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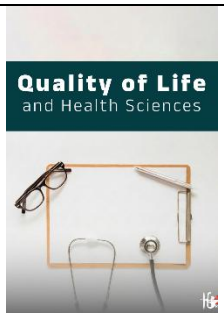

The Effectiveness of Parent Management Training on Oppositional Behaviors, Parenting Stress, and Parent–Child Interaction in Children With ADHD

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A B S T R A C T

Objective: This study aimed to examine the effectiveness of Parent Management Training on oppositional behaviors, parenting stress, and parent–child interaction in children with attention-deficit/hyperactivity disorder.

Methods and Materials: This quasi-experimental study was conducted using a pre-test, post-test, and follow-up design with an experimental group and a control group. The statistical population consisted of children with ADHD and their parents in Tehran, Iran. A total of 30 parent–child dyads were selected through purposive sampling and randomly assigned to the experimental group and control group, with 15 dyads in each group. The experimental group received Parent Management Training in 10 weekly sessions, each lasting approximately 90 minutes, while the control group remained on the waiting list and received no structured intervention during the study period. Data were collected using standardized measures of oppositional behaviors, parenting stress, and parent–child interaction at three stages: pre-test, post-test, and follow-up. The data were analyzed using repeated-measures analysis of variance and Bonferroni post hoc tests.

Findings: The results showed significant time, group, and time × group interaction effects for all study variables. The interaction effect of time and group was significant for oppositional behaviors ($F = 47.29$, $p < .001$, $\eta^2 = .628$), parenting stress ($F = 36.21$, $p < .001$, $\eta^2 = .564$), and parent–child interaction ($F = 34.56$, $p < .001$, $\eta^2 = .552$). Bonferroni comparisons indicated that oppositional behaviors and parenting stress decreased significantly from pre-test to post-test and from pre-test to follow-up in the experimental group, while parent–child interaction increased significantly across the same stages. No significant differences were observed between post-test and follow-up scores, indicating stability of intervention effects.

Conclusion: Parent Management Training was effective in reducing oppositional behaviors and parenting stress and improving parent–child interaction in children with ADHD, and its effects remained stable during the follow-up period.

Keywords: *Parent Management Training; ADHD; Oppositional Behaviors; Parenting Stress; Parent–Child Interaction; Children*

1. Introduction

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders of childhood and is characterized by developmentally inappropriate patterns of inattention, hyperactivity, and impulsivity that interfere with academic performance, peer relationships, family functioning, and adaptive behavior.

Although ADHD is often described through its core symptoms, the clinical reality of the disorder is frequently more complex, particularly when children also display irritability, noncompliance, defiance, argumentativeness, emotional dysregulation, and aggressive or oppositional behaviors. These associated behavioral difficulties often create a level of impairment that extends beyond the child's individual symptoms and affects the emotional climate of the family, the quality of parent–child interaction, and the psychological well-being of parents. Contemporary clinical reviews emphasize that irritability and externalizing behaviors are highly relevant transdiagnostic concerns in youth and should be understood not only as isolated symptoms but also as markers of broader developmental, relational, and treatment-related challenges (Polanczyk & Sugaya, 2026). In children with ADHD, such difficulties may become especially persistent because deficits in self-regulation, inhibitory control, and frustration tolerance can increase the likelihood of conflictual interactions with parents and caregivers.

Oppositional behaviors represent one of the most common and impairing behavioral concerns observed among children with ADHD. These behaviors include recurrent defiance, refusal to comply with adult requests, arguing, blaming others, anger, resentfulness, and deliberate rule-breaking. When these behaviors become frequent and persistent, they may overlap with or meet criteria for oppositional defiant disorder, a condition that is closely associated with disruptive family processes and later psychosocial impairment (Ahmed & Vs, 2023). Oppositional behaviors in childhood are clinically important because they can intensify parent–child conflict, reduce parental efficacy, disrupt classroom adjustment, and increase the likelihood of referral to mental health services. Evidence-based reviews of oppositional defiant disorder have consistently highlighted the importance of behavioral treatment programs, particularly those that target parenting practices, reinforcement patterns, discipline consistency, and family communication (Kaur et al., 2022). Moreover, disruptive behavior problems may exist along a developmental continuum that includes conduct-related symptoms, and theoretical as well as applied behavioral perspectives have emphasized the need for early intervention before coercive and aggressive behavioral patterns become more stable (Fai, 2022).

The co-occurrence of ADHD and oppositional behaviors is particularly significant because it places substantial demands on parents and caregivers. Parents of children with ADHD often experience repeated episodes of noncompliance, emotional outbursts, temper loss, and difficulty enforcing household routines. These daily challenges can lead to elevated parenting stress, reduced parental confidence, harsher disciplinary reactions, and inconsistent management strategies. Parenting stress is not merely a secondary consequence of child behavior; rather, it may function as an active mechanism through which child oppositionality and family dissatisfaction reinforce one another. Research on children's opposition, marital satisfaction, life satisfaction, and parenting stress suggests that parenting stress can mediate the broader impact of child oppositional behaviors on family well-being (Matalon et al., 2022). In this context, interventions that reduce disruptive child behaviors while simultaneously improving parental coping and perceived competence may have broader relational and psychological benefits for both children and parents.

Parent–child interaction is a central domain in understanding the persistence and modification of oppositional behaviors in children with ADHD. Repeated cycles of child noncompliance and parental frustration can create coercive interaction patterns in which negative behaviors are inadvertently reinforced. For example, when a child refuses a parental command and the parent withdraws the demand to avoid conflict, the child may learn that resistance is effective; conversely, parents may increasingly rely on criticism, threats, or inconsistent punishment when positive strategies appear ineffective. Over time, these patterns weaken warmth, responsiveness, and mutual cooperation within the family. The importance of early relational intervention is supported by trials of programs designed for neurodevelopmental and behavioral syndromes, which indicate that early parent-focused support may improve outcomes when children show early symptomatic patterns requiring developmental and clinical attention (Johnson et al., 2021). Therefore, treatment approaches for ADHD-related oppositional behaviors must address not only the child's behavior but also the reciprocal interactional processes that maintain behavioral difficulties within the family system.

Parent Management Training (PMT) is one of the most widely recognized psychosocial approaches for addressing disruptive and oppositional behaviors in children. PMT is grounded in social learning theory and behavioral principles and aims to help parents modify child behavior by changing the contingencies, communication patterns, and disciplinary strategies used in everyday interactions. In PMT, parents are

typically trained to increase positive attention, reinforce desirable behaviors, give clear commands, establish consistent rules, use predictable consequences, reduce harsh and inconsistent discipline, and manage noncompliance in a structured manner. The application of PMT has been discussed as a treatment approach for conduct and disruptive behavior problems, with emphasis on its role in helping caregivers identify maladaptive behavior cycles and replace them with consistent behavioral management strategies (Abidogun, 2023). PMT is especially relevant for children with ADHD because many behavioral difficulties in this population are expressed in daily family routines such as homework completion, bedtime, transitions, sibling interactions, and compliance with parental instructions.

The empirical literature supports the effectiveness of parenting interventions for children with ADHD and externalizing symptoms. A randomized controlled study of parenting training for Thai children with ADHD demonstrated improvements in emotional and behavioral problems, indicating that structured parent-focused interventions can be useful across cultural contexts (Tiwawatpakorn et al., 2021). Similarly, parental group interventions have shown beneficial effects on parents' growth mindset and children's behavior among families of children with ADHD, suggesting that changes in parental beliefs and behavioral responses may contribute to improved child outcomes (Fuengfoo et al., 2024). These findings are consistent with broader clinical recommendations that parent-oriented interventions should be considered core components of psychosocial treatment for ADHD when disruptive behaviors and family conflict are present. In addition, pediatric mental health access programs have emphasized the need for practical, evidence-informed guidance to support clinicians and families managing child behavioral and emotional problems in real-world care settings (Harris et al., 2023).

Recent developments in the field have also expanded PMT beyond traditional face-to-face delivery. Digital, mobile-based, and web-based formats have been introduced to increase accessibility, reduce treatment barriers, and provide parents with structured guidance outside specialized clinical centers. Online parent training for children with externalizing behavioral problems and affective dysregulation has been proposed as a promising approach for prevention and intervention (Ritschel et al., 2021). Digital and microlearning approaches have also been discussed as strategies for scaling PMT to reach more families, particularly when access to trained therapists is limited (Grodberg & Smith, 2022). Furthermore, research on the acceptance and utilization of web-based self-help for caregivers of children with externalizing disorders indicates that caregiver engagement and usability are key considerations in the implementation of digital parent-support programs (Wähnke et al., 2024). Mobile-based self-directed PMT has recently been evaluated in parents of children with ADHD with or without oppositional defiant disorder, further demonstrating the growing interest in flexible formats for parent training (Döpfner et al., 2025). Protocols for smartphone-based interventions with supportive accountability also reflect the field's movement toward technology-supported treatment for childhood disruptive behavior problems (Lindhiem et al., 2024), while scoping reviews of parent-focused eHealth interventions have highlighted the importance of defining behavior change techniques and persuasive system design features in such programs (Silva et al., 2023).

Although technological adaptation is important, the clinical content of PMT remains rooted in modifying parenting behavior and strengthening the parent–child relationship. Interventions that focus exclusively on symptom reduction may not fully address relational processes, parental stress, and family functioning. The importance of tailoring parenting programs to specific child characteristics has been shown in studies adapting parent training for children with callous–unemotional traits, where treatment responsiveness may depend on matching intervention content to the emotional and behavioral profile of the child (Fleming et al., 2022). Similarly, parent training has been evaluated for irritability in children and adolescents, reflecting the relevance of parent-focused approaches for emotion-related behavioral difficulties beyond narrowly defined diagnostic categories (Fongaro et al., 2022). Follow-up studies of parent management training combined with additional cognitive-behavioral components have also shown that intervention effects for oppositional defiant symptoms may remain clinically relevant over extended periods (Helander et al., 2022). However, the cost-effectiveness literature suggests that stacking interventions, such as adding child-focused programs to PMT, should be carefully examined because more intensive treatment is not always more efficient or necessary for every family (Nystrand et al., 2020).

Children with ADHD and oppositional behaviors may also present with irritability, temper loss, anxiety, aggression, or broader emotional dysregulation. Differential diagnostic discussions have emphasized that irritability and

temper loss in young children require careful clinical interpretation because similar behaviors may arise from different developmental and psychopathological pathways (Fredrick et al., 2022). Co-occurring conduct problems and anxiety can further complicate functioning and treatment planning among youth with oppositional defiant disorder, suggesting that interventions must be sensitive to emotional as well as behavioral dimensions of child adjustment (Halldorsdottir et al., 2023). Evidence-based reviews of psychosocial treatments for childhood irritability and aggressive behavior have also emphasized the value of structured psychosocial interventions for reducing disruptive behavior and improving regulation (Kalvin et al., 2025). Regulation-focused psychotherapy for children with emotion dysregulation further reflects the increasing recognition that behavioral interventions must be understood in relation to emotional regulation capacities (Maeng et al., 2026). These considerations are directly relevant to ADHD, where emotional impulsivity and poor frustration tolerance may intensify oppositional responses and parent–child conflict.

The relevance of parent-focused interventions is not limited to ADHD alone. Parent training approaches have been explored in diverse clinical and developmental populations, including families of children with neurogenetic conditions such as Noonan syndrome, demonstrating that structured support for parents may improve management of child difficulties across diagnostic groups (Montanaro et al., 2022). Social competence training for children with oppositional defiant disorder and conduct disorder has also shown stability of effects at follow-up, indicating that psychosocial interventions can produce durable benefits when they target behavioral and interpersonal functioning (Giudice et al., 2022). At the same time, the broader disruptive behavior literature includes varied and sometimes less conventional approaches, such as studies examining homoeopathy for disruptive behavioral symptoms in children with conduct disorder, which illustrates the diversity of treatment claims and underscores the need to prioritize well-established, behaviorally grounded interventions in clinical research (Gilla et al., 2023). Abstract collections from international child and adolescent psychopathology conferences also indicate the continued global attention to child externalizing problems and the need for empirically supported treatments across settings (Essau, 2024).

Another important issue in the treatment of children with ADHD and oppositional behaviors is caregiver engagement. Parenting interventions require active parental participation, homework practice, consistency between sessions, and sustained implementation in daily routines. Systematic review evidence on father engagement in parenting interventions indicates that parent programs often need intentional strategies to include fathers and other caregivers, rather than assuming that one caregiver's participation is sufficient for broader family change (González et al., 2023). This point is particularly relevant in cultures and family systems where caregiving responsibilities may be distributed across mothers, fathers, grandparents, and extended family members. Moreover, caregiver attitudes and health-related decision-making among parents of children with ADHD, such as intentions to vaccinate during the COVID-19 pandemic, show that parental beliefs and perceived risks can shape engagement with child health recommendations (Tsai et al., 2021). Therefore, PMT programs must consider not only behavioral techniques but also parental beliefs, motivation, stress, and readiness to change.

Measurement of treatment outcomes is another growing area of concern. Traditional pre-test and post-test questionnaires provide useful information about changes in behavior and parenting stress, but they may not fully capture daily fluctuations in irritability, conflict, and family interaction. Recent work on ecological momentary assessment has suggested that in vivo measurement may advance the evaluation of psychotherapy outcomes for youth with irritability by capturing real-time behavioral and emotional changes in natural contexts (Naim et al., 2025). Although such methods are not always feasible in routine intervention studies, they highlight the importance of assessing outcomes that reflect meaningful changes in everyday life. For PMT, relevant outcomes include not only reductions in oppositional behavior but also decreases in parenting stress and improvements in the quality of parent–child interaction. These outcomes are particularly important because effective parent training should improve the family environment in which child behavior develops and is maintained.

The importance of addressing disruptive behavior problems is further heightened by concerns about developmental continuity and later risk. Adolescents with disruptive behavior disorders may experience additional comorbidities, including substance use problems, which can compromise educational, social, and psychological development (Ameen, 2026). Although the present study focuses on children rather than adolescents, early intervention during childhood may reduce the likelihood that

oppositional and disruptive behaviors become more entrenched. By equipping parents with effective behavior management strategies, PMT may alter coercive family cycles, increase positive reinforcement, reduce escalation, and support more adaptive emotional and behavioral development. Given that children with ADHD are at elevated risk for persistent behavioral impairment when oppositional symptoms and family stress remain untreated, parent-based interventions represent a clinically significant and developmentally appropriate treatment pathway.

Despite the growing international evidence supporting PMT and related parenting interventions, additional research is needed in specific sociocultural contexts, including Tehran, where family expectations, educational pressures, access to child mental health services, and parenting norms may influence both the expression of oppositional behaviors and the acceptability of intervention strategies. Many existing trials have been conducted in Western or East Asian contexts, and findings cannot always be assumed to generalize without local empirical evaluation. Furthermore, although many studies examine child behavioral outcomes, fewer simultaneously evaluate oppositional behaviors, parenting stress, and parent–child interaction as integrated indicators of intervention effectiveness. Examining these three outcomes together is important because PMT is expected to produce change across behavioral, emotional, and relational domains. A reduction in oppositional behaviors without a reduction in parenting stress may indicate incomplete family-level benefit, while improvement in parent–child interaction may reflect deeper relational change that supports the maintenance of treatment gains over time.

The aim of this study was to examine the effectiveness of Parent Management Training on oppositional behaviors, parenting stress, and parent–child interaction in children with ADHD in Tehran.

2. Methods and Materials

2.1. Study Design and Participants

This study was conducted using a quasi-experimental pre-test, post-test, and follow-up design with an experimental group and a control group. The statistical population consisted of children with attention-deficit/hyperactivity disorder and their parents in Tehran, Iran. The participants were selected from children referred to child psychology and psychiatry clinics in Tehran during the study period. After initial screening and confirmation of eligibility, 30 children with ADHD and one of their parents were selected through purposive sampling and were randomly assigned to the experimental group and the control group, with 15 parent–child dyads in each group. The inclusion criteria were a clinical diagnosis of ADHD based on a specialist evaluation, child age between 7 and 12 years, the presence of oppositional behaviors reported by parents, willingness of parents to participate in all intervention sessions, and absence of severe neurological disorders, intellectual disability, autism spectrum disorder, or uncontrolled psychiatric conditions in the child. Parents who were simultaneously participating in another structured parenting intervention or whose children were receiving a new psychological treatment during the study were excluded. Before the beginning of the intervention, all participants were informed about the objectives and procedures of the study, confidentiality of information, voluntary participation, and the right to withdraw at any stage. Written informed consent was obtained from the parents. The experimental group received Parent Management Training, while the control group did not receive any structured psychological intervention during the same period and remained on the waiting list. Assessments were conducted at three stages: pre-test, post-test, and follow-up.

2.2. Measures

Oppositional behaviors were assessed using a standardized parent-report scale designed to evaluate disruptive and oppositional behaviors in children. The scale measures behaviors such as arguing with adults, refusing to comply with rules, losing temper, deliberately annoying others, blaming others for mistakes, and showing anger or resentment. Parents rated the frequency and severity of these behaviors based on their child's usual behavior during recent weeks. Higher scores indicated greater severity of oppositional behaviors. The instrument has been widely used in clinical and educational settings for children with behavioral difficulties and ADHD, and previous studies have confirmed its validity and reliability for assessing oppositional and disruptive behavior patterns in children.

Parenting stress was measured using the Parenting Stress Index–Short Form, developed by Abidin, which evaluates stress experienced by parents in relation to the parenting role. This instrument includes items related to parental distress, dysfunctional parent–child interaction, and difficult child characteristics. Respondents rate each item on a Likert-type scale, and higher scores indicate higher levels of

parenting stress. The scale is appropriate for parents of children with developmental, emotional, and behavioral difficulties and has been frequently used in studies involving children with ADHD. Previous research has supported the internal consistency, construct validity, and reliability of this instrument in measuring stress associated with parenting demands.

Parent–child interaction was assessed using a standardized parent–child interaction questionnaire that evaluates the quality of emotional, behavioral, and communicative exchanges between parents and children. The instrument measures dimensions such as warmth, responsiveness, conflict, communication quality, parental involvement, and the ability of parents and children to engage in positive reciprocal interaction. Parents responded to items based on their everyday interactions with their child. Higher scores reflected more positive and adaptive parent–child interaction, whereas lower scores indicated greater conflict, emotional distance, or ineffective communication patterns. The validity and reliability of this tool have been confirmed in previous studies, and it is considered suitable for evaluating changes in parent–child relationships following parenting-based interventions.

2.3. Intervention

The experimental group participated in a Parent Management Training program delivered in 10 weekly sessions, each lasting approximately 90 minutes. The intervention was conducted with parents and focused on improving parenting skills, reducing oppositional behaviors, decreasing parenting stress, and strengthening parent–child interaction. The first session introduced the goals of the program, the nature of ADHD, and the relationship between ADHD symptoms, oppositional behavior, and parenting patterns. The next sessions focused on identifying ineffective parent–child interaction cycles, increasing positive attention, improving parent–child communication, using praise and reinforcement appropriately, establishing clear rules and expectations, giving effective commands, managing noncompliance, applying consistent consequences, reducing harsh or inconsistent discipline, and developing problem-solving strategies for daily behavioral challenges. Parents were trained to observe child behavior accurately, reinforce desirable behaviors immediately, ignore minor inappropriate behaviors when appropriate, and use structured behavior management techniques at home. Later sessions emphasized emotion regulation in parenting, stress management, maintenance of treatment gains, relapse prevention, and the generalization of learned skills to school-related and family situations. Homework assignments were given at the end of each session, and parents discussed their experiences, difficulties, and progress at the beginning of the following session. The control group received no intervention during the study period but was offered the opportunity to receive the training after completion of the follow-up assessment.

2.4. Data Analysis

Data were analyzed using SPSS statistical software. Descriptive statistics, including mean and standard deviation, were used to describe the demographic characteristics of participants and the scores of oppositional behaviors, parenting stress, and parent–child interaction across the pre-test, post-test, and follow-up stages. Before conducting inferential analyses, the assumptions of normal distribution, homogeneity of variances, and equality of covariance matrices were examined using appropriate statistical tests. To evaluate the effectiveness of Parent Management Training over time and compare changes between the experimental and control groups, repeated-measures analysis of variance was used. The interaction effect of time and group was examined to determine whether changes in the dependent variables differed significantly between the two groups across the three assessment stages. When significant effects were observed, Bonferroni post hoc comparisons were applied to identify differences between pre-test, post-test, and follow-up scores. The level of statistical significance was set at 0.05 for all analyses.

3. Findings and Results

The final sample consisted of 30 parent–child dyads, including 15 dyads in the experimental group and 15 dyads in the control group. The children were between 7 and 12 years of age, and the mean age of the children was 9.18 ± 1.42 years in the experimental group and 9.34 ± 1.37 years in the control group. In terms of gender distribution, 19 children were boys and 11 were girls, which is consistent with the higher clinical prevalence of ADHD among boys. The experimental group included 10 boys and 5 girls, while the control group included 9 boys and 6 girls. Most of the participating parents were mothers, and the parental respondents included 24 mothers and 6 fathers. The mean age of the parents was 37.46 ± 5.21 years in the experimental group and 38.12 ± 5.64 years in the control group.

Examination of demographic characteristics showed that the two groups were comparable in terms of child age, child gender, parent age, parent gender, parental education level, and medication status of the children. Independent samples t-tests and chi-square tests indicated no statistically significant differences between the experimental and control groups in demographic variables at baseline. Therefore, the two groups were considered homogeneous before the implementation of the intervention, and post-intervention differences could be interpreted with greater confidence as being associated with the Parent Management Training program rather than initial demographic differences.

Table 1

Descriptive Statistics of Study Variables

Variable	Group	Pre-test Mean ± SD	Post-test Mean ± SD	Follow-up Mean ± SD
Oppositional behaviors	Experimental	34.27 ± 5.18	22.46 ± 4.61	23.08 ± 4.82
Oppositional behaviors	Control	33.81 ± 5.42	32.94 ± 5.30	33.27 ± 5.49
Parenting stress	Experimental	104.73 ± 13.66	82.18 ± 11.94	84.06 ± 12.37
Parenting stress	Control	102.91 ± 14.02	101.76 ± 13.55	102.48 ± 13.91
Parent–child interaction	Experimental	54.36 ± 7.83	71.42 ± 8.21	70.18 ± 8.04
Parent–child interaction	Control	55.02 ± 8.09	55.86 ± 8.12	55.44 ± 8.35

As shown in Table 1, the experimental and control groups had relatively similar mean scores at the pre-test stage in all three dependent variables, indicating that the groups were comparable before the intervention. After the implementation of Parent Management Training, the experimental group showed a clear reduction in oppositional behaviors, with the mean score decreasing from 34.27 at pre-test to 22.46 at post-test. This reduction was largely maintained at follow-up, where the mean score was 23.08. In contrast, the control group showed only minimal change across the three stages, with oppositional behavior scores remaining relatively stable from pre-test to follow-up. A similar pattern was observed for parenting stress. The experimental group showed a substantial decrease in parenting stress from 104.73 at pre-test to 82.18 at post-test, with the effect remaining relatively stable at follow-up. However, the control group showed almost no meaningful reduction in parenting stress over time. Regarding parent–child interaction, the experimental group showed a noticeable improvement, with the mean score increasing from 54.36 at pre-test to 71.42 at post-test and remaining high at follow-up. In comparison, the control group demonstrated only negligible changes in parent–child interaction scores. Overall, the descriptive findings suggest that Parent Management Training was associated with reduced oppositional behaviors, decreased parenting stress, and improved parent–child interaction among children with ADHD and their parents.

Before conducting the main inferential analysis, the assumptions required for repeated-measures analysis of variance were examined. The results of the Shapiro–Wilk test indicated that the distribution of scores for oppositional behaviors, parenting stress, and parent–child interaction did not significantly deviate from normality at the pre-test, post-test, and follow-up stages. Levene's test also confirmed the homogeneity of error variances between the experimental and control groups for all dependent variables. In addition, Mauchly's test of sphericity was examined for the repeated-measures factor. The results indicated that the assumption of sphericity was not violated for the study variables; therefore, the standard repeated-measures ANOVA results were used. Table 2 presents the results of repeated-measures analysis of variance for the effects of time, group, and the interaction between time and group.

Table 2

Results of Repeated-Measures Analysis of Variance

Variable	Effect	df	F	p	Partial Eta Squared
Oppositional behaviors	Time	2, 56	54.83	< .001	.662
Oppositional behaviors	Group	1, 28	13.76	.001	.329
Oppositional behaviors	Time × Group	2, 56	47.29	< .001	.628
Parenting stress	Time	2, 56	39.64	< .001	.586
Parenting stress	Group	1, 28	11.45	.002	.290
Parenting stress	Time × Group	2, 56	36.21	< .001	.564
Parent–child interaction	Time	2, 56	31.78	< .001	.532
Parent–child interaction	Group	1, 28	12.03	.002	.301
Parent–child interaction	Time × Group	2, 56	34.56	< .001	.552

The results presented in Table 2 indicate that the main effect of time was statistically significant for oppositional behaviors, parenting stress, and parent–child interaction. This finding shows that the scores of the dependent variables changed significantly across the pre-test, post-test, and follow-up stages. The main effect of group was also statistically significant for all three variables, indicating that the experimental and control groups differed significantly when their scores were compared across the measurement stages. More importantly, the interaction effect of time and group was statistically significant for oppositional behaviors, parenting stress, and parent–child interaction. The significant time × group interaction demonstrates that the pattern of change over time was different between the experimental and control groups. In other words, the experimental group experienced meaningful improvement after receiving Parent Management Training, while the control group showed no comparable improvement. The effect sizes based on partial eta squared were large for the interaction effects, particularly for oppositional behaviors and parenting stress, indicating that a considerable proportion of variance in the outcomes was explained by the intervention over time. These findings confirm that Parent Management Training had a statistically significant effect on reducing oppositional behaviors and parenting stress and on improving parent–child interaction among children with ADHD.

To further clarify the pattern of changes across the three measurement stages, Bonferroni post hoc comparisons were conducted for the experimental group. Table 3 presents the pairwise comparisons between pre-test, post-test, and follow-up scores for the three dependent variables.

Table 3

Bonferroni Pairwise Comparisons of Scores

Variable	Comparison	Mean Difference	SE	p	95% Confidence Interval
Oppositional behaviors	Pre-test – Post-test	11.81	1.43	< .001	8.55 to 15.07
Oppositional behaviors	Pre-test – Follow-up	11.19	1.51	< .001	7.76 to 14.62
Oppositional behaviors	Post-test – Follow-up	-0.62	0.89	.740	-2.64 to 1.40
Parenting stress	Pre-test – Post-test	22.55	3.23	< .001	15.22 to 29.88
Parenting stress	Pre-test – Follow-up	20.67	3.48	< .001	12.77 to 28.57
Parenting stress	Post-test – Follow-up	-1.88	2.67	.682	-7.94 to 4.18
Parent–child interaction	Pre-test – Post-test	-17.06	2.74	< .001	-23.28 to -10.84
Parent–child interaction	Pre-test – Follow-up	-15.82	2.61	< .001	-21.74 to -9.90
Parent–child interaction	Post-test – Follow-up	1.24	1.72	.793	-2.66 to 5.14

The Bonferroni results in Table 3 show that oppositional behaviors in the experimental group decreased significantly from pre-test to post-test and from pre-test to follow-up. However, the difference between post-test and follow-up was not statistically significant, indicating that the reduction in oppositional behaviors was maintained during the follow-up period. Parenting stress showed the same pattern. There was a significant reduction in parenting stress from pre-test to post-test and from pre-test to follow-up, while the difference between post-test and follow-up was not significant. This finding suggests that the intervention produced a stable reduction in parental stress rather than a temporary post-intervention effect. For parent–child interaction, the negative mean differences from pre-test to

post-test and from pre-test to follow-up reflect an increase in scores over time, because the mean score at post-test and follow-up was higher than the pre-test score. These differences were statistically significant, demonstrating that Parent Management Training significantly improved the quality of parent–child interaction. The non-significant difference between post-test and follow-up indicates that the improvement was preserved after the completion of the intervention. Overall, the post hoc findings confirm that the main changes occurred between the pre-test and post-test stages and that these therapeutic gains were maintained at follow-up.

4. Discussion

The present study examined the effectiveness of Parent Management Training on oppositional behaviors, parenting stress, and parent–child interaction in children with ADHD. The findings showed that the experimental and control groups were comparable at baseline, while clear differences emerged after the intervention. Children whose parents participated in Parent Management Training demonstrated a significant reduction in oppositional behaviors from pre-test to post-test, and this improvement was maintained at follow-up. Parenting stress also decreased significantly in the experimental group, whereas the control group showed no meaningful change across the three measurement stages. In addition, parent–child interaction improved significantly following the intervention and remained stable during the follow-up period. The significant time, group, and time × group effects indicated that changes in the dependent variables were not merely the result of repeated measurement or natural fluctuation over time, but were associated with participation in the Parent Management Training program. These results suggest that Parent Management Training can be considered an effective parent-focused psychosocial intervention for reducing child oppositional behaviors, alleviating parental stress, and strengthening relational functioning in families of children with ADHD.

The significant reduction in oppositional behaviors is consistent with the theoretical foundation of Parent Management Training, which assumes that disruptive and oppositional behaviors are shaped and maintained, at least in part, through reciprocal parent–child interaction patterns. Children with ADHD often experience difficulties in inhibition, emotional control, delay tolerance, and compliance with instructions, and these difficulties can increase the probability of argumentativeness, refusal, temper loss, and resistance to parental rules. When parents respond to these behaviors with inconsistent discipline, excessive criticism, repeated ineffective commands, or withdrawal of demands after conflict, oppositional behavior may be unintentionally reinforced. Parent Management Training directly targets these mechanisms by teaching parents to provide clear instructions, reinforce appropriate behavior, ignore minor inappropriate behavior when suitable, apply consistent consequences, and prevent escalation. This interpretation is aligned with evidence-based reviews of behavioral treatment programs for oppositional defiant disorder, which emphasize that parent-focused behavioral interventions are central to reducing defiant and noncompliant behaviors in children (Kaur et al., 2022). The findings are also compatible with clinical discussions of oppositional defiant disorder, in which recurrent patterns of anger, irritability, defiance, and vindictiveness are presented as major targets for early behavioral intervention (Ahmed & Vs, 2023).

The results also correspond with previous research supporting parenting interventions for children with ADHD and externalizing symptoms. The observed reduction in oppositional behaviors is consistent with randomized evidence showing that parenting training can reduce emotional and behavioral problems in children with ADHD (Tiwawatpakorn et al., 2021). Similarly, the findings support studies of parent-group interventions indicating that modification of parental beliefs, behaviors, and responses can improve behavioral outcomes among children with ADHD (Fuengfoo et al., 2024). The present findings also align with the reported efficacy of mobile-based self-directed Parent Management Training for parents of children with ADHD with or without oppositional defiant disorder, which suggests that the core components of PMT can produce beneficial effects even when delivered in more flexible formats (Döpfner et al., 2025). Taken together, these studies support the conclusion that parent-focused behavioral training is highly relevant for ADHD when oppositional behaviors are part of the clinical presentation.

The decrease in parenting stress observed in the experimental group is another important finding. Parents of children with ADHD and oppositional behaviors often face persistent demands related to rule enforcement, emotional outbursts, school difficulties, sibling conflict, and daily routines. These repeated challenges may produce feelings of exhaustion, incompetence, frustration, and helplessness. Parent Management Training may reduce parenting stress

through several pathways. First, it gives parents a structured framework for understanding child behavior, which can reduce uncertainty and self-blame. Second, it provides practical strategies that increase parental efficacy and predictability in managing difficult behaviors. Third, as children become more compliant and less oppositional, parents may experience fewer conflict episodes and less emotional burden. This interpretation is consistent with research showing that parenting stress has a meaningful role in the association between child opposition and broader family functioning, including marital and life satisfaction (Matalon et al., 2022). In this sense, the reduction in parenting stress in the present study may reflect both direct changes in parents' coping abilities and indirect benefits resulting from improvement in child behavior.

The improvement in parent–child interaction is particularly meaningful because it suggests that the intervention did not only suppress undesirable child behaviors but also enhanced the relational quality of the family system. Parent Management Training typically increases positive attention, praise, warmth, responsiveness, and consistent communication. These changes can shift the parent–child relationship from a conflict-dominated pattern toward a more cooperative and emotionally supportive interactional style. Such a shift is important because the quality of parent–child interaction may influence the durability of treatment gains. If parents continue to use positive reinforcement, effective commands, and consistent consequences after the sessions end, children may remain more likely to comply and less likely to engage in oppositional behavior. The maintenance of gains at follow-up in the present study supports this interpretation. Previous research on parent management training combined with group cognitive-behavioral components has also shown that improvements in oppositional defiant symptoms can remain evident over extended follow-up periods (Helander et al., 2022). Similarly, studies examining the stability of psychosocial intervention effects for children with oppositional defiant disorder and conduct disorder indicate that behavioral and interpersonal gains may be maintained when interventions successfully modify relevant social and family processes (Giudice et al., 2022).

The findings can also be understood in relation to the broader literature on irritability, emotional dysregulation, and aggressive behavior in childhood. Oppositional behavior in children with ADHD often occurs alongside irritability, anger, and poor emotion regulation. Contemporary clinical reviews emphasize irritability as a transdiagnostic construct that cuts across diagnostic categories and contributes to impairment in youth (Polanczyk & Sugaya, 2026). Evidence-based reviews of psychosocial treatments for childhood irritability and aggressive behavior similarly highlight the importance of structured interventions that address behavioral escalation and emotional reactivity (Kalvin et al., 2025). In the present study, parents were trained not only to discipline more consistently but also to manage escalation, reduce harsh responses, and respond to behavioral difficulties in a calmer and more predictable manner. These components may have reduced the emotional intensity of parent–child exchanges and helped children regulate behavior more effectively. This interpretation is compatible with emerging regulation-focused approaches for children with emotion dysregulation, which emphasize the need to target emotional and behavioral control processes in treatment (Maeng et al., 2026).

The present findings also support the value of early and family-based intervention for disruptive behavioral trajectories. Childhood oppositional behaviors, when left untreated, may become more stable and may increase vulnerability to later conduct problems, peer difficulties, academic impairment, and adolescent risk behaviors. Discussions of conduct disorder and disruptive behavior development emphasize that early behavioral intervention may help interrupt the progression of coercive and maladaptive behavior patterns (Fai, 2022). The relevance of early intervention is further supported by literature on disruptive behavior disorders and later comorbidities, including substance use and related psychosocial difficulties in adolescence (Ameen, 2026). Although the present study focused on children rather than adolescents, the findings suggest that strengthening parental management skills during childhood may be an important preventive strategy. By reducing oppositional behavior and parenting stress while improving interaction quality, PMT may help create a family environment that is less conflictual and more supportive of adaptive development.

Another important implication of the findings concerns the adaptability of parent-focused interventions across settings and populations. Parent training has been examined not only in ADHD and oppositional behavior but also in other child clinical presentations, including irritability, callous–unemotional traits, neurodevelopmental conditions, and broader externalizing problems. Trials of parent training adapted for children with callous–unemotional traits indicate that parent interventions may need to be sensitive to specific child characteristics while retaining core behavioral

principles (Fleming et al., 2022). Parent training for irritability has also been examined as a targeted approach for children and adolescents with prominent emotional and behavioral dysregulation (Fongaro et al., 2022). Furthermore, the use of parent training in families of children with neurogenetic conditions demonstrates the broader relevance of helping parents manage child behavioral and developmental challenges through structured guidance (Montanaro et al., 2022). The present study contributes to this literature by supporting the usefulness of PMT for children with ADHD in Tehran, a context in which family expectations, school demands, and access to specialized services may influence treatment needs and outcomes.

The findings also have relevance for current efforts to increase access to parenting interventions. Although the present study used a face-to-face group-based protocol, recent literature has increasingly emphasized online, mobile-based, and self-help formats for caregiver training. Digital and microlearning approaches have been proposed as methods for scaling Parent Management Training and reducing barriers to treatment access (Grodberg & Smith, 2022). Online parent training for children with externalizing behavioral problems and affective dysregulation has also been introduced as a potentially useful format for reaching families who may not have regular access to in-person services (Ritschel et al., 2021). In addition, caregiver acceptance and utilization of web-based self-help interventions are important factors in determining whether digital programs can be implemented successfully in real-world contexts (Wähnke et al., 2024). The present findings support the clinical value of PMT content and suggest that future implementation efforts in Tehran and similar settings may benefit from exploring flexible delivery models while maintaining fidelity to the core intervention principles.

At the same time, the results highlight the importance of caregiver engagement. Parent Management Training requires parents to attend sessions, complete homework, practice skills at home, monitor child behavior, and maintain consistency over time. The improvement observed in this study suggests that participating parents were able to translate session content into everyday family routines. However, parent training may be more effective when it engages multiple caregivers, including fathers, because child behavior is shaped by the broader caregiving environment. Systematic review evidence on father engagement in parenting interventions indicates that father participation often requires deliberate intervention and implementation strategies (González et al., 2023). In the present study, most participating caregivers were mothers, which is common in parent-training research but may limit the degree to which intervention strategies are consistently applied across all family interactions. Future PMT programs may therefore need to include structured strategies to increase father involvement and whole-family participation.

The findings further suggest that multi-domain assessment is necessary when evaluating interventions for children with ADHD and oppositional behaviors. If only child behavior is measured, important changes in parental functioning and relationship quality may be overlooked. Conversely, if only parenting stress is measured, the behavioral significance of the intervention may remain unclear. The simultaneous improvement in oppositional behaviors, parenting stress, and parent–child interaction in the present study provides a more comprehensive picture of intervention effectiveness. This is consistent with recent work emphasizing the need to advance the measurement of psychotherapy outcomes for youth with irritability and behavioral difficulties, including methods that capture change in daily life and naturalistic contexts (Naim et al., 2025). Although the present study relied on standardized parent-report measures, the inclusion of behavioral, emotional, and relational outcomes strengthens the interpretation that PMT produced meaningful family-level change.

5. Conclusion

Taken together, the findings indicate that Parent Management Training was effective in improving behavioral and relational outcomes among children with ADHD and their parents. The intervention significantly reduced oppositional behaviors and parenting stress while enhancing parent–child interaction. The stability of the results at follow-up suggests that the skills learned by parents during the training program were not limited to the immediate intervention period but continued to influence family functioning after the sessions ended. Therefore, the findings support the effectiveness of Parent Management Training as a structured, parent-focused intervention for improving child behavior, reducing parental burden, and strengthening the quality of parent–child relationships in families of children with ADHD. The results are also relevant to service delivery. Pediatric and child mental health systems increasingly emphasize practical, accessible, and evidence-informed interventions for families dealing

with emotional and behavioral problems (Harris et al., 2023). Parent Management Training fits this need because it is structured, skill-based, and directly applicable to common family challenges. Moreover, research on supportive accountability and smartphone-based treatment protocols suggests that technology can be used to support parent implementation and sustain engagement between sessions (Lindhiem et al., 2024). Reviews of parent-focused eHealth interventions further indicate that behavior change techniques and persuasive system design principles can help define and strengthen digital parenting programs (Silva et al., 2023). Although the present study did not test a digital version of PMT, its positive results support the potential value of developing culturally adapted, accessible, and scalable parenting interventions for families of children with ADHD.

6. Limitations & Suggestions

This study had several limitations that should be considered when interpreting the findings. First, the sample size was relatively small and included only 30 parent–child dyads, which may limit the generalizability of the results to the wider population of children with ADHD and their families. Second, the participants were selected from Tehran, and cultural, socioeconomic, and service-access characteristics of this setting may differ from those of other regions. Third, the study relied primarily on parent-report measures, which may be influenced by parental expectations, response bias, or increased awareness following participation in the intervention. Fourth, the follow-up period was limited, and longer-term assessment would be necessary to determine whether the effects of the intervention remain stable over several months or years. Finally, the control group did not receive an active alternative intervention, so the findings cannot fully distinguish the specific effects of Parent Management Training from nonspecific factors such as attention, group support, and expectancy.

Future studies should replicate these findings with larger and more diverse samples across different cities, clinical settings, and socioeconomic backgrounds. It is also recommended that future research include longer follow-up periods to examine the durability of intervention effects over time. Studies may benefit from using multi-informant and multi-method assessment, including teacher reports, direct behavioral observation, clinical interviews, and real-time ecological assessment of parent–child conflict and child compliance in natural environments. Future trials should also compare Parent Management Training with other active interventions to identify the specific and comparative effectiveness of different treatment models. In addition, researchers should examine potential moderators and mediators of treatment response, such as child age, ADHD presentation, severity of oppositional symptoms, parental mental health, parenting style, father involvement, family structure, and treatment adherence.

The findings support the use of Parent Management Training as a practical intervention for families of children with ADHD who show oppositional behaviors and high levels of parent–child conflict. Clinicians should train parents in concrete behavioral skills, including positive attention, effective commands, consistent reinforcement, predictable consequences, and calm management of noncompliance. Treatment should also address parenting stress directly, because stressed parents may find it more difficult to apply behavior management strategies consistently. Practitioners are encouraged to involve both mothers and fathers whenever possible and to adapt examples, homework assignments, and behavioral plans to the daily routines of each family. Schools, child clinics, and community mental health centers can use structured parent-training programs as part of comprehensive ADHD care, particularly when child symptoms are accompanied by defiance, emotional outbursts, and impaired family interaction.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed to this article.

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