

The effectiveness of parent-child interaction intervention on behavioral problems of children with attention deficit hyperactivity disorder(ADHD)

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Abstract

The aim of this study was to determine the effectiveness of parent-child interaction intervention on behavioral problems of children with attention deficit/hyperactivity disorder (ADHD).

This research was a quasi-experimental study with pretest-posttest and a control group. The SNAP-IV-Rating Scale (Swanson, Nolan, & Pelham, 1980) and Child Behavioral Problems Checklist (Achenbach & Rescorla, 2001) were used. The selected sample consisted of 60 students aged 6 to 11 years with attention deficit / hyperactivity disorder and their mothers. These students were referred to the clinics and diagnosed with ADHD by a psychiatrist. The parent-child interaction intervention program was applied for experimental group in 15 one-hour sessions (two sessions per week for 8 weeks).

Findings showed that after the intervention, the scores of experimental group for the internalizing problems (anxiety, physical complaints and depression) and externalizing problems (breaking the law and aggression) decreased significantly in children ($P < 0.05$).

Based on the findings, the implementation of the parent-child interaction-training program can reduce the internalizing and externalizing problems of children with attention deficit / hyperactivity disorder.

Keywords: attention deficit / hyperactivity disorder, parent-child interaction intervention, behavioral problems, externalizing behavioral problems, internalizing behavioral problems

Introduction

Attention deficit/hyperactivity disorder(ADHD) affects approximately 5 to 10 percent of children and adolescents and 3 percent of adults. About 30 to 70 percent of children with ADHD also show the

symptoms of this disorder in the adulthood (Nutt, Fone, & Asherson, 2007). Some reports indicated the ratio of 9: 1 for boys to girls, and some more recent reports have shown the ratio of 3: 1 (Canadian Attention Deficit Hyperactivity Disorder

Resource Alliance (CADDRA), 2011). The core symptoms of ADHD are inattention, hyperactivity, and impulsivity. They are associated with significant impairment across children's cognitive, academic, behavioral, social, and familial functioning (Mash & Barkley, 2003).

Behavioral problems considered as abnormal behaviors that are severe, chronic, or persistent in proportion to age. Based on social and cultural expectations, they are extreme and unacceptable behaviors (Mundschenk & Simpson, 2014; Walker, Yell, & Murra, 2014). They may appear as externalizing problems or internalizing problems (Carragher, Krueger, Eaton, & Slade, 2015; Achenbach & Edelbrock, 1978; Achenbach & Rescorla, 2001). The externalizing spectrum includes externally focused behavioral symptoms (aggression, conduct problems, delinquent behavior, and oppositionality, hyperactivity, and attention problems) and internalizing spectrum includes internally focused symptoms (anxiety, fear, sadness/depression, social withdrawal, and somatic complaints). The significant co-occurrence of ADHD and externalizing difficulties such as aggressive or oppositional symptoms (Spencer, 2006) and internalizing problems such as anxiety (Jarrett & Ollendick, 2008) is well documented.

In children, these difficulties can have negative effects on their interactions with the teachers, families and other people, and in fact are associated with high level of social problems (Khoddam et al., 2008). The problematic behavior of the child can lead to inappropriate relationship between mother and child (Rasafiani, et al., 2012), reduces the mother's self-confidence, and lowers the parental self-efficacy (Bulgan & Ciftci, 2017). These problems in kids can elicit negative feelings in parents (Calkins, 2002; Nicholson, Fox, & Johnson, 2005)

and when the child show behaviors such as negative affect and noncompliance, the parent may experience negative emotions, thus convey some harsh behaviors (Cole, Martin, & Dennis, 2004; Forbes et al., 2008). Patterson (1976) believes that many challenging behaviors (such as disobedience) of a child are part of his/her normal development. They are usually temporary and vary in severity depending on the child development. Specific circumstances for instant, the parent's failure to reinforce community-friendly skills and most of the time responding to the child's misbehavior inappropriately, may persuade some children to continue engaging in behaviors such as disobedience (Akbarizadeh, et al., 2020).

Improvement of parent-child interaction is an important factor for treatment of children. In order to strengthen this relationship and reduce the child's behavioral problems, parent-child interaction therapy has a great reputation and has strong scientific support in the areas of behavioral problems reduction, parental self-efficacy, mother-child interaction, family functioning, attachment styles and parenting styles (Chasea et al., 2019). Parent-child interaction therapeutic program, was designed based on the theory of attachment and social learning (Chasea, Carmody, Lent, Murphy, Amaya-Jackson, Wray et al., 2019). It is usually used for children aged two to eight years old with history of destructive behaviors (Pirnia, Rasoulzadeh Tabatabai, Pirkhaefi and Soleimani, 2017). The goals of this program is to improve the quality of parent-child relationships; in children reduction of behavioral/ emotional problems and improvement of the social skills, and in parents promote positive parenting skills and reduce their stresses (Vazqueza, Molina, Ramosa & Artazcoza, 2019). Parent-child interaction-based intervention eliminates the

negative and defective cycle of parent-child behaviors using non-violent disciplinary techniques by training and reinforcing the positive parent-child interaction (Batzer, Berg, Godinet, Wray and Stotzer, 2019). A sense of social competence and self-control in parents can be achieved through a proper teaching (Lee, 2017). By using modeling and structured problem solving, it creates a safe environment with minimal conflicts, and increases behavioral, emotional, intellectual, language, and social efficiency in children (Rosaloz et al., 2019).

This intervention is a useful training program for parents and their children in terms of communication, family functioning, parent-child interaction and behavior management at home and school. Behavioral problems are common in school and preschool age children due to the specific developmental characteristics of these ages. In this period, emotional stresses manifest as transient behavioral problems. These problems may fade spontaneously as the children grow, but it may continue and cause serious social, psychological, and educational damages (Khazaei et al., 2005). A study on children with autism who had severe behavioral problems, indicated that parents underestimated their child's behavioral problems and after the treatment, reduction of routine problem behaviors and increase of adaptive behaviors were obvious in their children (Solomon, Ono, Timmer, & Goodlin-Jones, 2008). There are studies indicating that parent-child interaction therapy has reduced the behavioral problems in children and improved the positive parenting skills such as increase of social support, resilience, and greater intimacy between parents (Vazquez et al., 2019; Chesea et al., 2019; Ros, Hernandez, Graziano, Bagner, 2016; Comer et al., 2012; Bratton, Opiola & Dafoe, 2015). Some research have examined the effect of

this program on parents and their children with disabilities (Ros, Hernandez, Graziano & Bagner, 2016; Javadi et al., 2018). A study showed that teaching parents the parent-child interaction skills has reduced externalized behavioral problems in children with developmental delays (Ros, Hernandez, Graziano & Bagner, 2016). It has been effective in reducing the rate of behavioral problems (Hosogane, et. Al., 2018) and anxiety in children with ADHD too (Pirnia, et.al., 2017).

The efficacy of parent-child interaction has been well established, and much research has focused on examining and improving the effectiveness of this intervention targeting a wider range of families. Some of the intervention program designed to train parents of all groups of children with special needs, especially for parents of children with behavioral and emotional disorders and children with autism spectrum disorder. Although, parent-child interaction therapy was applied for parents of children with behavioral problems, the present intervention program was adapted for children with ADHD and their mothers. The results of this study will help the families, therapists, teachers and whom they work with these children. It also helps to develop more studies in this field in the future. Thus, the present study seeks to answer this question: is parent-child interaction intervention being effective on behavioral problems of children with ADHD?

Method

The present study was semi-experimental design with pretest-posttest and a control group. The sample consisted of 60 children aged 6 to 11 years with combined attention deficit hyperactivity disorder and their mothers. The children were first to third grade boys with ADHD whom referred by a psychiatrist. In the present study, we used the convenience

sampling method. The SNAP-IV- Rating Scale of attention deficit / hyperactivity disorder was performed by a psychiatrist. Hence, 60 children whose ADHD test scores fell below the cut line (1.57), were considered as a research sample. They were randomly assigned to two groups (30 in experimental and 30 in control). The Child Behavioral Problems Checklist administered to both groups as a pre-test. The experimental group (30 children and their mothers) had parent-child interaction training. The intervention program consisted of 15 one-hour sessions (8 weeks and 2 sessions per week). After the intervention, the Child Behavioral Problems

Checklist performed on both groups as a post-test.

Parent-child interaction training program:

By studying the background of relevant foreign and domestic research, the therapeutic model of parent-child interaction was used which is based on the theory of Eyberg (1999). This program includes 15 one-hour weekly sessions to reinforce the appropriate parent-child relationships. It was used by Varasteh, Aslani & Elahi (2016) in a study about the effectiveness of positive parenting training on the quality of parent-child interaction. In the present study the sessions of training were as follow:

Table 1. Summary of parent-child interaction therapy sessions

session	topic	goals	homework
First	Initial evaluation and determination of treatment orientation	Familiarization of mother and child with the therapist, observing how the parent-child interact, completing the questionnaire by the mother, explanation of therapist about the goals, steps and process of treatment	-----
Second	Teaching child-centered interaction skills (without child presence)	Parents' obedience to the child, mother's familiarity with different skills (to do or not to do), implementation of activities to improve the quality of parent-child communication	Reflective Response Practice, Emotional Response Sheet completion, 30 seconds continuous attention practice, face and sound harmony practice
Third	Guide and practice child-centered interaction skills (with the presence of the child)	More focus on behavioral skills, on positive feedback, and parents' strengths.	Choosing toys for creativity and expressing emotions, practicing child-guided play, practicing empathy with the child while playing, reflecting the child's words, using

			titled praises
Fourth	Guidance with explanation of the issue of children modeling from parents (with the presence of the child)	Explain the role of modeling in the formation of undesirable behaviors, explain the criteria for achieving skills in the stage of parent-child interaction, and receive training on anger management.	Practice reducing the number of questions and increasing feedbacks, increasing praise, practice describing a child's behavior
Fifth	Guidance with emphasis on the issue of receiving support (with the presence of the child)	Familiarity and explanation about the concept of admiration, how to receive support from others, assessing the mothers' mastery of child-centered skills.	Use toys to express the child's creativity, practice praising skills, practice receiving support in emergencies
Sixth	Guidance with emphasis on the issue of children's stress (with the presence of the child)	Explain the role of stress and its consequences in children, explain about children's emotional perception, investigate the weaknesses in child-centered skills.	Practice the child's emotional comprehension while playing Practice using skills in combination More practice on weak skills
Seventh	Parent-centered interaction skills training (without child presence)	Teaching effective instructions, teaching the correct execution of the deprivation process, reviewing the contents of the session.	Review tips on effective commands, praise and proper implementation of the deprivation process
Eighth	Guidance and practice of parent-centered interaction skills (with the presence of the child)	Explain about the parent-centered interaction process in accordance with the child's developmental level, implement the parent-centered interaction process, and explain about homework.	Practice effective commanding practice the deprivation process practice the obedience with the child
Ninth	Guidance with the beginning of generalization of skills out of the game room (with the presence	Practicing parent-centered interaction skills, explaining the criteria for acquiring skills, explaining how to	Practice collecting toys Carefully, select of 2 or 4 direct commands

	of the child)	generalize skills to other places, assigning a new task.	
Tenth	Guidance (with the presence of the child)	Review the effects of treatment on the behavior of the child and mother, practice how to use the skills ; improve the skills of both stages of treatment.	Perform previous exercises, practice using the skills of this step only in cases where the child's obedience is important to parents. Simultaneous practice of child-centered and parent-centered interaction stage skills
Eleventh	Guidance with home rules (with the presence of the child)	Examine the chart of the child's behavior, review the remaining behavioral problems with the mother, determine the appropriate method for each problem, learn to determine and implement household rules.	Practice parent-centered interaction skills in a gathering situation. Use parent-centered interaction skills to advance the necessary commands. Set new rules at home
Twelfth	Guidance with behavior management training in public places (with presence of the child)	Assess the criteria for mastering the interaction-oriented skills, set new rules if the previous house rules are established, teach the necessary tips for controlling behavior in public places.	Practice fixing previous house rules Set new rules
Thirteenth	Navigating in a public place (with the presence of the child)	Preparing the family to complete treatment through interaction guidance, reviewing learned lessons about controlling the child's behavior, explain how to manage potential problems using problem-solving techniques.	Identify three general behaviors that practiced outside. Set new rules if needed Set limited rules for public behavior
Fourteenth	Guidance and solving the problems that prevent the completion of treatment (with the presence of	Focus on weak interaction skills, examine barriers to mastery of skills, and perform role-play by	Use parent-centered interaction skills to advance commands, house rules, and general behaviors as needed. Doing

	the child)	therapist and mother to improve weak skills, homework assignment.	game practice in 2 sessions with 2 siblings together (use child-centered interaction skills, unless requires direct play with parent-centered interaction skills due to non-participatory behavior).
Fifteenth	graduation (with the presence of the child)	Evaluate the criteria for completing the training along with introducing other behavioral management techniques, emphasizing the importance of continuing to use skills, and planning a supportive session	Practice child-centered interaction for 5 minutes daily. To advance commands, house rules, and general behaviors, use parent-centered interaction skills as needed.

SNAP-IV- Rating Scale of attention deficit / hyperactivity disorder

Swanson, Nolan, & Pelham developed this scale in 1980; it has a single 18-questions used by both parents and teachers. Nine questions are related to ADHD for inattention type and nine questions related to ADHD for hyperactivity type. Each question is scored from zero to three (0 = never, 1 = sometimes, 2 = often, 3 = always). The total score of the person divided into 18 and in each subgroup to 9. The cut point in the whole scale with combined type, dominant type of inattention and dominant type of hyperactivity are 1.57, 1.10 and 1.90, respectively (Sadr al-Sadat, Hoshyari, Zamani & Sadr al-Sadat, 2007; Bussing, Fernandez, Harwood, Hou, Garvan, Eyberg et al., 2008). Test validity coefficients in the population of Iranian children have reported as 82%, 90% and 76%, respectively, using retest methods, Cronbach's alpha and split half coefficient. The cut point for ADHD is considered moderate as 1.57 and severe as 1.24 (Sadr al-Sadat et al., 2007). Also, in foreign research, many studies have

confirmed the validity and reliability of this scale (Dineen and Fitzgerald, 2010., Abd El Hay & et al, 2010).

Child behavior problems checklist (CBCL)

This questionnaire, developed by Achenbach & Rescorla in 2001, has 113 items that is part of Achenbach system of empirically based assessment (ASEBA). It evaluates various behavioral problems of children and adolescents aged 6 to 18 years old from the parents, teacher or child view in the last six months in following eight factors: anxiety / depression, isolation / depression, physical complaints, social problems, thinking problems, attention problems, ignoring the rules and aggressive behavior. In this study, we used the parent form. CBCL consists of three scales: the scale of internalized behavioral problems consists of anxiety / depression, isolation / depression, physical complaints and the scale of externalized behavioral problems includes ignoring the rules and aggressive behavior. The remaining factors are also classified as other problems. The answers to

the questions are in the form of 3-point Likert from 0 to 2. Test-retest reliability of the scales ranged from 0.93 to 1. The overall validity coefficients have reported to be 0.97 using Cronbach's alpha and 0.94 using retest validity. Content validity, criterion validity and structural validity have also reported to be favorable (Achenbach and Rescorla, 2001). Yazdkhasti and Arizi (2011) obtained Cronbach's alpha validity coefficient for this list of behavioral problems in three forms of

parents, teacher and child as 0.90, 0.93 and 0.82, respectively.

Findings

For analyzing the data mean, standard deviation and analysis of variance (ANOVA) between the subjects were used.

Table 2 shows the internalized and externalized behavioral problems of children with ADHD in pre-test and post-test stages.

Table 2. Internalized and externalized behavioral problems of children with ADHD in pre-test and post-test stages

	stage	Statistical index group	mean	Standard deviation	minimum	maximum	number
Internalization problems	Pre-test	Experiment	48.13	12.27	28	68	30
		control	50.20	7.18	35	63	30
	Post-test	Experiment	32.13	9.62	14	47	30
		control	49.23	6.51	34	62	30
Externalization problems	Pre-test	Experiment	57.80	6.07	45	68	30
		control	58.43	6.48	45	68	30
	Post-test	Experiment	24.30	5.80	15	37	30
		control	57.70	6.54	43	67	30

According to the means obtained in Table (2), the mean of internalized and externalized behavioral problems in children with ADHD has decreased significantly after parent-child interaction training.

Due to the first hypothesis of the study, (parent-child interaction therapy reduces the behavioral problems of children with ADHD) and its analysis, in order to examine other assumptions of the MANCOVA test, the equality of variance-covariance matrix is investigating.

The results for Multivariate test in intergroup effects are shown in table 3.

Table 3. Multivariate test for intergroup effects

Test name	value	F value	Freedom degree of Hypothesis	freedom degree of error	P-value
Pillai's trace	0.930	366.113 ^b	2.000	55.000	0.001
Wilks Lambda	0.070	366.113 ^b	2.000	55.000	0.001
Hotelling's trace	13.313	366.113 ^b	2.000	55.000	0.001
Roy's largest root	13.313	366.113 ^b	2.000	55.000	0.001

Considering the obtained level of significance (0.000) in the above table, it can infer that there is a significant difference by increasing the interaction of mother and child with ADHD.

Table 4 shows the results for analysis of variance (ANOVA) between subjects.

Table 4. Analysis of variance (ANOVA) between subjects

Source of changes	dependent variable	Total squares	Degrees of freedom	Squares mean	Test statistics	P-value
group	Externalized behavioral problems in children	3714.241	1	3714.241	100.104	0.001
	internalized behavioral problems in children	16121.519	1	16121.519	508.616	0.001

According to the levels of significances obtained in the above table, we can state that there is significant difference between the levels of child behavioral problems (externalized and internalized behavioral problems) after parent-child interaction training (significance level less than 0.05). As seen in the descriptive statistics, the externalized and internalized behavioral problems have decreased.

Due to the study hypothesis, (parent-child interaction therapy reduces the internalized behavioral problems of children with ADHD), univariate analysis of covariance (ANCOVA) used to test the above hypothesis. According to the presuppositions of the univariate analysis of covariance test (normality of data distribution and homogeneity of variances), this test was performed.

The results for the effectiveness of parent-child interaction training on internalized behavioral problems in children with ADHD are seen in table 5.

Table 5. Internalized behavioral problems in children with ADHD after intervention

Source of changes	Total squares	Degrees of freedom	Squares mean	F value	P-value
Group	319.439	1	319.439	8.405	0.005
Pre-test	6132.644	2	3066.322	80.680	0.001
Error	2166.340	57	38.006		
total	107607.000	60			

According to the above table, because $F = 8.405$ (57 and 1) obtained at the significance level (0.005) is less than 0.05; this means that the test hypothesis is accepted. Hence, we conclude that parent-child interaction training has been effective on internalized behavioral problems in children with ADHD.

Due to the study hypothesis, (parent-child interaction therapy reduces the externalized behavioral problems of children with ADHD), univariate analysis of covariance (ANCOVA) used to test the above hypothesis. So, according to the presuppositions of the univariate analysis of covariance test (normality of data distribution and homogeneity of variances), this test was performed.

Table 6 shows the results for effectiveness of parent-child interaction training on externalized behavioral problems of children with ADHD

Table6. Externalized behavioral problems in children with ADHD after intervention

Source of changes	Total squares	Degrees of freedom	Squares mean	F value	P-value
Group	200.282	1	200.282	9.431	0.003
Pre-test	17739.491	2	8869.745	417.655	0.001
Error	1210.509	57	21.237		
total	119810.000	60			

Based on the above table, because $F = 9.431$ (57 and 1) obtained at the significance level (0.003) is less than 0.05; this means that the test hypothesis is accepted. Hence, we conclude that parent-child interaction training has been effective on externalized behavioral problems in children with ADHD.

Discussion

Based on the findings, parent-child interaction intervention could reduce the internalizing behavioral problems of children with attention deficit / hyperactivity disorder (ADHD).

Behavioral problems in children have long considered by experts. Many interventions and treatment methods have designed in this regard. Some therapies rely on the therapist's direct intervention in face-to-face interaction with the child. In the meantime, a number of therapies have modeled the intervention based programs for improving parent-child interaction. A study by Edwards, Sullivan, Meany-Walen, & Kantor (2010) showed that providing parent-child interaction program increased parenting knowledge and trust, and reduced the behavioral problems in children. In a study, Lenze, Pautsch & Luby (2011) used the interaction therapy program and their results indicated reduction in depressive symptoms of preschoolers. Also the effectiveness of this program on anxiety symptoms in children was shown by Pirnia, et al. (2017). Akgun and Yesilyaprak (2010) determined that this treatment has

associated with improved parent-child relationships. Parents of anxious children inadvertently have anxious responses to their children. The parents usually show a pattern of fear or avoidance, trying to control the child's behavior to limit the child's autonomy, over-supporting the child, or facilitating avoidant responses. Parents' anxious response to the child's anxiety maintains the anxiety in children. These negative supporting patterns can reinforce the child's fear. In this study, the parent-child interaction intervention program had some training in which supported the increase of warmth, acceptance and positive interactions between parent and child and improved the secure attachment between them, thus help the child feel safe. In this program, the guided games, use of toys that child could express his/her emotions along with empathy during plays, use of praises, and creativity were practiced. When needed, enough supports for children and their mothers were provided. Practicing combination of skills to reduce the child's internal problems such as anxiety and depression were applied.

Regarding the effect of this intervention on externalizing problems, the results of the present study showed that parent-child interaction program reduced the externalized behavioral problems of children with ADHD. In fact, this program showed a greater reduction in externalizing problems than internalizing problems. Many

behavioral problems of children are rooted in parenting skills and practices. Hinshaw, Morrison, Carte, Cornsweet (1987) stated that negative parental strategies reinforce negative child behaviors such as disruptive behaviors (oppositional, aggressive, hyperactivity). Spanking and physical aggression are linked to childhood aggression and increases of parenting aggressiveness leads to enhance the severity of problems in children (Strassberg et al., 1994). Also it was indicated that deficits in positive parent—child interactions is a predictor of conduct problems in their kids (Denham, Renwick, & Holt, 1991; Pettit & Bates, 1989). Parent-child interaction program breaks this defective cycle by reinforcing positive interactions and teaching parents to be consistent and use non-violent techniques. In parent-child interaction program, parents learn skills to build secure relationships and help the development of their children. They increase the socially desirable behaviors in the child and reduce the negative behaviors in her/him. In this intervention program, mothers learn how to approach their children, use more effective parenting styles which could meet their children's needs, pay attention to the child's adaptive behaviors, and ignore his or her maladaptive behaviors, so children can respond to these interactions in a healthier way (Javadi et al., 2018). In addition, harsh and fanatical family atmosphere seems to build a ground for possible behavioral disorders such as aggression and disobedience. Obviously, changing the atmosphere, work on parent-child interaction style and improving family skills in this regard, can reduce the aggressive behavior in the child. In the present study, practicing control of emotions and behaviors, obeying the rules, and learning appropriate skills were reinforced. Subsequently, post-test results indicated that

these practices were able to affect the external behavior problems of hyperactive children were decreased. This finding is consistent with previous research (Akgun, Yesilyaprak, 2010; Edwards, Sullivan, Meany-Walen, Kantor, 2010). Some research also pointed out that parental training and community-based interventions are effective in treating behavioral disorders of children (Farmer et al., 2002).

This study had some limitations such as time constraints, which led to the impossibility of following the effects of treatment after few months or a year, limited sample of the study to boys and the use of measurement tools by the mothers, which could lead to some biases. The further research can use different tools responding by the teachers or instructors and, if possible, self-report, with long-term follow-up of the results in both sexes.

Conclusion

According to the results of this study, the implementation of interaction training program for children can be effective in reducing the internalizing (anxiety, depression) and externalizing (breaking the law and aggression) problems of children with attention deficit hyperactivity disorder. It also improves positive parenting skills in mothers of children with ADHD.

Disclosure statement

No conflict of interest was reported by the authors.

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