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The effectiveness of parent-child interaction training on behavioral problems and aggression of children with ADHD symptoms

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A B S T R A C T

Objective: Attention-deficit/hyperactivity disorder or ADHD is one of the most common problems of children and adolescents and the reason for referral to psychiatrists and psychologists. Therefore, this research aimed to determine the effectiveness of parent-child interaction training on behavioral problems and aggression of children with ADHD symptoms.

Methods and Materials: In terms of the purpose, the current research design was of an applied type, and in terms of the method of conducting it, it was a quasi-experimental research with a pre-test, post-test, and two-month follow-up plan with the experimental and control groups. The statistical population of this study consisted of 6-10-year-old children with ADHD referred to a private counseling center in the 10th district of Tehran in 1401. An available sampling method was used for sampling, and 30 people were selected, and 15 people were equally assigned to the experimental group and 15 people to the control group. In this research, the tools used included Achenbach's Child Behavior Checklist (CBCL), and Buss & Perry's (1992) Aggression Questionnaire. Parent-child interaction therapy was performed according to McNeil & Hembree-Kigin's (2010) protocol on the experimental group, but the control group did not receive any intervention. Statistical data was analyzed with spss software and using analysis of variance with repeated measurements, and Bonferroni's post hoc test was used to check the stability of the effects of the interventions.

Findings: F values were calculated for behavioral problems (F = 7.63) and aggression (F = 10.74). It can be concluded that the effect of the group membership factor, or in other words, the treatment of parent-child interaction, has led to a significant decrease in dependent variables ($p<0.01$). Bonferroni's post hoc test results indicate that the effect of parent-child interaction therapy on behavioral problems and aggression of children with ADHD was stable.

Conclusion: It can be concluded that parent-child interaction training was effective on behavioral problems and aggression of children with ADHD symptoms, and this effect was stable.

Keywords: *Teaching parent-child interaction, behavioral problems, aggression, ADHD disorder.*

1. Introduction

Attention Deficit/Hyperactivity Disorder or *ADHD* is one of the most common problems of children and adolescents and the reason for referral to psychiatrists and psychologists. It is a behavioral pattern that appears in adulthood in addition to childhood. Developmentally, ADHD manifests with a disproportionate amount of inattention, impulsivity, and hyperactivity (Morshedzadeh, Qomarsi, & Zabihi, 2020). In other words, this disorder can continue from childhood to adulthood, leaving many symptoms and defects in attention, activity and impulsivity (Mulsow et al., 2014). People with attention-deficit/hyperactivity disorder often experience forgetfulness, restlessness, and mood instability, have difficulty understanding time, and deal with problems such as aggression and other behavioral problems (Hoogman et al., 2022).

Children with problems and *behavioral disorders* create many challenges for their parents. These children show behaviors that harm the people around them. Common childhood disorders are usually classified into two broad areas: externalizing disorders and internalizing disorders. Externalizing disorders are characterized by behaviors such as aggression, disobedience, hyperactivity, and impulsivity that are more directed outward (Saurabh & Ranjan, 2020). *Behavioral problems* in children appear in the form of different behaviors caused by many factors. The most important are biological, environmental, social, cultural and family factors (Zuppardo et al., 2023). Studies indicate that the most influential factor in children's behavior problems and aggression is the behavior of parents with children (Katz, Pedro, & Michaud, 2017). Therefore, it can be concluded that treating behavioral problems of patients with attention-deficit/hyperactivity disorder is very important.

Aggression is one of the most widely investigated issues among all behavioral problems of children and adolescents, especially those with ADHD (Chung et al., 2019). In other words, aggression is one of the most important problems and the most common abnormal childhood behaviors, the purpose of which is to hurt oneself or others (Rahimi Pardanjani et al., 2021). Aggression is a complex concept influenced by situational and psychological factors on the one hand and genetic factors on the other (Street et al., 2016). Aggression is a visible behavior whose purpose is physical or psychological harm, loss, or harm (Ambler, Eidels, & Gregory, 2015). Aggression manifests in three forms: physical, verbal, and relational, and is one of the main reasons adolescents should be referred for psychological services (Martin et al., 2012). Aggression is a learned behaviour that when a child does not reach his goal and fails, he shows it to satisfy his inner need (Rezaee, Khodabakhshi Koolaee, & Taghvaee, 2015). In addition, this behavior is associated with anger, often a precursor to aggression in children (Lochman et al., 2010).

In *child-parent interactions*, parents' failure to use appropriate behavioral methods to curb their children's behavior makes parenting stressful for both parents (Moradi, Farhangi, & Tizdast, 2023). Parents' relationships with other family members, especially their children, have important effects on the development of children's health and their psychological health (Fagan, 2020). In the past, therapeutic approaches to children were mainly focused on the child (e.g., play therapy, individual approaches). However, recently there has been a great trend toward treating children's behavioral problems through the involvement of parents (Urquiza & Timmer, 2012). Recently, treatments have been developed for children with behavioral problems that both make immediate changes and maintain long-term treatment goals (Egger & Angold, 2006). One of the factors that led to the invention of these treatments is the persistent nature of these disorders. Early disruptive behaviors persist throughout development, a powerful predictor of later delinquency and criminal behavior. These two factors necessitate the need for treatments that are both effective and durable (Lambert et al., 2001). Parent-child interaction therapy was developed by Eyberg (1970) (Eyberg et al., 2001). This treatment is conceptually drawn from Baumrind's longitudinal research on authoritarian parenting style and approaches such as behavior therapy, play therapy, social learning theory, and attachment theory. It teaches parents to interact with their children warmly, attentively and computer-responsively. This treatment is designed for serious behavioral problems in children (Hosogane et al., 2018). Therefore, according to the above, this study aimed to investigate the effectiveness of parent-child interaction training on behavioral problems and aggression in children with ADHD symptoms.

2. Methods and Materials

2.1. Study design and Participant

The design of the present research was a quasi-experimental type with a pre-test, post-test and two-month follow-up plan with experimental and control groups. The statistical population of this study consisted of 6-10-year-old

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children with ADHD referred to a private counseling center in the 10th district of Tehran in 1401. An available sampling method was used for sampling, and 30 people were selected, and 15 people were equally assigned to the experimental group and 15 people to the control group. Parent-child interaction therapy was performed according to McNeil & Hembree-Kigin's (2010) (McNeil, Hembree-Kigin, & Anhalt, 2010) protocol on the experimental group, but the control group did not receive any intervention. Criteria for entering the research: not having a diagnosis of psychiatric disorders except for ADHD, parental consent. Exclusion criteria: lack of parental consent to continue interventions, absence of more than one session in treatment sessions.

2.2. *Measures*

In order to collect data, Achenbach's Child Behavior Checklist (CBCL), and Buss & Perry's (1992) Aggression Questionnaire were used.

2.2.1. *Behavioral Problems*

The Achenbach Child Behavior Checklist was first designed by Achenbach & Rescorla (2001). It is one of the Achenbach ASEBA parallel forms and evaluates the problems of children and adolescents. In this research, the subscale related to behavioral problems related to attention-deficit/hyperactivity disorder was used. This subscale includes 10 items. The scoring of the questionnaire is based on a 3-point Likert scale. Therefore, the minimum score for the mentioned subscale is 0, and the maximum score is 20. The reliability of the questionnaire was reported using Cronbach's alpha 0.97 and test-retest reliability 0.94. Content validity (choosing the logic of the questions and using the analysis of a class of questions), criterion validity (using a psychiatric interview with the child and correlation with the CSI-4 scale) and construct validity (internal relations of the scales and group differentiation) of these forms are good (Achenbach & Rescorla, 2014). In Iran, the range of internal consistency coefficients of scales using Cronbach's alpha formula has been reported from 0.63 to 0.95 (Moradi, Farhangi, & Tizdast, 2023).

2.2.2. *Aggression Questionnaire*

Aggression Questionnaire Buss & Perry (1992) questionnaire has 29 items that are scored based on a five-point Likert scale (1=completely disagree to 5=completely agree). The score of this tool is obtained through the item's total score, so the range of scores is between 29 and 145, and a higher score means more aggression (Buss & Perry, 1992). Buss & Perry (2012) reported the correlation of the items with the whole test in the range of 0.25 to 0.45, which indicated appropriate validity and reported the tool's reliability with Cronbach's alpha method of 0.89. In addition, Yazdani, Hafezi & Ehteshamzadeh (2022) calculated the reliability coefficient of the questionnaire using Cronbach's alpha method of 0.86, which indicates its favorable reliability coefficients (Yazdani, Hafezi, & Ehteshamzadeh, 2022).

2.3. *Interventions*

2.3.1. *Parent-child interaction therapy*

In the present study, the McNeil & Hembree-Kigin (2010) protocol was used to implement parent-child interaction therapy. The content of the treatment sessions is presented in the Table 1.

Table 1

Parent-child interaction therapy sessions

Session	Goal	Content
1	Initial assessment and determination of treatment direction	In the form of an interview, historical information about the child and the current problem was collected, and the therapist got the opportunity to get to know the child and the family's conditions. The therapist informs the parents about the goals, steps, treatment process and explaining the first homework. First stage: child-centered interaction
2	Teaching child-centered interaction skills (without the child's presence)	In this meeting, parents are explained the logic of using brief daily play therapy sessions at home. After that, a set of skills that should not be done is presented as "avoidance" and a set of skills that should be done as "doing" and each skill is described with its logic. The therapist presents the concept of "strategic attention" and "selective gaze" in order to shape behavior. At the end of the session, skill booklets and homework sheets will be given.
3	Guidance session and practice of child-centered interaction skills (with the presence of the child)	Reviewing and verifying homework is strengthening the therapeutic relationship with the family and providing support for the goals of this meeting. During guidance, the focus is more on behavioral descriptions and only positive feedback is provided without mentioning errors. At the end, more emphasis

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		is placed on the strengths of the parents and they are asked to try harder to reduce the number of questions and increase the feedback in homework.
4	Guidance session with explanation of children's example from parents (with the presence of the child)	Examining and checking assignments, explanations are given about the fact that the formation of many undesirable behaviors is a result of children modeling the behaviors of their elders. While guiding the parents, it is emphasized not to use questions. Trainings are provided in the field of anger control. In homework, parents are encouraged to focus on increasing titled praise.
5	Guidance session with an emphasis on receiving support (with the presence of the child)	Reviewing and checking assignments, "getting support" is an issue that is shared with parents and they are encouraged to get support from other people around them in an appropriate way when necessary. In homework, parents are encouraged to focus on skills that have not yet been mastered.
6	Guidance session emphasizing the issue of children's stress (with the child's presence)	Reviewing and checking assignments, in this meeting parents are discussed about the effect of stress on children and children's emotional understanding. In the guidance process, special attention is paid to the use of skills in a combined manner. From this meeting onwards, if the parents had mastered the skills, the treatment enters the second stage.
7	Teaching parent-centered interaction skills (without the presence of the child)	In this session, parents are taught parent-centered interaction skills, which include discussing how to give effective instructions, praise the child's obedience, and properly implement the deprivation process in case the child disobeys.
8	guidance session (with the presence of the child)	At the beginning of the meeting, the whole process is reviewed with the parents, and then the deprivation procedure is explained to the child according to his.her level of development. If the work process in this session is carried out well and the session ends with the obedience of the child, the parents will be asked to do the first homework of the second stage of the treatment at home.
9	Guidance session with the beginning of generalization of skills outside the playroom (with the presence of the child)	Marine skills of this stage continue. The criteria for acquiring skills are explained to parents. From now on, we are looking to generalize the skills to environments other than the playroom, so parents are asked to use the skills in the waiting room or after each session if needed. If the parents have completed the first homework successfully, they will be given another homework that includes the situation of collecting toys.
10	guidance session (with the presence of the child)	The effects of the treatment on the child's behavior with the parents are reviewed and the improvement of the skills of both stages of the treatment continues. From now on, parents are asked to use the skills of this stage for issues where the child's obedience is important for parents, and for other issues, use other taught techniques.
11	Guidance session with training on setting household rules (with the presence of the child)	After guiding the parent-centered interaction, the remaining behavior problems will be reviewed with the parents. For each problem, it is determined which method is suitable. Parents are taught the process of determining house rules and how to implement them
12	Guidance session with behavior management training in public places (with the presence of children)	The guiding process continues and if the parents are far from the skills mastery criteria, more time will be spent guiding the interaction. If the previous house rules are established, new rules will be determined with the cooperation of the parents. The child's behavior in public places will be discussed and the necessary tips to control his behavior in these places will be given
13	Guidance session in a public place (with the presence of the child)	Preparing the family to complete treatment will be done through guided interaction at the beginning of this session in the playroom. Then, the tips taught about controlling the child's behavior in public places are reviewed with the parents. The middle part of the session continues to practice the same points in a public place
14	Guidance session and solving problems that hinder the completion of treatment (with the presence of the child)	While in order to prepare the family for the completion of the treatment, more focus will be placed on the weaker skills, attention will also be paid to the issues that prevent mastering the skills. If needed, parents play the role of weaker skills with the play therapist. If part of the remaining problems are related to the child's relationship with his or her sibling, you can give them the homework of the children's two-player game and even lead a meeting with the presence of the child's sibling. The objectives and program of this meeting can continue until the parents master the skills.
15	Graduation meeting (with the presence of the child)	Evaluation of training completion criteria along with introduction of other behavior management techniques is done in this meeting. The importance of continuing to use the skills should be emphasized and the therapist should show his satisfaction with the success of the parents in the treatment process. The families are told that they can contact the therapist whenever they encounter a problem, and if necessary, a special meeting will be held for them.

2.4. Data Analysis

Finally, the statistical data was analyzed with SPSS software and using analysis of variance with repeated measurements. Bonferroni's post hoc test was used to check the stability of the effects of the interventions.

3. Findings and Results

In terms of demographic characteristics, the mean (standard deviation) of the age of the experimental group members was 7.19 (2.05) and the control group was 7.55 (2.10). The Table 2 contains the descriptive findings obtained in the current research.

Table 2

Descriptive statistics findings

Variable	Stage	Experimental group		Control group	
		Mean	SD	Mean	SD
Behavioural problems	Pre-test	16.58	2.50	17.01	1.91
	Post-test	13.39	2.19	17.22	2.02
	Follow-up	12.98	2.22	17.29	1.85
Aggression	Pre-test	111.18	12.81	109.71	11.99
	Post-test	102.82	13.11	110.07	12.56
	Follow-up	103.14	12.54	109.80	12.70

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As reported in the Table 2, the mean of behavioral problems and aggression variables in the experimental group after the intervention in the post-test and follow-up phases are lower than in the pre-test phase. However, it has not changed in the control group. To perform the analysis of variance test with repeated measurements, the assumption of normality of the data was confirmed through the Shapiro-Wilk test. The assumption of sphericity was verified according to Mauchly's test, and the assumption of homogeneity of variances was verified through Levene's test. Therefore, the mentioned test can be used by fulfilling the required assumptions.

Table 3

The results of the analysis of variance with repeated measures for the treatment of parent-child interaction in the three stages of pre-test, post-test and follow-up assuming the sphericity of the data

Variable		Sum of squares	Df	Mean square	F	P	Effect size
Behavioural problems	Stage	520.72	2	260.36	109.32	0.000	0.70
	Stages* group	52.66	2	26.33	7.63	0.001	0.42
	error	80.92	28	2.89			
Aggression	Stage	2931.51	2	1465.60	152.71	0.000	0.76
	Stages* group	98.04	2	49.02	10.74	0.001	0.47
	error	220.41	28	7.87			

In the Table 3, the analysis results of variance analysis with repeated measurements are reported. F values were calculated for behavioral problems (F = 7.63) and aggression (F = 10.74). It can be concluded that the effect of the group membership factor, or in other words, the treatment of parent-child interaction, has led to a significant decrease in dependent variables ($p<0.01$). This means that the research variables in the experimental group, due to the treatment of parent-child interaction compared to the control group in the post-test and follow-up stages, had a significant decrease, and this change was done because of the intervention. Bonferroni's post hoc test was used to check the stability of this effect.

Table 4

Results of Bonferroni's post-hoc test in the three stages of pre-test, post-test and follow-up by groups

Statistical index	Stage		PCCT vs Control	
Variable			Mean dif.	Sig.
Behavioural problems	Post-test	Pre-test	3.21	0.00
	Follow-up	Pre-test	3.62	0.00
	Follow-up	Post-test	0.41	0.82
Aggression	Post-test	Pre-test	8.84	0.00
	Follow-up	Pre-test	8.52	0.00
	Follow-up	Post-test	0.32	1.00

As shown in Table 4, the results of Bonferroni's follow-up test indicate that the effect of parent-child interaction therapy on behavioral problems and aggression of children with ADHD was stable in the follow-up phase.

4. Discussion and Conclusion

The present study aimed to investigate the effectiveness of parent-child interaction training on behavioral problems and aggression in children with ADHD symptoms. The results of this research were consistent with some previous studies (Akbarizadeh et al., 2020; Al Sehli, Helou, & Sultan, 2021; Eyberg et al., 2001; Fawns, 2021; Hosogane et al., 2018; Lieneman et al., 2017; Mikami et al., 2010; Urquiza & Timmer, 2012).

In explaining the findings, it can be said that treatment based on parent-child interaction increases their acceptance and empathy and reduces their interpersonal problems. In this way, parents can play their role effectively, and the family's abilities can be improved in all fields. A treatment program based on parent-child interaction includes a clear framework for guiding the cultural adjustment process. The purpose of this educational program is to encourage parents to actively participate in an intervention that reduces

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children's behavioral problems and aggression. Correct methods of communicating and correct understanding of children's problems and needs expand, regulate emotions and develop emotional status (Akbarizadeh et al., 2020). Parents, as the closest people to their children, contribute the greatest to their children's education and learning. Therefore, the correct behavior of parents improves parents' relationships, helps them better understand their children's needs, and actively and effectively reduces their and their children's problems (Mikami et al., 2010). Therefore, this study's treatment of parent-child interaction reduced aggression and behavioral problems in children with ADHD.

To further explain the current research findings, it can be said that in this program, two categories of skills are considered in two consecutive stages of treatment. In the child-centered interaction stage, parents learn to use the usual play therapy skills to improve the parent-child relationship. In the phase of parental interaction, parents learn the necessary skills to increase their obedience and reduce their child's disruptive behaviors (Lieneman et al., 2017). In treating parent-child interaction, goals such as improving the quality of parent-child relationships, reducing behavioral problems and increasing social behaviors, increasing parenting skills, including positive discipline, and reducing parental stress are pursued. In the process of this treatment, parents learn to form and strengthen constructive ways to cope with feelings of failure (Eyberg et al., 2001). In addition, the treatment of parent-child interaction makes parents manage the child's behavior more effectively, and in this way, the child's desirable behavior increases, and the undesirable behavior decreases. Parent-child interaction therapy helps to break parent-child negative wheel behaviors by encouraging positive parent-child interactions and teaching parents how to be stable and use non-violent discipline techniques (Al Sehli, Helou, & Sultan, 2021).

5. Limitations

The present study, like any other study, had limitations. One of these limitations was using a questionnaire to measure and collect data. Please comply with the principle of honesty, bias, and error in answering in this way to ensure the accuracy of the data is maintained. Also, the current research design was quasi-experimental, which reduces the power of generalizing the findings. In addition, the sampling method and the limitedness of the statistical population create problems in the generalization of the findings. Finally, it should be noted that some variables are out of the researchers' control, so one should be very cautious in generalizing the obtained results.

6. Suggestions and Applications

Finally, researchers are suggested to investigate and study parent-child interaction therapy for other disorders of children and adolescents in various statistical communities. It is also suggested that the therapists use the techniques used in this treatment method and hold specialized workshops for teaching the treatment protocol used in the present study.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethics principles

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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