetful, and complains about insomnia along with bad dreams and nightmares; however, they may experience fear of a situation with the physical symptoms including heartbeat, blood pressure, thorax pressure, abdominal pain, fatigue, and blurred vision [12]. Anxiety is defined as an ambiguous feeling of fear and worry with an unknown origin that includes physical, cognitive, emotional, and behavioral components, small amount of which is necessary for a person's survival. Excessive anxiety spoils the organization of behavior and in case of getting chronic, it reduces the person's flexibility and causes a wide range of anxiety disorders [13]. Freud has named anxiety a mental pain, i.e., when the body suffers from a scar, inflammation, or disease, fever will be the first symptom and when the person suffers from a mental problem, anxiety will be the first symptom. Anxiety is both cause and effect, i.e., the cause of most of the mental problems is anxiety. In fact, when a person faces a mental problem that disturbs the balance of his mind, he experiences anxiety [12]. Therefore, investigating and offering solutions to reduce it especially with regard to the victims of child abuse is of great importance. Physical exercise and its extracurricular activities are one of the methods that may reduce anxiety [14].

Today, exercise and its extracurricular activities are important for spending the leisure time, creating cheerful moments, and feeling relieved and relaxed. Furthermore, they are considered as the solution to most physical and mental problems of the society's people. Correct and regular exercises as an important part of person's daily duties can be effective in the health of society and bearing social responsibilities that require a strong body, and the people who possess a better physical fitness, are more successful [15]. This fact gets additional importance when it is proposed in relation to the children and adolescents with especial problems such as child abuse; since physical exercise reduces emotional stress and anxiety effectively and eliminates most of their undesirable consequences. Literature review on the effect of sporting programs indicates the positive effects of

exercise on stress and anxiety reduction [16, 17] and the results of analysis in these researchers indicate that regular exercise can reduce people's problems such as stress, anxiety, and aggression.

Stănescu and Vasile in a study entitled "Using Physical Exercises to Improve Mental Health", described the effects of exercise on mental health and its components and showed that sport activities help improve symptoms of anxiety in individuals [18]. Moreover, the previous studies results show although there is an increasing rate of studies about the positive effects of exercise and physical activity on anxiety, this technique, as at least a secondary therapy, it is a long way to achieve clinical use like psychotherapy or pharmacotherapy [19, 20]. Some studies show that there is a significant relationship between the performance of sports activities and the anxiety treatment, and, suggest that doing exercises besides increasing the concentration span, reduces the symptoms of stress and anxiety disorders [21, 22].

Given the study results, it seems that physical activities can affect the reduction of anxiety. Although much research have been carried out about the positive effects of exercises on anxiety and even about its possible mechanisms [23]–[26], there are still many questions that are left unanswered about the effect of exercises on different groups (in terms of age, gender, various types of physical and mental disorders, and so on) and about the effects of cultural differences on this issue, as well. The review of the previous study results about the effects of physical activity and exercise on anxiety raises the question that whether physical activity has a significant role in the reduction of problems such as anxiety among the victims of child abuse? Therefore, in this paper, it has been attempted to investigate the effect of physical exercise on reducing anxiety among the victims of child abuse.

Methodology

Research plan

The present research design is quasi-experimental of pre-test–posttest type with a control group. It was designed to investigate the effects of physical exercise on reducing anxiety among the victims of child abuse; both groups were evaluated twice, the first being performed through a pre-test and the second one through a post-test.

In order to form the groups, using random sampling method, half of the participants (11 individuals) were assigned to the test (experimental) group and the rest (11 individuals) were assigned to the control group. The two formed groups in this way were similar to each other and measuring the dependent variable for both groups was performed at one time and under one condition. Furthermore,

in the above-mentioned design, the effect of other variables such as gender, intelligence, special disease, grade, and chronological age of the participants was controlled.

Table 1 shows the diagram of the scheme under discussion:

According to Table 1, we can say that: (1) there are two groups; (2) both groups have been measured at the same time and before the implementation of the independent variable (physical exercises); (3) both groups have been measured again at the same time and after the implementation of the independent variable (physical exercises); (4) participants were randomly placed in groups; (5) the first group was exposed to the independent variable (physical exercises), but this variable was not performed in the second group.

Population, sample and sampling method

The statistical population of this research included all the students who were the victims of child abuse in Tehran during 2017–2018. The participants were selected from among primary school girl students within the age range of 11–8.

The sampling method was random cluster sampling. First, district seven was selected randomly from the districts of Tehran, then, by visiting its department of education, the list of female elementary schools was provided among which one school was selected randomly. Finally, by visiting this school and requesting permission from the people in charge, students' records were received and girl students with a history of domestic violence, neglect and abuse, child abuse, and related cases were separated. Then, Childhood Trauma Questionnaire (CTQ) was used to measure child abuse. At the next stage, State-Trait Anxiety Inventory (STAI) by Spiel Berger was completed in cooperation with the counselor and the parents of the students who were the victims of child abuse and finally, 22 girl students with the highest score of anxiety and without any special disease (at the age range of 8–11) were selected from all the collected questionnaires and assigned to the test and control group.

The experimental group then participated in a 2-month course of physical training (8 weeks, and three 1-h sessions a week), while the control group did not receive any intervention. Finally, when the sessions of physical exercise finished, both groups were reevaluated in terms of anxiety.

Table 1 Research design

$N=22$	Random selection	Pre-test	Independent variable	Post-test
Experimental group	$R=11$	T_1	X	T_2
Control group	$R=11$	T_1	–	T_2

Exercise protocol (exercise sessions)

The training protocol for the present research was selected according to the design by Burgess et al. [27]. The researchers used an aerobic dance for 6 weeks in an intervention designed to reduce body image dissatisfaction and physical self-perceptions in 13- to 14-year-old school girls, in Britain, and their research results showed that this method had positive effects.

Exercise sessions

Physical exercises included aerobic exercises along with dance and were divided into three parts: (1) warming up (10–15 min); (2) basic movements (35–40 min); (3) cooling down (10 min). It was held for 8 weeks (three sessions a week) and each session lasted 1 h. In this intervention, aerobic movements were performed along with dance and music by an aerobics instructor accompanied by the participants.

1. During warm-up phase, various movements (about 1 min per each movement) were used including: marching; back-kicking exercise; hands-in-the-air exercise; front-kicking exercise; foot-touching exercise; knee-lifting exercise; knee-bending exercise; shoulder-rotating exercise; arm-rolling exercise; arm stretch-and-pull exercise; full back-pull exercise; arm, leg and torso stretch; ankle-holding stretch; heel-holding exercise; back and leg stretch; and in sum, the performance of these movements in combination lasted for 10–15 min.
2. During basic moves phase, various exercises were performed including: step touch; double step touch; V step; step knee; Mambo and Salsa Mambo. Dance and rhythmic movements, involving step moves in different combinations with hand and body movements, were performed during this phase to increase the intensity of the work-out, which totally lasted for 35–40 min. At first sessions, first simple movements and then with participants' progress more complex movements were performed and the number of sets and the speed of movements were increased in subsequent sessions.
3. During cool-down phase, various stretching movements (about 20–40 s each) were used such as: hamstring stretch; gluteal muscles; quadriceps femoris muscles; groin muscles; erector spinae muscles; abdominal muscles; cross-body shoulder stretch; chest and front of shoulder stretch; triceps side stretch; wrists; gastrocnemius muscles; band side raise; adductor brevis muscle stretch; neck stretch; stretch with twist. Having performed cooling down exercises, the phases of body training course (aerobic and dance) was completed.

Instruments

The instruments used in this research were State-Trait Anxiety Inventory (STAI) developed by Spielberger and Childhood Trauma Questionnaire.

- (A) *Childhood Trauma Questionnaire (CTQ)* In order to measure child abuse, Childhood Trauma Questionnaire was applied which was designed by Bernstein et al. in 1994 and its final version of 53 articles was presented in 1995. This questionnaire measures harm in five sub-scales of emotional harm, physical harm, sexual harm, emotional neglect, and physical neglect and in order to score the articles, a four-point Likert scale (0–3) is used. The reliability of different factors of CTQ has been reported between 0.65 and 0.94 using the bisection method and Cronbach's alpha; in order to calculate the validity of CTQ, factor analysis method was used and the obtained factors were in accordance with the sub-scales of this questionnaire.
- (B) *State-Trait Anxiety Inventory (STAI)* This 20-item questionnaire includes separate self-evaluation scales in order to measure anxiety and it can be performed both individually and collectively. For responding to the above-mentioned scales, there are a number of alternatives for each sentence in this scale and the subject must select the alternative describing his feeling in the best way. These alternatives include (1) not at all, (2) somewhat, (3) moderately, and (4) very much. According to the answers, each of the sentences of STAI gains a score between 1 and 4 that score 4 indicates high anxiety. A study has been conducted to standardize Spielberger's test [28] and its reliability coefficient in the norm group and criterion group has been investigated separately. The reliability for the norm group (600 individuals) is equal to 0.91 and for the criterion group (130 individuals) is equal to 0.94. In addition, the test reliability was calculated through the ratio of true score variance to observed variance and its value in the norm group has been recorded as 0.945. The reliability of this questionnaire is equal to 0.87 in different research [28].

Results

After the completion of the sessions and reevaluation of anxiety among both groups, the collected data were analyzed using SPSS software 16 and analysis of covariance (ANCOVA). The mean and standard deviation of participants' anxiety in both groups are presented in Table 2:

The results of this hypothesis that sporting programs and physical exercise are effective in anxiety among the victims of child abuse are presented in Table 3. In order to use the

Table 2 The mean and standard deviation for both groups before and after physical exercise

Groups	<i>M</i>	SD
Experimental group:		
Pre-test	59.45	7.18
Post-test	49.63	7.43
Control group:		
Pre-test	60.00	6.88
Post-test	59.54	6.14

Mean anxiety in the experimental group: 59.45 in pre-test, and 49.63 in post-test ($p < 0.01$). And mean anxiety in the control group: 60.00 in pre-test, and 59.54 in post-test ($p > 0.05$)

Table 3 Analysis of covariance test for anxiety in the test group and control group

Source	Mean square	<i>df</i>	<i>F</i>	Sig	Partial Eta square
Pre-test	45.15	1	7.85	0.054*	0.04
Group	499.88	1	19.82	0.001**	0.51
Error	25.21	19			

*The significance level of pre-test ($p > 0.05$). **The significance level of the group in post-test ($p < 0.01$). So physical exercise is effective in reducing anxiety among the victims of child abuse, also, 0.51% of the variance of anxiety is determined by physical exercise

R squared = 0.674 (adjusted R squared = 0.640)

analysis of covariance (ANCOVA) test, first, the hypotheses of analysis of covariance—homogeneity of variance, normality of distribution, linearity of the relationship between pre-test and post-test, and homogeneity of regression slopes were investigated, then analysis of covariance was used.

In order to investigate the effect of physical exercise on anxiety among the victims of child abuse, as it is observed, according to Table 3, physical exercise is effective in anxiety among the victims of child abuse and reduces it.

Discussion

Child abuse has been seen in all social economic and human society levels effecting children and families and the society as a whole and one of the signs of child abuse is anxiety in children's behavior. The victims of child abuse show more maladaptive behaviors compared to normal children due to the behavioral problems such as anxiety and isolation considering their condition, which are regarded as one of the most important problems of teachers and parents. Therefore, applying methods such as physical exercise can be effective in reducing such behaviors. As the results indicated, sporting

programs and physical exercise are effective in reducing anxiety among the victims of child abuse.

There is different research on this field consistent with the present study. In this regard, the result of a study has indicated that exercise has a positive effect on reducing people's stress and anxiety [23], which is in line with the result of the present study. Robinson et al. [24] indicated that exercise is effective in reducing behavioral problems. Other results indicate the positive effect of physical exercise on stress, anxiety, and aggression [25, 26], which in line with the result of the present study. All of these research emphasize the effect of physical exercise on reducing problems such as anxiety, stress, etc. Also according to another study [22], physical exercise improves symptoms among patients with social anxiety disorder, generalized anxiety disorder, obsessive compulsive disorder, and posttraumatic stress disorder. Exercise-induced improvements seem to be comparable to empirically supported treatments for panic and generalized anxiety disorders.

Accordingly, physical activity and exercise in recent years have been recognized as a beneficial way to reduce mental illnesses such as anxiety, and most people who are involved with these types of problems tend to use this kind of exercise movements [26, 29]. In this regard, Nejad et al. [30] showed that physical exercises in the form of aerobic movements as a non-pharmacological intervention could reduce the depression in children with cancer; they recommended the use of this method for the health and well-being of hospitalized children. Moreover, Carek et al. [31] in an article aimed at examining the effect of exercise as a way on depression and anxiety treatment; they stated that due to the high prevalence of depression and anxiety disorders and the negative effect of these variables on the individuals' lives, in some cases, the use of therapeutic interventions can be as useful as pharmacotherapy and according to research findings, exercise and physical activity have an effective role in the improvement of depression and anxiety disorders. Elizabeth Anderson and Geetha Shivakumar [23] in another study with consistent results, considered physical exercise as an important factor modifying the individuals' lifestyle for the prevention and treatment of chronic diseases, and they showed the effectiveness of exercises in reduction of anxiety symptoms in their research.

The reason for the similarity found in the findings can be the joyful nature of physical activity (aerobic and dance movements) and the impact of group performance and the necessity of music during the exercises affect individuals' mood and reduces the anxiety symptoms.

In fact, anxiety is a mental mechanism that the person unconsciously produces behaviors and reactions to daily pressures, which are not appropriate, and if controlled, the growth will be natural and desirable. In this regard, sporting programs and physical exercise can effectively control

anxiety. There is a growing body of literature that recognizes the positive effects of exercise on mood states such as anxiety, stress and depression, through physiological and biochemical mechanisms, including endorphins, mitochondria, mammalian target of rapamycin, neurotransmitters and the hypothalamic–pituitary–adrenal axis, and via the thermogenic hypothesis. In addition, psychological mechanisms influence the effects of exercise on mood states and can also contribute to better health outcomes in people suffering from mood disorders [32]. Exercise is also known to have acute analgesic effects [33].

However, in a review study, Riahi et al. [34] examined the “Moderating Effect of Physical Exercise in Anxiety Disorder” and stated that along with drug interventions, physical activity was found to be beneficial in the treatment of a wide range of mental pathologies (e.g., depression, mood disorders). However, in the case of anxiety disorder treatment, studies reported inconsistent findings depending on the exercise type (e.g., acute or chronic exercise, aerobic or anaerobic exercise) among clinical or non-clinical population. In any case, the results of their findings showed that the effectiveness of exercise on anxiety reduction depends on type, intensity and volume of the exercises.

To explain the relationship between physical training and anxiety reduction as evident in some studies results [24, 35]–[37], which show the number of panic attack and anxiety attack is much less in people who regularly do physical activity such as aerobic exercise for at least 30 min a day, several mechanisms have been proposed: exercise has a positive effect on anxiety by increasing the cardiovascular tolerance [38]. Exercise by modulating neurotransmitters in the brain, positively affects the increase of dopamine, serotonin, noradrenaline and gamma amino butyric acid (GABA), which in turn causes more relaxation in individuals and reduces the anxiety [23, 39, 40]. Exercise enhancing endorphin (happiness hormones) level in blood results in anxiety reduction [23, 41]. Exercise reducing the effect of stress hormones through the influence on the hypothalamic–pituitary–adrenal axis and results in anxiety reduction [42]. Exercise can make the person feel calm via increasing body temperature [43]. During exercise, especially aerobic exercises and dance, the person focuses less on his anxiety [44, 45]. Physical training exercises have a behavioral and mental impact on people with anxiety disorders. In these people, through increased level of exercises, heart rate and sweating as a natural body responses, the panic induced by physical and nervous conditions of anxiety can be gradually eliminated [23, 35].

Therefore, given the effects that physical exercises have on the process of anxiety reduction in individuals; likewise, the results of the present research showed anxiety reduction among victims of child abuse; hence, we can claim that physical activities, i.e., aerobic exercises combined with dance and

accompanied by music, performed regularly in 1-h sessions three times a week and for 8 weeks, through mechanisms that influence the brain, mind and behavior, can gradually relax and reduce anxiety among these people. In this regard, Burgess et al. [27] using the same intervention, i.e., aerobic dance method for 6 weeks, reached positive results, as well. In sum, the previous study results confirm the findings of the present study. It seems that since physical exercise (aerobic moves combined with dance) is associated with mobility and group activity, it has been able to bring joy and relaxation to girl students who have been victims of child abuse and it has been effective in their anxiety reduction.

Conclusion

According to the results of this research, the method can be applied in schools to reduce anxiety among these children. This investigation indicated that using this intervention is extremely helpful and can be effective in reducing the problems of these victims including anxiety; thus, it is recommended to apply the method to reduce the mentioned problems. According to some perspectives [46], the current literature highlights the importance of adding exercise programs to clinics, schools and families for the physical and psychological well-being of children and adolescents.

Overall, this research included some limitations. For example, its results cannot be generalized to other groups and people, since this study included only female students who were the victims of child abuse. However, it is recommended that researchers conduct a similar research on other groups, for example, male students who are the victims of child abuse and compare the results in this regard.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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