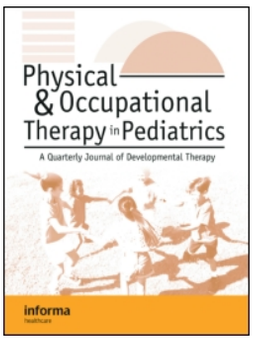

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Parental Occupation Executive Training (POET): An Efficient Innovative Intervention for Young Children with Attention Deficit Hyperactive Disorder

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ABSTRACT

Background: The American Academy of Pediatrics strongly recommends first-line treatment of preschool aged children with attention deficit hyperactivity disorder (ADHD) be parent- or teacher-administered behavior therapy. *Aim:* To assess the efficacy of Parental Occupation Executive Training (POET), a new intervention for young children with ADHD symptomatology. *Materials and Methods:* We implemented a controlled, counterbalanced design with a study and comparison group (72 children with mean age of 5.42 years identified as having ADHD symptomatology. using the DSM-IV and Conners Parents and Teachers Rating Scales). Intervention included parental-training sessions focused on children's occupational goals and capitalized on the assumed relationship between daily activities and executive functions. We evaluated achievement with the Canadian Occupational Performance Measure (COPM), Behavioral Rating Inventory of Executive Functions, and a questionnaire we developed related to parental knowledge and skills. *Results:* Executive functions and preselected daily functions significantly improved following the POET intervention. Parent perceptions related to their knowledge of their children's executive difficulties and appropriate management strategies changed significantly following the intervention, and significantly correlated with the COPM scores. *Conclusions:* A short-term parental training program, the POET improved daily functioning of young children with ADHD symptomatology by focusing on their parents' ability to cope with the children's executive delays.

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Attention deficit hyperactivity disorder; executive functions; daily living skills; self-care

1. Introduction

In 2011, the American Academy of Pediatrics (AAP) (2011) recommended diagnosticians consider diagnosing children with attention deficit hyperactivity disorder (ADHD) as early as in the preschool years. They strongly recommended first-line treatment of preschool-aged (4–5 years) children be evidence-based parent-or teacher-administered

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behavior therapy, based on the quality of evidence. For young children, parent-training programs, rather than drug treatment, are advocated as first interventions (Ougrin, Chatterton, & Banarsee, 2010).

Evidence-based interventions for young children with ADHD focus on enhancing positive family interactions and the children's behavior, and on setting consistent limits (Bor, Sanders, & Markie-Dadds, 2002). Some interventions resulted in significant improvements in the parents' wellbeing and mental health or the children's behavior and ADHD symptoms, measured with varied parental scales, checklists, and questionnaires (Ghanizadeh & Shahrivar, 2005; Sonuga-Barke, Daley, & Thompson, 2002; Sonuga-Barke, Thompson, Daley, & Laver-Bradbury, 2004). The effectiveness of several intervention programs designed to improve children's behavior through parental supervision was evaluated based on parent reports about their children's behavior pre- and post-intervention (Forehand et al., 2016; Wilson et al., 2012). Parental assessments reflect their interpretations of symptomatic behavior that may influence the degree of stress and conflict they experience in families in which a child suffers from a psychiatric disorder (Lench, Levine, & Whalen, 2013).

In recent years, the research literature has increasingly considered one of the important, if not central, mechanisms contributing to ADHD symptoms—executive functions (EFs; Barkley, 2012). These EFs are complex cognitive processes that enable flexible, goal-directed behavior. They allow individuals to change their own behavior towards better future consequences (Barkley, 2010) and direct their functioning, movements, and speech, even early in development (Barkley, 2012). The literature shows general agreement that all EFs derive from three core abilities: inhibitory control, working memory, and cognitive flexibility (Diamond, 2013), but shows the number of ADHD patients with deficient EFs as ranging from all to only 30% to 50% (Biederman et al., 2004; Loo et al., 2007; Nigg, Willcutt, Doyle, & Sonuga-Barke, 2005). However, some argue that the use of ecologically validated tests yields a higher percentage of children with ADHD who also have deficient EFs (Barkley & Fischer, 2011). Therefore, it is reasonable that early interventions for young children with ADHD should include cognitive strategies for coping with their compromised EFs. Cognitive strategies are known to help individuals deal with challenges in daily functioning (Toglia, Rodger, & Polatajko, 2012).

Considering the good efficacy of parent-training programs, researchers have suggested teaching children cognitive strategies through parent-training interventions (Gleason, 2013). Because parents are the central "contextual factor" in their children's lives (Rosenbaum & Gorter, 2012), providing knowledge and cognitive strategies specifically tailored to their child's EF deficits may enhance the parents' coping and, subsequently, the child's daily functions and behavior (Dawson & Guare, 2010; Rosenbaum & Gorter, 2012; Toglia, 2005). Some updated interventions originally developed for preschoolers with ADHD symptoms focus on improving children's EFs in academic and social contexts using EF-promoting activities (Raver et al., 2011) or implementing cognitive strategies for everyday functioning via direct intervention with the child (Maeir et al., 2014).

The Cognitive Orientation to Daily Occupational Performance is an approach originally developed for children with developmental coordination disorder. It supports improved motor performance of children with ADHD aged 7 to 12 years, following the children's direct encouragement to implement cognitive strategies (Gharebaghy, Rassafiani, & Cameron, 2015).

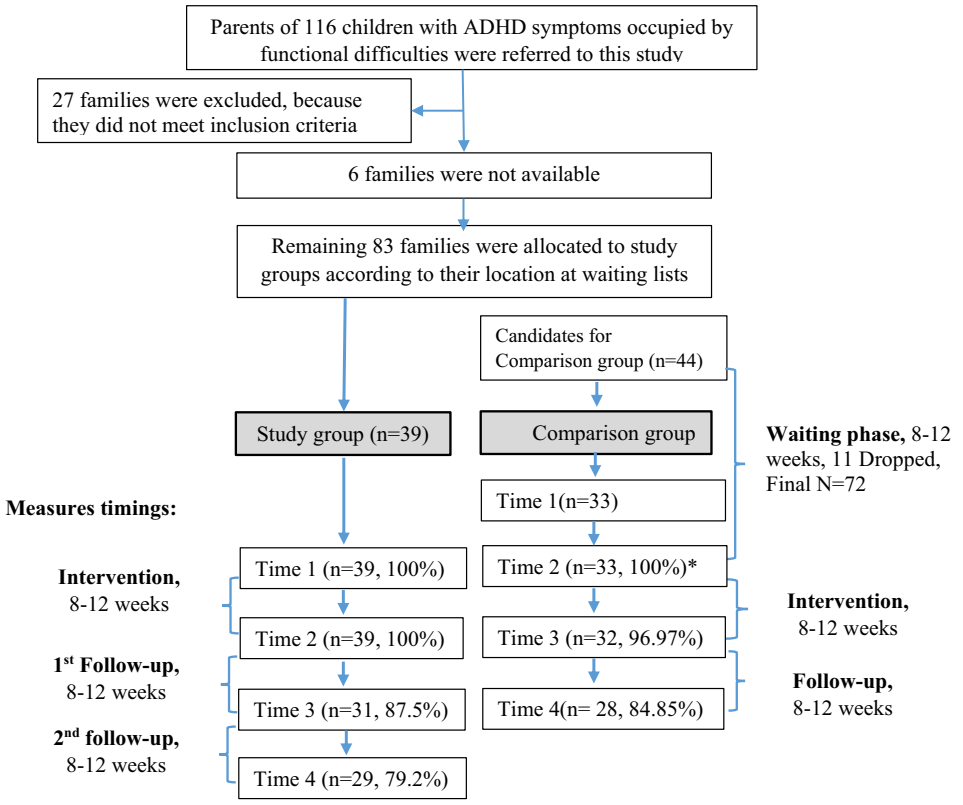
The Parental Occupational Executive Training (POET) is a new parent-training program that promotes the use of cognitive strategies to support daily functioning of children with ADHD at the ages of 4 to 7 years. It was developed based on Barkley's (2012) theory for EFs, the Occupational Performance Coaching model for parents' guidance (Graham, Rodger, & Ziviani, 2013), and concepts published in the International Classification of Functioning Disability, and Health (ICF; World Health Organization, 2001). Barkley's (2012) theory relates to six EFs: inhibitory control, nonverbal working memory, verbal working memory, emotional control, reconstitution (creative problem solving and planning), and self-awareness. It enables occupational therapists (OTs) who apply the intervention to learn with parents about the nature of EFs and their implications for everyday functioning, as well as about strategies to support daily functioning while coping with executive delays. Barkley attached verbal images to his model's concepts, titling nonverbal working memory as the brain's eyes; verbal working memory as the brain's voice; emotional control as the brain's heart; and reconstitution as the brain's playground (Barkley & Benton, 2010). In our study, we used Barkley's professional concepts and images to create the POET's visual model that served parents throughout the intervention. Further, we utilized the Occupational Performance Coaching model to structure the meetings, guide the OTs in a collaborative exchange of knowledge with the parents, and apply emotional support elements such as listening, emphasizing, reframing, guiding, and empowering (Graham et al., 2013). Finally, the ICF directs the practitioner to take into account additional internal and external factors, such as the child's characteristics (e.g., sensory-motor skills or gender), desired activity features (e.g., length or sequence of actions), and environment in which it is performed (e.g., stimuli load, room size, or parental ADHD), that may affect the child's performance in a specific goal (World Health Organization, 2001).

Our study aimed to examine the POET's efficacy. We hypothesized that following the intervention, compared to the comparison group, the study group would show significant positive changes in the (a) children's daily functioning, (b) children's EFs, (c) parents' perceptions of their knowledge regarding EF, and (d) parents' ability to assist their children in improving daily functioning. We also hypothesized that the change in the children's daily functioning and parents' outcomes would correlate with changes in the children's EF improvement.

2. Materials and methods

2.1. Participants

We calculated a sample size of 80 participants using the G*Power program with effect size of .30, significance of .05, and power of .80. As presented in Figure 1, public child developmental centers and private OT clinics in the North and Central Districts of Israel referred the families to the study. Inclusion criteria were children who met the DSM-IV (AAP, 2011) criteria for ADHD and had *t*-scores of at least 65 on one or more of the Conners Parent Rating Scale (CPRS) or Conners' Teacher Rating Scales (CTRS) attention or hyperactivity-impulsivity subscales (Goyette, Conners, & Ulrich, 1978). All the children were Jewish, of two-parent families, and attended regular preschool and first grade; had no evidence of developmental delay in language, sensory



*percentages were calculated with regard to number of participants that started the intervention

Figure 1. Flowchart showing the number of families entering each of the study's phases.

deficits, or additional emotional diagnoses; and received no additional treatment during the study period. Only children with both parents willing to participate and attend all sessions were included. We specifically excluded children with chronic illnesses or receiving chronic or short-term medication or nonmedical interventions (e.g., psychological consultations) that may have affected their attention or behavior. Initially referred 116 families to this study between March 2013 and February 2015. We excluded 37.9% of them from the cohort based on the above mentioned exclusion criteria.

The final sample included 72 families of children aged 3.83 to 7.08 years ($M = 5.42$, $SD = .86$), of whom 55 (76.4%) were boys and 17 (23.6%) were girls. Based on the DSM-IV (AAP, 2011) criteria, the participants distributed as 35% Type 1 (inattentive), 20.8% Type 2 (hyperactive-impulsive), and 52.8% Type 3 (combined).

2.2. Measures

2.2.1. Screening and background characteristics questionnaires

To screen for the inclusion criteria and to identify ADHD symptoms among children, we created a questionnaire based on the DSM-IV-TR (AAP, 2011) criteria for ADHD,

translated by expert OTs. Use of such a tool is considered valid and frequently used in research (DuPaul, Power, Anastopoulos, & Reid, 1998). The questionnaire consists of 18-items, divided into two subscales: The first scale includes nine items related to inattention symptoms. The second scale includes nine items related to hyperactivity/impulsiveness symptoms. For each item the respondent indicates whether it characterizes the child's behavior (yes/no). Children were included if the response was yes for at least six items in one or both subscales (inattentive-distractible, hyperactive-impulsive), in the home and the educational setting.

Further questionnaires were served for collection of children's background characteristics.

The demographic questionnaire collected sociodemographic and health-related variables data of the children and their family members, such as age, date of birth, gender, parent education, developmental difficulties, and family members' health status.

The CPRS and CTRS questionnaires were implemented in order to gather information related to specific ADHD scales (Goyette et al., 1978). The CPRS includes 48 items relating to six scales: the conduct problem, learning problem, psychosomatic, impulsive-hyperactive, anxiety, and hyperactivity indices. The 28 items of the CTRS relate to four scales: the conduct problem, hyperactivity, inattentive-passive, and ADHD indices. In both questionnaires, all items are ranked on a four-point scale (0 = not present to 3 = often present). We converted the CPRS and CTRS scale scores to *t*-scores. For CPRS and CTRS reliability and validity, see (Goyette et al., 1978).

The Children Activity Scale-Parent (ChAS-P; Rosenblum, 2006) was used to screen the children for suspected developmental coordination disorder. The ChAS-P includes 27 items relating to children's organization in time and space while performing day-to-day activities, self-care, movement, ball games, and school and preschool activities. Every statement is ranked on a five-point scale (1 = barely enough to 5 = very good), and the higher the score, the better the child's performance. For ChAS-P reliability and validity, see Rosenblum (2006).

The Pediatric Symptom Checklist (Jellinek, Murphy, & Burns, 1986) was used to screen the children for suspected emotional problems. The checklist has 35 items ranked on a three-point scale (0 = never to 2 = frequently). The cutoff score (that may indicate a problem with psychological functioning) among children aged 6 to 16 years is 28 points or more. Among children aged 4 to 5 years, the cutoff score is 24 points. For reliability and validity, see Jellinek, Murphy, and Burns (1986).

2.2.2. Outcome measures

We implemented the Canadian Occupational Performance Measure (COPM) to determine individual intervention goals with each family and to measure changes in parents' perceptions of their children's performance over time. The COPM includes a 20- to 30-minute interview about the children's daily routines. We encouraged parents to focus on activities their child was trying to accomplish or was interested in doing, albeit with difficulty. Parents rated each activity on a 10-point scale for perceived *performance capacity* (1 = not able to do at all to 10 = able to do extremely well) and similarly for *performance satisfaction*. The family and OT then collaboratively set and prioritized goals.

The COPM enabled parents and therapists to re-rank the intervention goals after treatment. An improvement of two or more points has clinical significance. See Law et al. (1998) for COPM reliability and validity.

The Behavior Rating Inventory of EF (BRIEF) measures EF behavior manifestations. We implemented two versions, depending on each child's age. Specifically, we used the preschool (BRIEF-P) version for children up to 5 years and 11 months and the BRIEF for schoolchildren aged 6 years or older. In both versions, items are rated on a three-point scale indicating the intensity with which each behavior is exhibited (1 = never to 3 = often). A lower score represents more optimal performance. The BRIEF-P contains 63 items divided into five scales: inhibitory control, shifting, emotional control, working memory, and planning-organization. These scales produce three index scores for the inhibitory self-control, flexibility, and emergent metacognition indices. The BRIEF contains more items (total of 86), representing three additional EFs: initiation, organization of materials, and monitor. Its eight scales produce the behavioral regulation and the metacognition indices. In both questionnaires, the sum of the five or eight clinical scales, respectively, constitutes the global executive composite score. Additionally, both BRIEF versions include two validity scales: inconsistency and negativity. Raw scores are converted to *t*-scores, with higher scores indicating more dysregulation in behaviors associated with EF. For reliability and validity of both tools, see Gioia, Isquith, Guy, and Kenworthy (2000) and Gioia, Isquith, Kenworthy, and Barton (2002).

Finally, we developed a two-item questionnaire scored on a Likert scale (1–7) for the current study to assess, following the intervention, parental perception of changes that occurred in their EF knowledge and skills: Question 1 was, "To what extent do you feel you understand the factors that make it difficult for your child to function (knowledge)?" and Question 2 was, "To what extent do you feel you can help your child function better when having EF difficulties (skills to help)?" Five expert OTs established the questionnaire's validity, and three parents not involved in the study affirmed its clarity.

2.3. Procedures

2.3.1. Study design

The Faculty of Social Welfare and Health Sciences at the University of Haifa (090/13) and Maccabi Healthcare Services, Israel (2013015) provided ethics approvals for the study, and parents signed informed consent forms.

We implemented a controlled counterbalance design, specifically with 39 families in the study group and 33 families in the comparison group. Assignment to each study group was determined according to the families' position on the waiting list. The study group (Group A) families started the intervention immediately after the child's assessment using the BRIEF-P, whereas the comparison group (Group B) families agreed to wait 8 to12 weeks following their first assessment before the intervention started. One parent of each child (90.3% were the mothers) completed the study measures four times at intervals throughout the 8-to-12-week period: pre-intervention, post-intervention, first follow-up, and second follow-up for Group A, and pre-waiting, pre-intervention, post-intervention, and first follow-up for Group B (Figure 1). Parents were not exposed to baseline assessment scores of any study measure (i.e., COPM, BRIEF, or questions

about parent knowledge and skills to help). Seventeen OTs evaluated all the children and implemented the intervention. The first author trained and guided the OTs using a written training protocol designed to integrate the POETs three theoretical bases (Barkley, 2012; Graham et al., 2013; World Health Organization, 2001), relevant literature, and clinical experience. To ascertain reliability among researchers, all 17 OTs performed the same 24-hour training that addressed the standardized protocol and completed structured diaries following each session. The written protocol also included precise instructions on how to contact the parents and introduce the study, as well as the order of and detailed instructions for completing the study's standardized parental questionnaires. The first author carefully reviewed the structured diaries within 3 days of their completion and then gave written feedback to assist researchers with adhering to the intervention principles and offered additional counseling as needed.

Before the intervention, we observed and assessed the children using the standardized assessment questionnaires discussed in Section 2.2. Additionally, the OTs assessed all children using the ICF concepts as part of the usual evaluation done at their clinics. Information on sensory-motor skills among children with ADHD (Kaiser, Schoemaker, Albaret, & Geuze, 2015) was collected using the ChAS-P and clinical observations. The Pediatric Symptom Checklist was used to obtain data on emotional difficulties.

The intervention included eight 45-minute parent-training sessions in which all researchers followed the protocol and completed unified forms. In the first session, parents defined up to five personalized occupational intervention goals using the COPM (Law et al., 1998). The OTs and parents completed forms to analyze collaboratively different dimensions that could influence the child's ability to perform those occupational goals, such as EFs, additional skills and characteristics (e.g., sensory-motor skills), demands and sequences of the occupation itself, and human and nonhuman environmental aspects. The OTs then exposed parents to strategies addressing the arising challenges. Such strategies could include, for example, using environmental cues to remind the child of the rules to follow, using gestures to cue the child in real time to stop and think, or teaching the child a new skill that will help him or her choose an idea for play. Each session ended with the parents choosing up to five applicable strategies to implement the following week, prescribed using standardized forms. The first strategy always included a message to share with the child, in order to enlist the child's motivation to perform it. In the following session, adhering to the Occupational Performance Coaching protocol (Graham et al., 2013), the OT highlighted the link between the parents' actions and the child's improved performance and encouraged parents to generalize their success to other tasks and situations.

We insured reliability between researchers and among the OTs by performing the same 24-hour training and supplying uniform protocol and counseling. Additionally, the OTs filled in constructed diaries after every session and were supervised by the first author.

2.3.2. Data analysis

We analyzed data with SPSS (version 21.0) using descriptive statistics to obtain descriptive information of children and parents. We examined differences between Groups A

and B using χ^2 *t*-tests and Bonferroni correction, evaluated our Hypotheses 1 through 3 using MANOVA for repeated measures (only three measurement points were included because of the low response rate at the second follow-up), and examined within-group effects. In analyzing the COPM scores, only each participant's first three goals were included. Similarly, only the scores of scales common to both the BRIEF and BRIEF-P versions were analyzed. No additional ad hoc analyses were necessary.

The number of returned and completed questionnaires decreased during the study stages; therefore, the number of questionnaires included in the analyses differed at each stage. We evaluated our Hypothesis 4 using ANOVA and Hypothesis 5 by calculating differences in the study's measures before and after intervention and by applying Spearman coefficient correlation analysis.

Because we found no significant differences in Group B scores during the waiting phase, and no difference between Groups A and B before the intervention, we treated the two groups (A and B) as one group ($N = 72$) for further analysis and calculated effect size by the partial eta squared (η^2p).

3. Results

3.1. Descriptive information

Figure 1 depicts the number of families that participated in each study phase. In both groups ($N = 72$), the majority (90.3%) of respondents were mothers with 12 to 23 years of education ($M = 16.17$, $SD = 2.23$). Similarly, the children's fathers had from 12 to 24 years of education ($M = 15.78$, $SD = 2.54$). No significant differences were found between the study groups in respondent gender, mother's years of education, suspected ADHD among family members, children's ages, gender distribution, medical diagnosis, or conduct or anxiety disorders as measured by the CPRS. Among the entire sample 59% of the children had suspected developmental coordination disorder, and 40.3% had emotional difficulties. Two children needed traditional OT intervention to improve their fine motor and graphomotor skills. According to the BRIEF scores, all of the children had EF deficits and based on the CHAS-P questionnaire and on the COPM, they all had difficulties in their daily functioning.

3.2. Differences between study and comparison groups

As described in Table 1, no significant differences were evident in the dependent variables between Groups A and B before the intervention. However, following Bonferroni correction, significant differences were found between Measure 2 of the Study Group (post-intervention) and Measure 2 of the comparison group (post-waiting, pre-intervention) for the questions about *knowledge* [$t(70) = 5.700$, $p < 0.001$], *skills to help* [$t(70) = 6.700$, $p < 0.001$], and the COPM [$t(61) = 9.820$, $p < 0.001$].

3.3. Effect on children's daily functioning

Among the 72 families, only forty-seven parents rated at least to three intervention-goals in at least three measurement points (COPM). Therefore, the MANOVA analysis

Table 1. Means, Standard Deviations, and *t*-scores for both groups' pre-intervention measures.

Tool	Group A (study) Measure 1[a] *M* (*SD*)	Group B (comparison) Measure 2[b] *M* (*SD*)	*t* (*df*)
Acquiring knowledge	3.84 (1.64)	4.39 (1.17)	−1.64 (68)
Ability to assist	3.68 (1.33)	3.82 (1.38)	−0.44 (68)
COPM (mean)	3.20 (1.18)	3.80 (1.46)	−1.83 (64)
BRIEF-P (GEC)	67.81 (10.77)	68.74 (11.37)	−35.00 (66)

Note.
[a]Measure 1 = pre-intervention in the study group;.
[b]Measure 2 = pre-intervention in the comparison group; COPM = Canadian Occupational Performance Measure, scored from 1 (not able to do) to 10 (can do extremely well); BRIEF-P (GEC) = Behavioral Rating Inventory of Execution Function—preschool version global executive composite score, with a *t*-score of 65 or higher clinically significant.
p = not significant.

Table 2. COPM children's performance scores over the study stages (T1–T3).

	Mean (*SD*)					
Goal	T1	T2	T3	*F*(2,92)	η^2_p	OP
1	3.66 (1.86)	7.60 (1.85)	7.60 (1.61)	101.87***	0.69	1.00
2	3.26 (1.80)	6.94 (1.83)	7.06 (1.55)	95.01***	0.67	1.00
3	3.83 (1.62)	7.20 (1.91)	7.23 (1.83)	83.03***	0.64	1.00

Note. *N* = 47. T1 = pre-intervention; T2 = post-intervention; T3 = 8–12-week follow-up; OP = observed power. COPM = Canadian Occupational Performance Measure, scored from 1 (not able to do) to 10 (can do extremely well). The significant difference was between T1 and T2.
***$p < 0.001$.

(within groups) on the COPM *children performance* scores included only 47 participants. Results indicated significant change between the study's stages [$F(6,180) = 37.070$, $p < 0.001$, η^2p = 0.550, observed power = 1.000].

As depicted in Table 2, *children's performance* scores significantly increased following the intervention for all three intervention goals. Improvements were maintained up to the first follow-up; no significant decline occurred across the maintenance phase (p = ns). In the study group, *children's performance* scores significantly improved for Goal 2 up to the second follow-up ($n = 20$; [$F(9,171) = 18$, $p < .001$, η^2_p=.470, observed power = 1.00]).Goals 1 and 3 also improved, although not significantly.

3.4. Effect on children's EFs

The MANOVA analysis indicated significant improvement following the intervention phase on the BRIEF-P scale scores [$F(10,180) = 3.450$, $p < 0.001$, $\eta^2_p = 0.160$, observed power = 0.990] and global executive composite scores [$F(2, 46) = 12.910$, $p < 0.001$,$\eta^2_p = 0.360$, observed power = 1.000].

As illustrated in Table 3, all scales' scores of the BRIEF-P decreased (improved) significantly following the intervention. Achievements were maintained up to the first follow-up (p = ns). In the study group (Group A, $n = 21$), the improvement was maintained up to the second follow-up [$F(2, 18) = 8.390$, $p = 0.001$, $\eta^2_p = 0.580$, observed power = 0.980]. Using 65 as the *t*-score cutoff representing clinical significance, following the intervention, high rates of participants showed significant clinical improvement. For the inhibition scale, 24.6% of the children improved their *t*-scores from the abnormal to the normal range, 22% for the working memory scale, 17% for the plan-organization scale, and 13% for the emotional control scale.

Table 3. BRIEF-P scores over the study stages (T1–T3).

	Mean (*SD*)					
Scale	T1	T2	T3	*F*(2,92)	η^2_p	OP
Inhibition	64.54 (10.94)	59.21 (9.63)	58.73 (10.84)	12.23***	0.21	1.00
Shifting	56.19 (11.39)	53.15 (10.27)	52.71 (12.51)	5.32**	0.10	0.83
Emotional control	60.52 (14.73)	55.60 (12.83)	54.31 (12.51)	9.33***	0.20	0.98
Working memory	68.08 (11.62	62.19 (10.56)	61.83 (11.56)	11.40***	0.20	0.99
Plan-organize	63.71 (13.18)	58.35 (10.99)	57.06 (12.70)	10.01***	0.18	0.98
BRIEF-P (GEC)	67.08 (10.97)	61.69 (10.67)	60.02 (11.31)	12.91***	0.36	1.00

Note. $N = 48$. T1 = pre-intervention; T2 = post-intervention; T3 = 8–12-week follow-up; OP = observed power. BRIEF-P (GED) = Behavioral Rating Inventory of Execution Function—preschool version global executive composite score, with a *t*-score of 65 or higher clinically significant. The significant difference was between T1 and T2.
**$p < 0.010$;.
***$p < 0.001$.

Table 4. Means and Standard Deviations for the knowledge and ability questions.

	M (*SD*)		
Measure	T1	T2	T3
Acquiring knowledge	4.16 (1.42)	5.76 (0.84)	5.98 (0.71)
Ability to assist	3.84 (1.32)	5.55 (0.92)	5.60 (1.04)

$N = 55$. T1 = pre-intervention; T2 = post-intervention; T3 = 8–12-week follow-up. The questions were scored on a scale of 1 (low) to 7 (high), and the significant difference was between T1 and T2.

3.5. Effect on parent knowledge and ability to assist

The ANOVA (between groups) applied to the scores of the *knowledge* question indicated a significant difference with a significant perceived improvement [$F(2, 53) = 40.410$, $p < 0.001$, η^2p $= 0.600$, observed power $= 1.000$]. Similar differences were revealed for the *ability to assist* question [$F(2, 53) = 45.210$, $p < 0.001$, η^2p $= 0.630$, observed power $= 1.000$].

As demonstrated in Table 4, no significant differences were revealed between the scores of both questions from the first to the second follow-ups (p = ns). The study group (Group A, $n = 24$) maintained achievements up to the second follow-up for the *knowledge* question [$F(3, 21) = 11.950$, $p < 0.001$, η^2p $= 0.630$, observed power $= 1.000$] and for the *ability to assist* question [$F(3, 21) = 17.010$, $p < 0.001$, η^2p $= 0.710$, observed power $= 1.000$].

A correlation analysis to examine the relationship between the observed improvement in performance and documented changes in parents' perceptions of their children's skills and changes in EFs revealed a single weak correlation between the COPM scores and one BRIEF scale (shifting, –.29, $p < .05$). However, moderate significant correlations were found between the COPM scores and the parents' acquired knowledge (.40, $p < .01$) and the parents' ability to assist their children (.42, $p < .01$).

4. Discussion

The current study introduces the efficacy of the POET, a new parent-training program for preschoolers with ADHD symptoms. Although using strong study designs with intervention and comparison waiting list groups, the evidenced-based parent-training programs suggested for preschoolers with ADHD symptoms to date have focused on

improving children's behavior or social function (Bor et al., 2002; Thompson et al., 2009). To our knowledge, the POET is the first reported evidence-based parent-training program that focuses on promoting personal daily functioning goals for young children with ADHD symptomology. For example, in our study, the POET enabled parents to improve their children's functioning in their abilities to settle down in the morning independently with up to two reminders from parents, return toys to their place in the evening with parental assistance, sit for 10 to 15 minutes during supper, and play a purposed game with a sibling. Former programs have already facilitated use of cognitive strategies in everyday function among children with ADHD (Gharebaghy et al., 2015; Maeir et al., 2014). The POET renews the ability to begin at 4 years of age—hence, the parental training—while considering the children's additional skills (e.g., sensory-motor skills) that may influence their functioning. Following the intervention, the children's COPM scores improved by more than two points, an improvement that is clinically significant (Law et al., 1998). Decreasing functional impairments at early ages has the potential to prevent many adverse long-term consequences that typify the ADHD trajectory (Berger & Nevo, 2011; Halperin, Bédard, & Curchack-Lichtin, 2012).

Following implementation of the POET, a significant improvement was observed in the children's EFs as measured by the BRIEF-P scales. The effect size was moderate to high, except for shifting, with a high observed power for the whole sample. Further, in contrast to a previous study (Rosenberg, Maeir, Yochman, Dahan, & Hirsch, 2015) conducted with a similar age group by direct child intervention, our study results did not apply only to scales in which children scored 65 or above before the intervention. In that earlier study, only children who received a score of 65 or above before the intervention significantly improved their EF scores. Following those results, the authors suggested that more intensive parental-involvement could lead to EF improvement for all participants.

Interestingly, in our study, the effect size was most significant in the scales of inhibition and working memory and in the global executive composite. Behavioral inhibition and working memory were also the scales most clinically improved. Earlier studies achieved similar results among preschoolers (e.g., Tamm, Nakonezny, & Hughes, 2014). However, those studies did not examine possible implications of EF improvements for everyday functioning. Our study included a measure of the changes in parent knowledge about EF and in their ability to support their children to cope with delayed EFs in daily functioning. Our study results lend support to the claimed importance of parental knowledge and involvement as change agents when treating young children (Camden et al., 2016). The finding that the children maintained achievements in follow-up measurements but did not continue to improve following the end of the intervention is similar to those in previous studies on parents' knowledge (Dunn, Cox, Foster, Mische-Lawson, & Tanquary, 2012; Tamm et al., 2014). Such findings emphasize the need to offer families booster sessions following the intervention (Hahn-Markowitz et al., 2011) and to provide additional guidance to meet the changing needs of the developing children. (Our other research results, including significant improvements in participants' ADHD symptomatology, will be published separately).

4.1. Limitations and future directions

The children in this study were not examined by a neurologist or pediatric psychiatrist but only by a pediatrician. Due to the public health agency rules, it was impossible to implement a randomized control treatment; therefore, we used a waiting list with no confounding interventions. We did not use independent examiners for outcome assessments. Instead, we used parent reports, which reflect daily real-life performance but may have biased the results. Because most participating parents had academic degrees, the results cannot be generalized to all parents of preschoolers with ADHD symptomatology. Finally, stability of the results was assessed over a short period (up to 6 months from the end of the intervention). We recommend future studies use objective tools in addition to parent reports to test the children's achievements and employ research coordinators to assist in overcoming methodological limitations.

5. Conclusion

The current research points to the relationship between improved EF and observed functional outcomes in young children with ADHD symptomatology. It also provides initial evidence for the efficacy of the POET as a useful intervention for preschool children with ADHD symptomatology as compared to no intervention. Future studies using the POET and similar methodology in other communities are necessary to confirm these results. Furthermore, the use of a comparison intervention in future studies (such as child-directed OT treatment or parental group therapy) may also point to the unique efficacy of this intervention.

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