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The effects of the triple P-positive parenting programme on parenting, family functioning and symptoms of attention-deficit/hyperactivity disorder. A randomized controlled trial

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ABSTRACT

OBJECTIVES: This is the first study to evaluate the efficacy of parent training in attention-deficit/hyperactivity disorder (ADHD) in Turkey. The aim of this study was to evaluate the effectiveness of the positive parenting programme (Triple P) on ADHD symptoms, functionality, severity of disease, and behavioural and emotional problems of children. An additional aim was to evaluate the potential effects of Triple P on parental attitudes and family functioning of children with ADHD.

METHODS: The study was a randomized controlled study. A total of 48 subjects aged between 7 and 12 years, who were diagnosed as ADHD by Schedule for Affective Disorders and Schizophrenia for School Age Children Present and Life-time Kiddie (K-SADS-PL). Following randomization into two equal groups, mothers of the first group participated to Group Triple-P Programme while the second group was receiving no treatment. The two groups were compared right before and after the intervention on rates of ADHD symptoms, emotional, behavioural variables, family functioning and parental attitudes.

RESULTS: When we compared the results before and after the implementation of Triple P in the intervention group, there was a statistically significant increase in CGAS scores, and a statistically significant decrease in CGI scores. There was a statistically significant decrease subscale scores of SDQ; and total score of the DuPaul Questionnaire; a statistically significant decrease in problem solving, communication, roles in family, affective sensitivity, behaviour controlling, and general functioning subscale scores in FAD; a statistically significant decrease of parenting attitude, hostility, and rejecting attitude, and authoritarian attitude subscale scores; and a statistically significant increase in democratic attitude subscale scores of PARI.

CONCLUSION: The results of our study suggest that Triple P could be useful in the treatment of children with ADHD, but further studies about Triple P on children with ADHD are needed.

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Triple P; positive parenting programme; ADHD; children; parent

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is an early-onset childhood neuropsychiatric disorder that has heterogeneous clinical characteristics such as inattention, hyperactivity, and impulsivity [1]. The prevalence of ADHD is reported to vary between 8 and 12% worldwide [2]. In a study on school-age children in Turkey, the prevalence of ADHD was determined to be 8.1% [3]. In a recent review, it was shown that cognitive behavioural therapy, parent training, behavioural classroom management, and behavioural peer interventions decreased symptoms of ADHD and ADHD-induced behavioural problems [4]. Family training programmes are effective in children with ADHD who have difficulty in controlling themselves, and also a useful additional method in many cases [5].

Parent training programmes are examined in two groups as relationship-based and behavioural approach-based programmes. Relationship-based programmes are based on psychodynamic, humanistic, and family system theory. The aim of the programmes is to understand the emotions and thoughts under the problematic behaviours of children, learn their way of thinking, and evaluate parents' responses to their children. The programmes include communication skills (active listening, language, feedback, conflict resolution), and approaches how parents should communicate with their children; the focus of the programme is the child [6–9]. Behavioural approach-based parent training programmes are based on social cognitive theory [8,9]. Social cognitive theory is based on learning being a cognitive process that takes place in a social context and can occur purely through observation or direct instruction, even in the absence of motor reproduction or direct reinforcement. In addition to the observation of behaviour, learning also occurs through

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experience of rewards and punishments, a process known as vicarious reinforcement [10–12].

A behavioural approach-based parenting training programme, Triple P, the positive parenting training programme, was developed by Matt Sanders in 1977 in Queensland University, Australia. It is organized as preventive, and includes family support strategies and more than one level for which children in the age group of 0–16 years are the target group.

Triple P has evolved from a programme of clinical research [13–15]. The parent training methods employed in Triple P have been demonstrated to be effective in reducing children's disruptive behaviour in a variety of populations, including depressed parents, children in step families, and children with persistent feeding difficulties [14,16,17]. The largest sample sized meta-analysis of Triple P was conducted by Sanders et al. [18]. In Sanders et al.'s review, 101 studies comprising 16,099 families were analysed quantitatively. The effect sizes of follow-up data for Triple P in the meta-analysis were 0.398 for children's behaviour, emotional and social problems, 0.457 for parenting practices, 0.512 for parenting satisfaction and efficacy, and 0.458 for parental adjustment [18].

In previous studies, it has been shown that Triple P had positive effects on ADHD; Triple P improved parenthood skills and decreased behavioural problems, depression, anxiety, and stress levels of children [19–21]. In a recent study that investigated the effectiveness of Triple P Online [22] in the parents of preschool-age children with ADHD symptoms, it was found that Triple P Online reduced preschool inattentive behaviour difficulties, and increased parenting competence, satisfaciton in the parenting role, and maternal well-being [23]. The present study is the first to examine the efficiency of this programme on ADHD in Turkey.

We aimed to evaluate the effects of level 4 Triple P on ADHD symptom level, severity of disorder, and behavioural and emotional problems in children aged 7–12 years with ADHD receiving methylphenidate medication for at least 2 months. We also aimed to evaluate the potential effects of level 4 Triple P on parental attitudes and family functioning of children with ADHD. The primary hypothesis was that parent participation in Triple P would report lower levels of child ADHD symptoms, and behavioural and emotional problems following intervention. The secondary hypothesis was that there would be improvements in parental attitudes and family functioning for the Triple P intervention group following intervention.

Method

Sample

The study was planned as single-centred, single-disciplinary (only child psychiatry), randomized controlled study. ADHD was diagnosed in accordance with the criteria of the text revised Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV TR). Parents (both or either) living with their 7–12-year-olds were included in the study. The physician assessing the children and parents was blinded to the intervention and control group (waiting list group).

The study was planned to include 80 children aged 7–12 years with ADHD who were followed up in the clinic of the Department of Child and Adolescent Psychiatry, Dokuz Eylül University, Faculty of Medicine, and receiving medication (methylphenidate, mean ± standard deviation dose = 0.88 ± 0.8 mg/ kg/day) for at least 2 months, and their parents in the study on a voluntary basis. 20 children excluded from study because they did not meet inclusion criteria. Sixty children who met the inclusion criteria for the trial were randomized using the online Random Sequence Generator (www.random.org on 01.06.2013). Out of the 60 children whose parents accepted to participate, 47 children and their parents completed the study (23 children for the intervention group and 25 children for the waiting list group). The participants flow through the trial is summarized in Figure 1 [24]. There were no differences participants who lost at follow up comparing to those completing the intervention in terms of all psychometric measures.

Ethical aspects

The research protocol was approved by the Dokuz Eylul University of Medical Sciences Research Ethics Committee (2013/16-13, 06.05.2013) and all participants gave their informed consents to participate in the study. Children in the waiting list group continued with their visits to the Child and Adolescent Psychiatry Department.

Study procedure

Following randomization into two equal groups, parents of the intervention group participated in Triple P for 8 weeks; the waiting list group received no treatment. The two groups were compared immediately before and after the implementation with regards sociodemographic, ADHD symptom levels, emotional and behavioural variables, attitudes of their parents, and family functioning. The study design is shown in Figure 1.

Psychometric measures

Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children – Present and Lifetime (K-SADS-PL): The children's diagnosis was determined using the K-SADS-PL, which is a semi-structured diagnostic interview designed to assess current and past episodes of psychopathology in children and

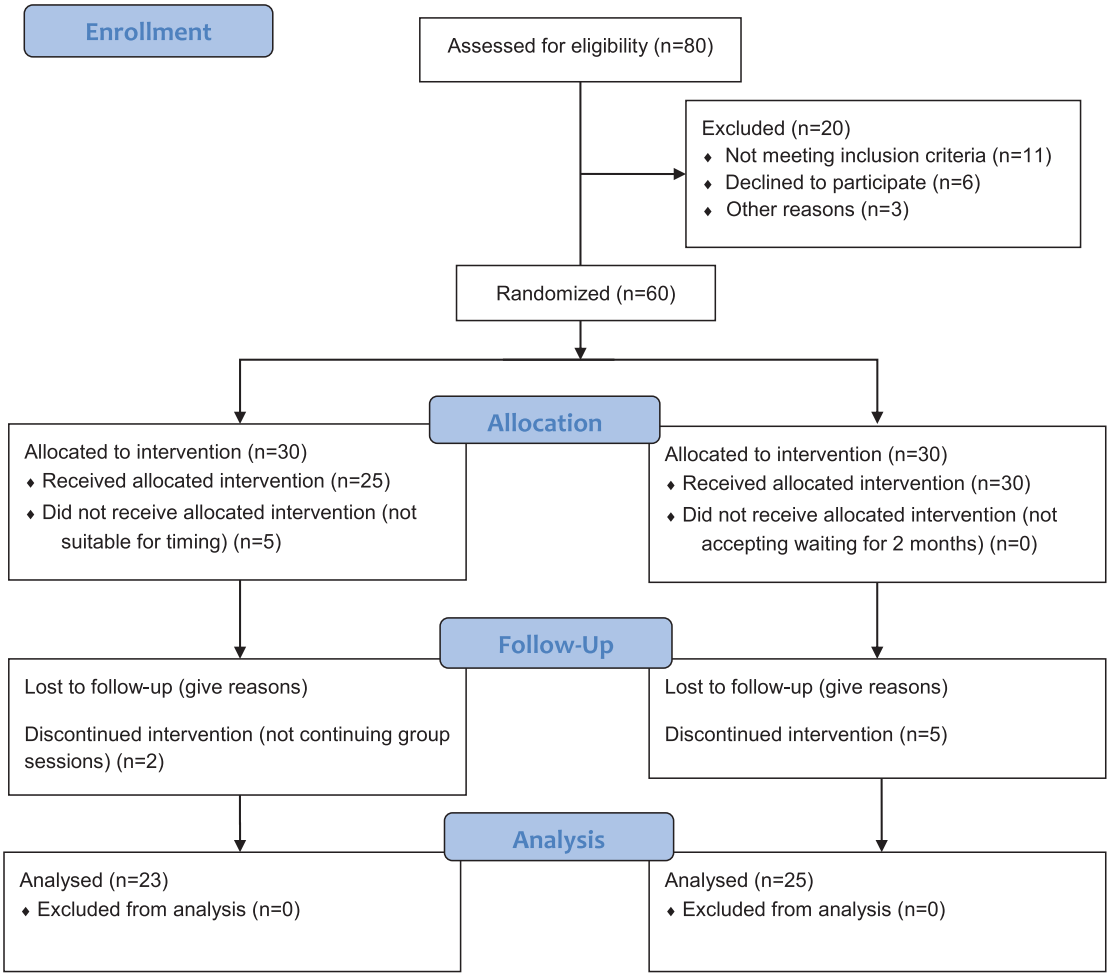


Figure 1. Consort diagram.

adolescents according to DSM-III-R and DSM-IV criteria. Child and parent ratings are combined in a compound summary [25]. The form consists of three sections; the first section questions socio-demographic characteristics, the second questions current and past episodes of psychiatric symptoms, and the third section evaluates the general functions of the children during the evaluation. Mood disorders, psychotic disorders, anxiety disorders, elimination disorders, disruptive behaviour disorders, alcohol and drug use disorders, eating disorders, and tic disorders can be evaluated in the interview. The Turkish translation and validity and reliability study of K-SADS-PL was performed by Gökler et al. [26].

The Strengths and Difficulties Questionnaire (SDQ) (Goodman) [27] is a 25-item behavioural screening questionnaire that measures parents' perceptions of pro-social and difficult behaviours in children aged 3–16 years [28]. The SDQ consists of 25 questions questioning positive and negative behaviour characteristics. These questions are collected under 5 subscales; (1) behavioural problems, (2) attention deficit and hyperactivity, (3) emotional problems, (4) peer problems, and (5) social behaviours. Each subscale is evaluated within itself and the total of the first 4 subscales gives the "total difficulty score." [29]. With the exception of the social behaviours subscale, a high score in the subscales indicates a problem. When using a version of the SDQ that includes an "impact supplement," the items on overall distress and impairment can be summed to generate an impact score that ranges from 0 to 10 for parent- and self-report [27]. Güvenir et al. translated the Turkish forms and its validity and reliability were performed by Güvenir et al. [30]. Its Cronbach's alpha was 0.73. SDQ has been used in recent Triple P studies.

Global Functioning and Severity: The Children's Global Assessment Scale (CGAS) (Shaffer et al.) [31] is a widely used measure of the overall severity of child disturbance, which provides a physician-rated index of functioning. CGAS is an adapted version of General Functional Assessment and Patient-Health scales, which were prepared to measure the severity of psychiatric disorders in adults. Scores range from 0 to 100, with higher scores indicating higher levels of functioning and lower scores indicating greater functional impairments.

Clinical Global Impression-Severity Scale: The Clinical Global Impression-Severity Scale (CGI-S) is the

Table 1. Contents of group triple P sessions.

Session number	Content	Session duration
1. Positive parenting	Working as a group What is positive parenting? Why do children behave as they do? Goals for change Keeping track	120 minutes (group)
2. Helping children develop	Developing good relationships with children Encouraging good behaviour Teaching new skills and behaviours	120 minutes (group)
3. Managing misbehaviour	Managing misbehaviour Developing parenting routines Finalizing your behaviour chart	120 minutes (group)
4. Planning ahead	Family survival tips High-risk situations Planned activities Preparing for telephone sessions	120 minutes (group)
5. Using positive parenting strategies 1	Preparing for the session Update on practice Other issues	15–30 minutes (telephone)
6. Using positive parenting strategies 2	Preparing for the session Update on practice Other issues	15–30 minutes (telephone)
7. Using positive parenting strategies 3	Preparing for the session Update on practice Other issues	15–30 minutes (telephone)
8. Programme close	Preparing for the session Update on practice Phasing out the programme Progress review Keeping up the good changes Problem-solving for the future Future goals Final assessment	120 minutes (group)

most widely used physician-rated measure of treatment-related changes in functioning [29]. The CGI-S score rates illness severity on a 7-point scale, ranging from 1 (normal) to 7 (among the most severely ill patients). CGI-S are usually used in Turkish Child and Adolescent outpatient and inpatient clinics. They have also been used in many Turkish clinical studies in this subject area. CGI-S were used to indicate symptom severity in the present study.

DuPaul ADHD-RS-IV Inventory (DuPaul ADHD Scale): The DuPaul ADHD scale is an 18-question scale with one item for each symptom (18 in total) of the DSM-IV diagnosis of ADHD. This symptom evaluation scale, developed by DuPaul et al., is completed by the doctor over a one-week evaluation period [32]. The validity and reliability study was performed by DuPaul et al. [33]. DuPaul ADHD scale is used in previous Turkish studies [34].

Parental Attitude Research Instrument (PARI): The scale was developed by Schaefer and Bell in 1958 [35]. PARI consists of five sections. The first section is about control, anxiety, and difficult parenting attitudes; the second is about attitudes, encouraging supportive and collaborative relationships; the third section is about angry, stressed, and distressed attitudes of mothers in relationships with children; the fourth section is about marital conflict in child rearing; and the fifth section is about severe punishment and strict parental attitudes. The scale is completed by parents [35]. The validity and reliability study was performed by LeCompte et al. [36].

Family Assessment Device (FAD): This scale was developed by Epstein et al. in 1983 [37]. The FAD comprises seven sections. The first section includes problem-solving skills; the second includes intra-family communication; the third includes roles in the family; the fourth includes effective responsiveness against emotions such as sadness, anger, fear, joy, love, interest; the fifth includes effective involvement of family members; the sixth section includes behaviour control; and the seventh section includes general functions in the family. This scale is also completed by the parents [37]. Bulut et al. translated the Turkish version and conducted its validity and reliability study [38].

Intervention

Triple P

Triple P is delivered to parents over the course of 8 weeks. The programme involves five 2-hour group sessions that educate and actively train skills, and three (15–30 min) individual telephone consultations that follow a self-regulatory format to facilitate independent problem-solving. The contents of the group sessions are shown in Table 1 [39].

Data analysis

The data of the study were evaluated using the Statistical Package for the Social Sciences (SPSS) version 15.0. Data are presented as a number of patients (n), mean, and standard deviation (SD). Categorical data are

presented using either absolute or relative frequencies. Demographic data were compared using the Chi-square test. Assumptions of normality were evaluated using the Shapiro–Wilk test. The nonparametric Mann–Whitney *U* and Wilcoxon signed-rank test were used in the comparison of numerical variables because the scores were not normally distributed. No attempt was made to improve the distribution of variables. The effect size computed by subtracting the mean of the second group from the mean of the first group and dividing by the pooled standard deviation of both groups. All tests were two-tailed with p values < .05 considered significant.

Results

Sociodemographic data

There was no significant difference between the case group and waiting list in terms of age, sex, and education levels of parents. The sociodemographic characteristics of the participants are shown in Table 2.

The differences of scale scores in intervention group at the before and after triple P

We found statistically significant decreases in DuPaul AD, DuPaul HA subscores, DuPaul total score and CGI-S and increase scores of CGAS significant after Triple P in intervention group ($p < .001$, $p < .001$, $p < .001$, $p < .001$, $p < .001$, respectively) (Table 3). We also found a statistically significant decrease in PARI overprotective parenting attitude (PARI OPA), PARI rejection of homemaking attitude (PARI RHRA), PARI strict discipline subscales and a statistically significant increase in PARI democratic attitude subscale in the intervention group before and after Triple P ($p = .001$, $p = .007$, $p = .008$, $p < .001$, respectively). We observed significant decreases in the scores of problem solving, communication, roles, affective emotions, affective attachment, behaviour control, general functionality subscales of FAD in the intervention group before and after Triple P ($p = .020$, $p = .007$, $p < .001$, $p = .002$, $p < .001$, $p < .001$, $p < .001$), (Table 4). There was a statistically significant decrease in SDQ emotional problems, SDQ behaviour problems, SDQ peer problems and SDQ total scores in the intervention group at the before and after Triple P ($p < .001$, $p = .021$, $p = .001$, $p = .021$, $p < .001$, respectively).

Table 2. Sociodemographic data of the intervention and waiting list groups.

	Intervention group	Waiting list group	*p*
Age	10.35 ± 1.50	10.16 ± 1.31	.561*
Sex			
Male	16	22	x^2=2,468, .116**
Female	7	3	
Maternal education			
<8 years	9	14	x^2=1.366, .265**
>8 years	14	11	
Paternal Education			
<8 years	8	15	x^2=3.052, .094**
>8 years	15	10	

*Mann-Whitney *U* analysis.
**Chi-square analysis.

The differences of scale scores between intervention and waiting list groups after triple P

We did not found statistical differences in subscales of PARI, except for democratic attitude subscale between the intervention group and the waiting list group after the Triple P. There were no statistical differences between the intervention and waiting list groups in terms of all the subscales of FAD after Triple P ($p > .05$). We found a statistically significant difference in SDQ emotional problems, SDQ ADHD problems subscales and SDQ total scores, between intervention and waiting list group after Triple P ($p = .004$, $p = .02$, $p = .001$; respectively). These are indicated in Table 4.

Discussion

This study investigated the efficacy of an eight-session behavioural intervention delivered to the parents of children with ADHD receiving medication (methylphenidate) for at least 2 months versus a waiting list control group. As hypothesized, the ADHD symptom levels of children in the intervention group decreased, whereas the waiting list group reported no significant changes after the waiting period. These results suggest that Triple P can be used as an augmentation method for the treatment of ADHD in children.

The main outcome of this study is the significant decrease of ADHD symptom scores in the intervention group with regard to the primary hypothesis. This finding is in parallel with other studies, in which family-based interventions such as Triple P were performed on parents. Salbach et al. applied a 10-week family education programme to the parents of children with ADHD receiving stimulant treatment and determined a significant decrease in ADHD core symptoms, especially in scores of the hyperactivity subscale at the end of 10 weeks (Salbach et al.) [40]. In a recent study, Franke et al. evaluated the efficacy of an online Triple P programme in a sample of parents of preschoolers with ADHD symptoms. They found a significant decrease in ADHD core symptoms in their short-term assessment, but no significant differences were found at the end of 6 months' follow-up [28]. In another study, the parents of children aged 3 years with ADHD who did not use medicine were given parent training, and no difference was determined in terms of ADHD symptoms when they were compared with the control group [41]. Triple P may be useful for use as an additional method besides medication in the treatment of children with ADHD.

Table 3. Average scores of children's DuPaul ADHD, HA, total scores, CGAS, and CGI-S in the intervention and waiting list group before and after the Triple-P programme.

	Intervention group		Waiting list group		T1a-T1b	T2a-T2b	
Scale	T1a	T2a	T1b	T2b	p*	p†	Cohen's d
DuPaul AD	17.39 ± 2.35	13.91 ± 1.8	19.08 ± 3.07	18.64 ± 3.16	.02	<.001	1.84
DuPaul HA	15.61 ± 3.14	12.82 ± 2.2	17.68 ± 3.73	17.32 ± 4.01	.054	<.001	1.39
DuPaul Total	32.95 ± 4.46	29.74 ± 2.9	37.00 ± 5.38	36.36 ± 5.68	.01	<.001	1.47
CGAS	48.65 ± 6.15	64.35 ± 5.2	46.24 ± 6.12	46.76 ± 6.09	.130	<.001	3.11
CGI-S	3.96 ± 0.77	2.57 ± 0.73	4.48 ± 0.87	4.28 ± 0.84	.029	<.001	2.17

DuPaul AD: DuPaul attention deficiency, DuPaul HA: DuPaul Hyperactivity, CGAS children's global assessment scale, CGI-S clinical global impression-severity
T1a Before Triple-P implementation, T2a after Triple-P implementation, T1b The initiation of the study, T2b after the initiation of the study.
p* Comparison of scores between intervention and waiting list group before Triple P (T1a-T1b).
p†: Comparison of scores between intervention and waiting list group after Triple P (T2a–T2b).

Table 4. Average scores of PARI, FAD, and SDQ scores in the intervention and waiting list group before and after the Triple-P programme.

	Intervention group		Waiting list group		T1a-T1b	T2a-T2b	
Scale	T1a	T2a	T1b	T2b	p*	p†	Cohen's d
PARI OPA	38.82 ± 6.24	34.35 ± 9.11	40.08 ± 9.33	38.04 ± 8.17	.869	.094	0.43
PARI DA	25.00 ± 2.97	29.09 ± 2.10	26.92 ± 3.46	26.60 ± 3.18	.036	.008	0.92
PARI RHRA	29.39 ± 4.49	26.09 ± 4.34	29.68 ± 7.85	29.80 ± 6.95	.885	.069	0.64
PARI MC	12.87 ± 2.85	12.65 ± 2.69	13.92 ± 3.93	13.84 ± 3.75	.205	.209	0.36
PARI SD	29.17 ± 5.64	26.43 ± 4.75	29.72 ± 8.03	29.96 ± 6.65	.612	.08	0.61
FAD problem solving	1.93 ± 0.40	1.69 ± 0.45	1.84 ± 0.45	1.84 ± 0.36	.355	.182	0.36
FAD communication	1.86 ± 0.34	1.71 ± 0.32	1.80 ± 0.44	1.80 ± 0.44	.662	.412	0.23
FAD roles	2.30 ± 0.33	1.98 ± 0.24	2.05 ± 0.39	2.00 ± 0.29	.250	.950	0.07
FAD affective emotions	1.80 ± 0.40	1.51 ± 0.33	1.77 ± 0.58	1.70 ± 0.47	.448	.239	0.47
FAD affective attachment	2.56 ± 0.45	2.20 ± 0.28	2.33 ± 0.39	2.25 ± 0.31	.071	.570	0.17
FAD behaviour control	2.27 ± 0.25	1.97 ± 0.23	2.01 ± 0.39	1.96 ± 0.34	.007	.580	0.03
FAD general functionality	1.96 ± 0.29	1.69 ± 0.29	1.77 ± 0.43	1.88 ± 0.41	.085	.128	0.54
SDQ emotional problems	5.52 ± 1.83	3.04 ± 1.74	4.72 ± 2.07	5.04 ± 2.26	.112	.004	0.99
SDQ behavor problems	3.93 ± 1.44	2.73 ± 1.60	3.32 ± 2.39	3.48 ± 2.06	.566	.221	0.40
SDQ ADHD	6.78 ± 1.95	5.22 ± 1.44	6.40 ± 2.60	6.52 ± 2.69	.676	.02	0.60
SDQ Peer problems	3.43 ± 1.70	2.61 ± 1.70	3.76 ± 2.24	3.60 ± 1.91	.810	.083	0.55
SDQ social behaviour	7.08 ± 1.53	7.57 ± 1.62	7.36 ± 1.60	7.16 ± 1.37	.467	.476	0.27
SDQ impact score	5.74 ± 1.48	4.52 ± 1.34	6.08 ± 1.55	5.76 ± 1.45	.564	.006	0.89
SDQ total Score	19.13 ± 4.19	13.61 ± 3.91	18.20 ± 6.11	18.64 ± 5.66	.469	.001	1.03

PARI parenteral attitude research instrument, PARI OPA; PARI overprotective parenting attitude, PARI DA: PARI democratic attitude, PARI RHRA: PARI rejection of homemaking attitude, PARI MC; PARI mariatal conflict, PARI SD; PARI strict dicipline, FAD: family assessment device, SDQ strengths and difficulties questionnaire T1a Before Triple-P implementation, T2a after Triple-P implementation, T1b The initiation of the study, T2b 8 weeks following the initiation of the study.
p* Comparison of scores between intervention and waiting list group before Triple P (T1a-T1b).
p†: Comparison of scores between intervention and waiting list group after Triple P (T2a–T2b).

In the present study, a significant increase in CGAS scores of the intervention group was observed when compared with the waiting list group after the intervention, supporting the findings of relevant literature [42]. In a study conducted by Mikami et al. on school children with ADHD receiving medication (stimulant), the researchers applied a parental friendship coaching programme and determined an increase in the scores of social and school functionality after the programme, similar to CGAS [42]. Another finding, similar to CGAS data in their study, was that when the intervention group was compared within itself and with the waiting list group before and after the training, a significant decrease was determined in Clinical Global Impression-Severity scores. In a study in which a 9-week family training programme was applied to children with ADHD aged 3–6 years, the children's behaviour problems and disease severity were reported to decrease significantly [43]. The fact that Triple P combined with medication decreased disease severity and improved functionality paves the way for further studies.

In the present study, when the intervention group was compared within itself before and after the training, and with the waiting list group after the training in terms of SDQ, a significant decrease was found in the scores of SDQ subscales. This finding shows a similarity with the findings of other studies that were performed with the Triple P and SDQ in the relevant literature [14,44–47]. Triple P was applied to preschool children with ADHD and their parents were given the Eyberg Child Behavior Inventory (ECBI), which is similar to SDQ, and significant decreases were determined in ECBI problem scores and total scores [19]. These results suggest that Triple P is an effective parental training programme for decreasing emotional and behavioural problems of children.

As a result of the evaluation of changes in PARI subscales in the present study, a significant decrease was determined in the PARI subscales of overprotective parenting attitude, rejection of homemaking attitude, strict discipline attitude, and democratic attitude subscales in the intervention group. However, no change

was observed in the PARI marital conflict subscale. These findings suggest that the use of Triple P on parents of children and adolescents with ADHD can be beneficial with parental attitudes. In the study conducted by Moharreri et al., parents of children aged 6–12 years with ADHD receiving medication (stimulant) were given an 8-week Triple P course and two scales, the parenting scale [48] and parent problem checklist [49], were applied to the families before and after the training to evaluate family attitudes. Statistically, significant decreases were observed in scores of authoritarian attitude and parental conflict subscales [21]. In another study, parents of 3-year-old children with behaviour, attention, and hyperactivity disorders were applied Triple P and the parenting scale and parent problem checklist were given to families before and after the training. Different from the present study, a significant difference was determined in the marital conflict subscale after the training [19]. The determination of a difference in marital conflict subscales in both these studies can be explained by the fact that marital conflict subscale scores before the training were lower in our study than in the other studies. It was determined that parenting training applied to families of children with ADHD who were receiving medication (stimulant) improved parenting abilities [19,20,50]. In the present study, when the intervention group was compared with the waiting list group after the training, no difference was determined in subscales of PARI, except for democratic attitude. This may be associated with the evaluation made immediately after the Triple P programme.

In our study, there was a significant decrease in scores of all subscales of FAD within the intervention group. This suggests that Triple-P is effective in problem-solving, communication, family roles, affective involvement of family members and affective responsiveness, parental attitude towards their children's behaviours, and general functionality of the family in parents of children and adolescents with ADHD. ADHD affects negatively family functioning [51,52]. Soysal et al. found relationships family problem solving and ADHD hyperactivity subgroup, family communication and ADHD inattention subgroup, family roles and ADHD combined subgroup [51]. In Triple P studies conducted on children and adolescents with ADHD, the families were evaluated by using different scales and a significant decrease was determined in non-functional attitude of families, and an increase was observed in their communication with each other [19,20]. In the study of Traecy et al., the families of children with ADHD were given FAD to evaluate general functionality of the families after 9 weeks of family training and a significant increase was determined in general functionality scores of FAD compared with the control group [53]. In our study, when the intervention and waiting list groups were compared after the training, there was no difference in subscales of FAD. This may be associated with the evaluation made immediately after the Triple P programme. However, effect sizes for affective emotions, general functioning and problem solving between intervention and waiting list after Triple P differ for FAD, which components of the intervention they thought were effective. It may be related to comparison after Triple P in two different groups.

Limitations

The current trial has a number of limitations. First, the small sample size reduces its power to detect differences between the intervention and waiting list group. Second, for practical reasons, the follow-up period was only 8 weeks, which meant there was only limited scope for assessing treatment maintenance. Third, we exclusively used self-reported measurements to assess child behaviours and parenting functioning. Fourth, using only information from the parents may have affected the objectivity of our work; the results of a study with the children's teachers could be more objective in obtaining information. Fifth, it may be ceiling effects due to pharmacotherapy. Despite these limitations, this study suggests that Triple P can be used as an adjunct to medication in the treatment of children with ADHD. Future studies should aim to incorporate follow-up assessments to determine the long-term outcomes of the intervention, and outcome measures should include parent ratings of their children's behaviours and teacher reports.

Conclusion

Children with ADHD are at great risk in terms of numerous future mental disorders, especially mood and anxiety disorders. Thus, treatment of ADHD is of particular importance. The results of the present study indicate that adjunctive use of the Triple P programme decreases ADHD symptoms, severity of disease, and behavioural and emotional problems in children with ADHD, and has positive effects on their functionality.

Compliance with ethical standards

Research involving Human Participants and/or Animals: Research involves human participants. Ethical approval (06.05.2013 dated and 2013/16-13 decision numbered) was obtained from Dokuz Eylül University Non-Invasive Clinical Research Assessment Commission.

Informed consent: Written consent of the voluntariness of the parents to participate in the study was obtained from all parents and verbal consent was obtained from children.

Disclosure statement

No potential conflict of interest was reported by the authors.

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