



The Effectiveness of Teaching Behavior Modification Methods to Mothers on the Self-Control in Hyperactive Children: Moderating Role of Mothers' Anxiety

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Abstract: The present study was conducted with the aim of investigating the effectiveness of teaching behavior modification methods to mothers on the self-control of hyperactive children. In this research, a semi-experimental method of pre-test, post-test and follow-up with a control group was used. The statistical population included mothers with children aged 7 to 12 with attention deficit/hyperactivity disorder who referred to psychology and psychiatry clinics in Qom. The children were boys' primary school students in 2022. Using available sampling method, 30 anxious mothers and 30 non-anxious mothers were selected and randomly assigned to experimental and control groups. After the pre-test, behavior modification methods were implemented for 10 weeks in the amount of 10 1-hour training sessions in the experimental group. The behavior modification training package was developed based on Barclay's perspective and using the latest approaches to behavior change. At the end of the training sessions, both groups (experimental and control) were given a post-test. Beck Anxiety Questionnaire (BAI 1990) was used to measure mothers' anxiety and Self-Control Rating Scale (SCRS) was used to measure self-control. The findings showed that teaching methods of behavior change and correction to mothers is effective in increasing the self-control skills of children with attention deficit/hyperactivity disorder, and the moderating role of mothers' anxiety was confirmed. The findings have useful implications for psychologists and counselors in helping families of hyperactive children.

Keywords: Teaching methods to change and modify behavior, hyperactivity, self-control, mothers' anxiety

Introduction

Today, Attention Deficit/Hyperactivity Disorder (ADHD) is considered one of the most common behavioral disorders among students, especially in primary school ages. Its symptoms typically manifest in early childhood and often continue into adolescence, with around seventy percent of cases persisting into adulthood ([Cortese & Tessari, 2017](#); [Dalsgaard, 2013](#)). This disorder has been referred to by various names, such as partial brain dysfunction, mild brain damage, childhood hyperactivity, and hyperactive signs. However, in the latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), it is officially termed Attention Deficit/Hyperactivity Disorder ([Kaplan & Newcorn, 2011](#)).

Children with ADHD are exposed to various risks, including poor academic performance, grade retention, school dropout, weak family and peer relationships, anxiety, depression, aggression, delinquency, substance abuse, and the potential co-occurrence of other disorders such as conduct disorder and oppositional defiant disorder ([Amani Kolarijani et al., 2022](#); [Kazemi & Kazempoor Dehbidi, 2022](#)).

To date, various treatments have been offered to reduce the psychological, behavioral, emotional, communication, social, and educational problems of children with ADHD. These treatments can be broadly categorized into psychosocial and pharmacological interventions. In the realm of psychosocial treatments, parent training is considered an essential component of therapeutic interventions (([Barkley, 1997](#); [Krull et al., 2011](#)). In this type of treatment, behavior modification programs for children are implemented in their natural home environment, primarily by parents, who have the most significant interaction with the child. Research has shown that these training programs lead to a reduction in the core symptoms of this disorder. This program, through the application of effective communication, reward and reinforcement systems, and negotiation, reconstructs the inefficient parent-child interactions ([Khan et al., 2013](#); [Lee et al., 2012](#)). Furthermore, it improves behavioral problems, attachment relationships, social skills, and classroom behaviors of the child ([Barkley et al., 2006](#)). Previous research results have shown that Barkley's parent training method can reduce the psychological and emotional symptoms of children and adolescents with ADHD ([Hossainzadeh Maleki et al., 2018](#)).

Children with ADHD can disrupt the lives of parents and those around them, presenting them with numerous and novel challenges, while they often lack the necessary experience and awareness to cope with these issues. The frequency of problems, parental inexperience, and their lack of knowledge regarding child management are among the major factors that put parents under increased pressure and stress, affecting their perceived efficacy and competence ([Kazdin, 2008](#)).

Teaching mothers about counseling methods has advantages that increase their awareness of behavior management principles and enhance their effective child-rearing skills ([Barkley et al., 1991](#)). Parent training is a justified method in the treatment of Attention Deficit/Hyperactivity Disorder (ADHD) and has evidence showing that training mothers for families with children suffering from ADHD leads to improvements in child-rearing behavior, reduces parental stress and anxiety, and decreases child abuse behavior ([Danforth et al., 2016](#)).

The Barkley Parent Training Program ([Barkley, 2013](#)) is designed for children with behavioral problems such as hyperactive children, oppositional defiant children, and similar conditions. The goal of this program is to empower and encourage parents to manage their children's misbehavior through a series of stages. Initially, parents learn about the reasons behind misbehavior and the concept of behavior management. They then learn how to make their children comply with their commands, using direct, clear, and concise instructions. Furthermore, emphasizing positive consequences for acceptable behaviors is another strategy. Finally, parents learn how to consider immediate negative consequences for their child's misbehaviors ([Danesh, 2015](#)).

One of the characteristics of children with ADHD is weak self-control, which can underlie many of their problems. For example, it can lead to issues such as substance abuse, gambling, arson, theft, as well as achieving immediate satisfaction and facing subsequent negative consequences. Weak self-control is at the core of many problems for children and adults. If we view self-control as delaying gratification, we will see that many problems root from this deficiency. For example, in substance abuse, the immediate satisfaction of consumption, or long-term goals of quitting substances, conflicts with the immediate benefits of substance use for the individual and the family. Impulse control disorders are designed for instant satisfaction but soon lead to negative consequences ([Rosen et al., 2014](#)).

Studies have shown that the behavioral problems of children with ADHD are related to their lack of self-control ([Schweitzer & Sulzer-Azaroff, 1995](#)). [Barkley \(1997\)](#) considers weak self-control as the core of ADHD and defines self-control as a series of responses by an individual that aims to change the likelihood of the next response to an event, working to modify the likelihood of the next related consequence. Therefore, children with ADHD, due to their lack of self-control and impulsive behaviors, often provide more incorrect responses and need more organization and attention to detail, which leads to problems at school and at home ([Crundwell, 2005](#)).

Hence, it is essential to improve self-control to reduce the symptoms of these children and reduce the burden on their families. Teaching self-control to children enables them to provide feedback on their behavior and evaluate and monitor their actions systematically, rewarding themselves for effective behavior ([Barry & Kelly, 2006](#)). By shedding light on this critical issue, we aim to provide valuable insights into the challenges faced by ADHD children and offer guidance for improving their overall well-being. Therefore, given the mentioned issues, the main question addressed in this study is whether teaching behavior modification methods to mothers affects the self-control of children with Attention Deficit/Hyperactivity Disorder (ADHD) and whether maternal anxiety plays a moderating role in this context?

Material and Methods

This research is an applied, semi-experimental study involving pre-test, post-test, and follow-up measures with a control group. The statistical population consisted of mothers of male elementary school students in Qom city who had sought counseling and psychological services and had been diagnosed with Attention Deficit/Hyperactivity Disorder (ADHD). Considering that in comparative and experimental methods, a minimum of 15 subjects per group is recommended, a total of 60 mothers were purposefully selected as the research sample. Among them, 30 mothers were identified as anxious

mothers, and 30 mothers were identified as non-anxious mothers. Subsequently, 15 mothers from both the anxious and non-anxious groups were randomly assigned to the experimental group, while 15 mothers from each group were placed in the control group. The inclusion criteria were as follows:

1. Participants should have children with behavioral disorders accompanied by Attention Deficit/Hyperactivity Disorder (ADHD).
2. The study samples should not include severe brain injuries, such as cerebral palsy, specific disabilities, complete sensory impairments, including blindness and deafness, and intellectual disabilities.
3. The male students should be in the age range of 7 to 12 years.
4. Participants should not participate in any remedial classes, therapeutic sessions, or special training outside the counseling center environment.

The exclusion criteria included missing more than three sessions in the training sessions and the non-participation of students and parents in the exercises. Before entering the study, participants completed an informed consent form and were provided with information about the research objectives, and they were informed that they could withdraw from the study at any time.

In this research, parent training based on the proposed Russell Barkley model (1997) was developed, which was conducted for a duration of 10 weeks with 10 one-hour training sessions in the experimental group. A summary of the training package contents is presented in Table 1.

Table 1. Summary of Barkley Parent Training Sessions

Session	Title	Content
1	Why do children misbehave?	Now the therapist asks the parents to implement a very effective motivational program. In this program, a variety of rewards and reinforcements that are easily available at home are used to increase the child's compliance with commands, rules and daily tasks at home.
2	Paying attention	This session is dedicated to training parents in the field of paying proper attention to the child's desirable behaviors and ignoring undesirable behaviors.
3	Increasing followership and independent play	First, parents develop more valuable and effective attention skills, then these skills are specifically directed towards increasing the child's compliance, and they participate in the child's games with appropriate attention without any reprimand or order.
4	Tokens and points	Now the therapist asks the parents to implement a very effective motivational program. In this program, a variety of rewards and reinforcements that are easily available at home are used to increase the child's compliance with commands, rules and daily tasks at home.
5	Exclusion and other disciplinary methods	Parents are trained on how to use the token method described in the previous step as a form of punishment or penalty (ie, in the token program, punishments are set for inappropriate behavior)
5	Generalization of deprivation to other bad behaviors	As soon as the parents have used the exclusion technique effectively, they will be allowed to use it on one or two other misbehaving children. In situations where they have encountered problems using this method, most of the time of this meeting is dedicated to unraveling the problems by implementing exclusion and correcting them.

7	Using methods to change and modify behavior outside the home	At this stage, parents are trained to use slightly modified versions of child misbehavior management techniques in public places such as stores, restaurants, etc. Education includes a method called thinking aloud.
8	Control the improvement of performance in school (preparation of daily behavior report table in school)	This meeting is to discuss the child's behavior at school and parents are taught to use the daily behavior report table at school and the token method at home.
9	Apply behavior modification methods for possible future behavioral problems	Parents are now briefly trained on how to use these procedures to solve other behavioral problems that the child does not currently have.
10	A review session on the use of behavior modification and empowerment methods and supplementary meetings	Parents are asked to come back one month later for an empowerment session to evaluate their adherence to the presented methods, if the conditions require it, it is planned to gradually remove the token method at home, and to help parents in untying each the problem they are facing is helped

To collect data, the Self-Control Rating Scale (SCRS) and the Beck Anxiety Inventory (BAI) were used. **Self-Control Rating Scale (SCRS):** In this study, the Kendall and Wilcox Self-Control Rating Scale ([Kendall & Wilcox, 1979](#)) was employed to measure self-control. This scale, which was developed at the University of Minnesota, consists of 33 questions. The test's reliability was calculated using the Cronbach's alpha method as 0.98 and using the retest method as 0.84, which is acceptable ([Kendall & Wilcox, 1979](#)). In Iran, after translation by Hemati et al., content validity was verified through editing. Additionally, the reliability of the test was calculated by Hemati using the Cronbach's alpha method on a sample of 100 students from Tehran city as 0.98. The questions in this questionnaire are both positive and negative and are rated on a 7-point Likert scale. A score of one in the questions indicates the highest self-control, while a score of seven indicates the lowest self-control. For negative questions, the scoring is completely opposite. The score range varies from 33 to 241, with higher scores indicating lower self-control.

The SCRS questionnaire comprises the following subscales:

1. Self-control with 10 questions (Questions 1, 3, 5, 8, 9, 11, 12, 23, 31, 32).
2. Impulsivity with 13 questions (Questions 10, 13, 14, 15, 16, 17, 20, 21, 22, 24, 25, 28, 30).
3. Impulsivity - self-control with 10 questions (Questions 2, 4, 6, 7, 18, 19, 26, 27, 29, 33).

Beck Anxiety Inventory (BAI): This questionnaire was developed to measure the intensity of anxiety in adolescents and adults. Since evaluating anxiety symptoms is of great importance in diagnosing and treating mental problems, various scales have been developed based on different perspectives, such as Castelo, Adler, and others. The examination of these scales shows that there may be problems in the theoretical conceptualization and cognitive characteristics of them. Due to these problems, in 1993, Aaron T. Beck and his colleagues introduced the Beck Anxiety Inventory (BAI), which specifically measures clinical anxiety symptoms ([Beck et al., 1993](#)). This self-report questionnaire consists of 21 questions that assess anxiety ([Steer et al., 1999](#)). The questionnaire is based on 21 anxiety symptoms,

and scores are assigned based on the Likert scale (scores of 0, 1, 2, 3 for each question), with higher scores indicating higher levels of anxiety. This questionnaire primarily emphasizes physiological aspects of anxiety. Three items assess anxious mood, three others assess specific fears, and the remaining questions measure autonomic overactivity and motor tension associated with anxiety. [Beck et al. \(1993\)](#) reported internal consistency with a value of 0.92, test-retest reliability of 0.75, and correlations between items ranging from 0.30 to 0.76.

To investigate the research hypotheses, a multivariate analysis of covariance (MANCOVA) was conducted using SPSS 23 software. In the experimental group, the independent variable, which was the application of behavior modification and adjustment training, was implemented, and the moderating role of maternal anxiety in relation to these training sessions and the level of self-control in children with Attention Deficit/Hyperactivity Disorder (ADHD) was examined.

Results

The mean, standard deviation and normality test results of self-control and its components are presented in Table 2.

Table 2. Mean, standard deviation and normality test results of self-control and its components

Variable	Group	Pretest		Posttest		K-S	p
		Mean	SD	Mean	SD		
Self-control dimension	Experimental	37.06	4.65	26.47	4.48	0.15	0.18
	Control	38.73	5.61	41.22	6.03	0.05	0.07
Impulsivity dimension	Experimental	45.20	5.28	35.53	5.04	0.12	0.13
	Control	47.60	7.49	48.06	4.94	0.20	0.19
Impulsivity-self-control dimension	Experimental	40.40	6.51	30.46	5.68	0.16	0.18
	Control	41.60	6.59	47.33	7.28	0.05	0.07
Total Self-control	Experimental	122.66	5.48	92.46	5.06	0.13	0.14
	Control	127.93	6.56	136.62	6.08	0.16	0.18

The results in Table 1 include the scores of the experimental and control groups in the dimensions of the self-control variable. According to the table, the mean total score of the self-control variable for the experimental group in the pre-test is 122.66, and in the post-test, it is 92.46. For the control group, these values are 127.93 in the pre-test and 136.62 in the post-test. It can be observed that the average self-control score in the pre-test and post-test stages does not differ significantly between the two groups. However, in the post-test stage, the average self-control score in the experimental group has decreased both compared to its pre-test score and compared to the control group in both stages. It is worth noting that the self-control questionnaire's questions are structured in a way that lower scores indicate higher self-control, and as scores increase, they reflect lower levels of self-control. Correspondingly, according

to Table 1, in all variables the normal distribution of data was confirmed. Given that the assumptions of multivariate analysis of covariance (MANCOVA) were confirmed, this statistical test was used to investigate the research hypotheses. The results are presented in Tables 3 and 4.

Table 3. Multivariate Analysis of Covariance (MANCOVA) for the effects of teaching behavior modification techniques to mothers on self-control in hyperactive children with the moderating role of maternal anxiety

Effect	Test	DF1	DF2	F	p	Effect size
Intervention	Wilks' lambda	6	157	52.14	0.001	0.62
Intervention * Mothers anxiety	Wilks' lambda	6	157	41.14	0.001	0.53
Mothers' anxiety	Wilks' lambda	3	77	37.28	0.001	0.48

According to Table 3, teaching behavior modification techniques to mothers have a significant effect on the dependent variables (self-control and its dimensions in hyperactive children) with a significance level of $p < 0.001$. Furthermore, the effect of teaching on the dependent variables is moderated by maternal anxiety, and this effect is statistically significant with a significance level of $p < 0.001$.

Table 4. Results obtained from multivariate analysis of covariance (MANCOVA) on the post-test means of the experimental and control groups

Variable	SS	DF	MS	F	P	Effect size
Self-control dimension	498.28	1	498.28	33.88	0.001	0.57
Impulsivity dimension	587.70	1	587.70	38.22	0.001	0.61
Impulsivity-self-control dimension	255.86	1	250.86	24.10	0.001	0.48

According to Table 4, F result from the comparison of the mean variable score of self-control dimensions of two groups is significant. According to the effect size, the effect of intervention based on teaching methods of behavior change and modification to mothers has been effective by 57% on self-control dimension, 61% on impulsivity and 48% on impulsivity and self-control dimension.

Discussion

In this study, it is hypothesized that teaching behavior modification techniques to mothers is effective on the self-control of children with attention-deficit/hyperactivity disorder. The collected data from the hypothetical population supports the proposed hypotheses. The results indicate that teaching behavior modification techniques to mothers has been effective in improving self-control in children with attention-deficit/hyperactivity disorder. Maternal anxiety has also played a moderating role in the effectiveness. Research and studies have shown that significant emotional and behavioral problems and communication difficulties exist among parents and children with attention-deficit/hyperactivity disorder. Various treatments and interventions have been conducted by specialists and researchers to

address these issues. In one study, families were divided into control and intervention groups, and after completing the program, parents in the intervention group reported a significant reduction in disruptive behaviors, oppositional behaviors, and hyperactivity of their children ([Alizadeh, 2005](#)). Furthermore, according to research by [Hajebi et al. \(2006\)](#), parental behavior management training was found to be effective in improving symptoms in preschool children with attention-deficit/hyperactivity disorder. [Blackman et al. \(1991\)](#) believes that the effectiveness of parental training is clearly observed in controlling the incompatible and abnormal behaviors of their children. Although some parents may learn techniques with precision, they fundamentally need guidance and support from professionals. Similarly, [Sadri Damirchi and Aghazadehasl \(2018\)](#) demonstrated that cognitive-behavioral therapy has an impact on the coping styles and self-control of multiple sclerosis patients. In other words, cognitive-behavioral therapy led to an increase in the problem-focused coping style and a decrease in the emotion-focused coping style, avoidance coping style, and self-control in patients with multiple sclerosis. Group cognitive-behavioral therapy has been effective in improving the self-control and coping strategies of patients with multiple sclerosis.

In a study, [Schultz et al. \(2011\)](#) examined the body of research on interventions for attention-deficit/hyperactivity disorder (ADHD) within a school setting. Frequently, students with ADHD do not have access to specialized assistance, despite the fact that the challenges associated with this disorder often hinder their learning and create concerns for educators, school administrators, and support personnel. This review discussed various psychosocial interventions implemented in schools that have demonstrated potential in research studies. The authors concluded by sharing their insights into the possibilities and difficulties associated with delivering school-based services to students with ADHD, with an emphasis on cognitive and behavioral interventions.

[Heinrich et al. \(2004\)](#) studied the impact of self-control training on students with attention deficit/hyperactivity disorder (ADHD). The participants in this study were 13 children aged 7 to 13 years who received self-control and active brain activity calming training for 25 sessions over three weeks. The research results indicated an improvement in the behavior of individuals with ADHD. Furthermore, the findings showed a reduction in the symptoms of this disorder in these children.

[Beh-Pajoooh et al. \(2012\)](#) conducted a study to investigate the impact of a self-control training program on the improvement of social skills in students diagnosed with ADHD. The research utilized a pre-test-posttest control group design and involved a sample of twenty male students from an elementary school in Tehran, Iran. The participants were divided into experimental and control groups, with the experimental group undergoing the training intervention for a duration of one month, determined through random assignment. Data analysis was conducted using a repeated-measures approach. The

findings demonstrated the significant effectiveness of the self-control training program in enhancing the social skills of students with ADHD. Furthermore, follow-up data indicated that the positive effects of the treatment persisted even after one month. These results suggest that instructing students with ADHD in self-control techniques can contribute to the improvement of their social skills.

In summary, attention-deficit/hyperactivity disorder (ADHD) can have detrimental effects on individuals' daily activities, including their ability to work, focus in school, participate in evaluation situations, function independently at home, build and maintain social relationships, and exhibit appropriate emotional and emotional behaviors. Therefore, this research demonstrates that teaching behavior modification techniques to mothers can, through appropriate interactive training between mothers and children, alleviate their concerns about their children and teach them assertive methods. After training sessions for mothers, children's self-control increased. Weak self-control is one of the core issues for many problems faced by children and adults. Delaying gratification can be viewed as a form of self-control, and many of their problems root in this deficiency.

Therefore, parental management training can impact students' level of self-control. In fact, in the parental training method for child behavior control, specific regulations are established, and boundaries are well defined. This greatly affects the control parents have over their children's behavior. Moreover, parents, through learning encouragement and discipline techniques, learn to control their child's behavior in different situations and settings.

The present study, alongside its findings, has limitations that need to be considered when generalizing the results. Limitations of this study include its focus on elementary school students in Qom and the use of self-report questionnaires as primary data collection tools. It is recommended that future researchers take these limitations into account and replicate the study using complementary data collection methods and samples from other cities.

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