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Promoting Parent Engagement in Behavioral Intervention for Young Children With ADHD: Iterative Treatment Development

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Abstract

The most efficacious psychosocial intervention for reducing attention-deficit/hyperactivity disorder (ADHD) symptoms in young children is behavioral parent training (BPT). Potential benefits are hindered by limited accessibility, low session attendance, and poor implementation of prescribed strategies. As a result, only approximately half of families with young children with ADHD receive BPT. We describe an innovative approach for reducing barriers to BPT access. Specifically, we invoked an iterative, 5-step process of intervention development and revision to modify an existing face-to-face BPT program and develop an online version. Results indicated that the revised program and online versions (a) increased parent engagement with BPT, (b) enhanced accessibility, (c) produced favorable parent acceptability and feasibility ratings, and (d) resulted in improved child outcomes.

Keywords

attention-deficit/hyperactivity disorder, behavioral parent training, online treatment, treatment development

Children with attention-deficit/hyperactivity disorder (ADHD) exhibit developmentally inappropriate levels of inattention and/or hyperactivity–impulsivity that are associated with impairment in daily functioning (American Psychiatric Association [APA], 2013). ADHD typically begins early in life and, by definition, children with this disorder must exhibit impairing symptoms prior to the age of 12 years (APA, 2013; Barkley, 2015). Although issues such as rapid developmental changes between ages 2 to 6 years make diagnosis of preschool children challenging (Lahey et al., 1998), research provides evidence that symptoms of ADHD typically emerge at a very young age (Egger, Kondo, & Angold, 2006; Strickland et al., 2011), are associated with significant deviations in brain structure (Mahone et al., 2011), and are likely to persist into elementary school and beyond for the majority of children (Lahey et al., 2004). The prevalence of ADHD in young children has been estimated to range from 2% to 15.1% depending on diagnostic methods and severity of impairment (Lavigne et al., 1996; Lavigne et al., 2009), and approximately 11% of U.S. children have received an ADHD diagnosis at some point in their lives (Visser et al., 2014).

ADHD symptoms of inattention and hyperactivity–impulsivity in young children are associated with significant impairment in behavioral, social, and preacademic functioning. For example, DuPaul, McGoey, Eckert, and VanBrakle (2001) found that a sample of 58 preschool children with ADHD received parent and teacher ratings of behavior control and social interaction difficulties that were approximately 2 standard deviations above a sample of 36 typically developing peers. Furthermore, young children with ADHD scored approximately 1 standard deviation below their peers on a test of cognitive development and preacademic skills. In elementary school, students with ADHD score on average .71 standard deviation units lower on standardized reading, mathematics, and spelling achievement tests (Frazier, Youngstrom, Glutting, & Watkins, 2007). Consequently, children with ADHD are at higher than average risk for the development of learning disabilities (LD), with comorbidity rates averaging 30 to 45% across studies (DuPaul, Gormley, & Laracy, 2013). In addition, children exhibiting high levels

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of hyperactive and impulsive behaviors (i.e., combined or predominantly hyperactive-impulsive presentations of ADHD) are at higher than average risk for developing disruptive behavior disorders (i.e., oppositional defiant disorder [ODD] and conduct disorder [CD]; e.g., Bendiksen et al., 2014) that may lead to long-term psychological and social difficulties. ODD symptoms include chronic actively defiant and noncompliant behaviors while CD involves antisocial behaviors that violate societal norms (e.g., vandalism, stealing, violent acts). Students exhibiting the combination of ADHD and disruptive behavior disorders are likely to be identified as having emotional and behavior disorders (EBD) and 51.6% of children with ADHD have an individualized education plan due to LD, EBD, or other health impairment (Murray et al., 2014). Because ADHD tends to be chronic and is associated with multiple impairments, the long-term economic burden to families and society is considerable (Chorozoglou et al., 2015). These findings underscore the importance of intervention at an early age to reduce the impact of ADHD and to interrupt the typical negative outcomes associated with this disorder.

A substantial literature base, including large-scale randomized control trials, has examined intervention for school-age children with ADHD (e.g., MTA Cooperative Group, 1999, 2004); the most common treatments with demonstrated effectiveness are psychotropic medications and behavioral interventions (Barkley, 2015). Unfortunately, there is a relative paucity of analogous research with preschool children. Although a randomized controlled trial of stimulant medication in a large sample of preschool children indicated significant reduction in ADHD symptoms (Greenhill et al., 2006), the study also raised critical concerns regarding the use of medication with this age group, most notably the risk for adverse side effects including reduced growth rates (Swanson et al., 2006; Wigal et al., 2006).

The most efficacious psychosocial intervention addressing ADHD in young children is behavioral parent training (BPT; Charach et al., 2011; DuPaul & Kern, 2011). BPT involves mental health practitioners educating groups of parents in the use of home-based behavioral interventions. Typically, interventions involve modifying antecedent and/or consequent environmental events to prompt and reinforce desired child behaviors. Several randomized trials have shown that BPT can reduce symptoms of ADHD and related behavior disorders in preschool children with or at risk for ADHD (e.g., Jones, Daley, Hutchings, Bywater, & Eames, 2007; Webster-Stratton, Reid, & Beauchaine, 2011) with medium size effects found for reduction of child ADHD symptoms and conduct problems as well as negative parenting (Rimestad, Lambek, Christiansen, & Hougaard, 2016). In fact, based on available evidence, the American Academy of Pediatrics (2011) issued guidelines that recommend behavior therapy as a first-line treatment (i.e., to be used prior to medication) for children with ADHD younger than 6 years old. Unfortunately, only about 55% of families with young children with ADHD receive recommended behavior therapy support (Visser et al., 2016). Even when families of children with ADHD have access to parent education, engagement with intervention may be limited by low rates of session attendance (e.g., Kern et al., 2007) and less than optimal levels of parent fidelity with prescribed treatment strategies (Clarke et al., 2015). In particular, established programs may require parents to attend treatment sessions over an extended period of time, thus taxing family time and resources (e.g., transportation, child care).

Given that access to and engagement with BPT may be limited for many families of young children with ADHD, it is important to examine the content of BPT programs to determine whether they can be refined to increase their accessibility. In an effort to address similar issues with accessibility and engagement for school-based interventions, Kern, Evans, and Lewis (2011) described an iterative treatment development and field-testing process that involved multiple phases of intervention delivery, consumer feedback, and treatment refinement. Specifically, Kern and colleagues obtained feedback from school personnel, parents, and students. In addition, they collected information regarding student outcomes to develop a comprehensive, efficacious intervention program for secondary school students with behavioral and emotional difficulties. The process, however, was designed for the development of school-based interventions. There are many unique considerations when developing BPT interventions that suggest the need for variations in this process. For instance, issues of feasibility and acceptability, considerations of baseline knowledge, and strategies to ensure ease of treatment implementation require deliberate attention.

One possible method to enhance parent access to and engagement with BPT is through web-based or online delivery of treatment. For example, recent investigations have shown positive effects on parent knowledge of behavioral procedures, fidelity with prescribed intervention, parent stress, treatment acceptability, and child behavior for Internet-delivered BPT for children with autism (Jang et al., 2012; Kobak et al., 2011; Steever, 2009; Vismara, McCormick, Young, Nadhan, & Monlux, 2013; Wainer & Ingersoll, 2015). Only one previous study has examined online support for parents of young children with ADHD. Franke, Keown, and Sanders (2016) evaluated the efficacy of an online self-help program for parents of preschool children with ADHD symptoms and found significant improvements for maternal ratings of child ADHD-related behavior, teacher ratings of prosocial behavior, and parenting stress, mood, and self-efficacy. Unfortunately, the children did not explicitly meet diagnostic criteria for ADHD, and the investigators did not assess parent fidelity with recommended intervention strategies.

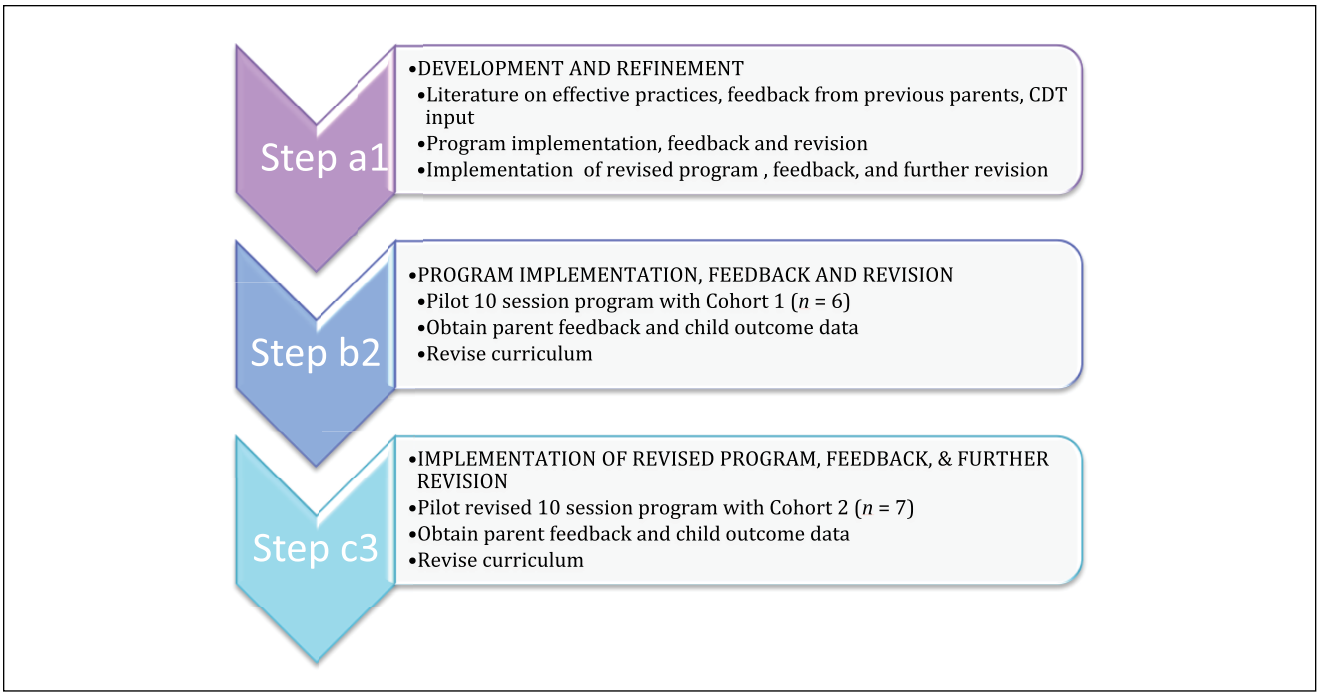

Figure 1. Steps to PEAK iterative treatment development Phase 1.
Note. PEAK = Promoting Engagement With ADHD Pre-Kindergartners; CDT = community development team.

The purpose of the current project was to extend the iterative treatment development process described by Kern et al. (2011) to create a BPT program that promoted treatment adherence and completion among parents of young children with ADHD. We reduced an existing 20-session parent education program (DuPaul & Kern, 2011; Kern et al., 2007) with evidence of efficacy to 10 sessions and developed an online version. This article describes the process, specific steps, and outcomes associated with this novel application of the treatment development process.

Goals of Intervention Development and Refinement Process

We had three primary goals during the intervention development, refinement, and field-testing process. The first was to develop a BPT program that would result in significant and meaningful child improvement, as well as be perceived as acceptable by parents. To accomplish this, we relied on the content from an existing program with empirical evidence of efficacy (DuPaul & Kern, 2011; Kern et al., 2007) as a starting point for the iterative refinement process. In addition, we collaborated with stakeholders, including parents, to ascertain acceptability. Our second goal pertained to feasibility of completing the program. Our objective was to modify the existing program to enhance parent engagement with BPT by assuring that it could be completed in a reasonable amount of time and with a sufficient level of treatment fidelity. Finally, our third goal was to increase accessibility of the program. Given the logistical difficulties many parents have attending a face-to-face program (e.g., meeting schedule, transportation, child care), we explored an alternative method to deliver parent education, specifically via an online platform. The resulting process described in this article represents an innovative practice that can be used for developing future programs, as well as alternative program formats, that rely on extensive parent collaboration and implementation.

Steps for Intervention Development and Refinement

We employed an iterative, five-step process for intervention development and refinement, which we implemented in two phases over the course of 2 years. Phase 1 steps included (a) modifying an existing BPT program based on input from community stakeholders ("community development team" [CDT]), (b) implementing the modified program with a cohort of families and revising based on parent feedback, and (c) implementing the revised program with a second cohort of families and revising again based on parent feedback (see Figure 1). In Phase 2, we (d) developed an online version of BPT using input from consultants and CDT and (e) implemented online BPT with a third cohort of families and revising based on parent feedback (see Figure 2). Because maintaining parent involvement in BPT was

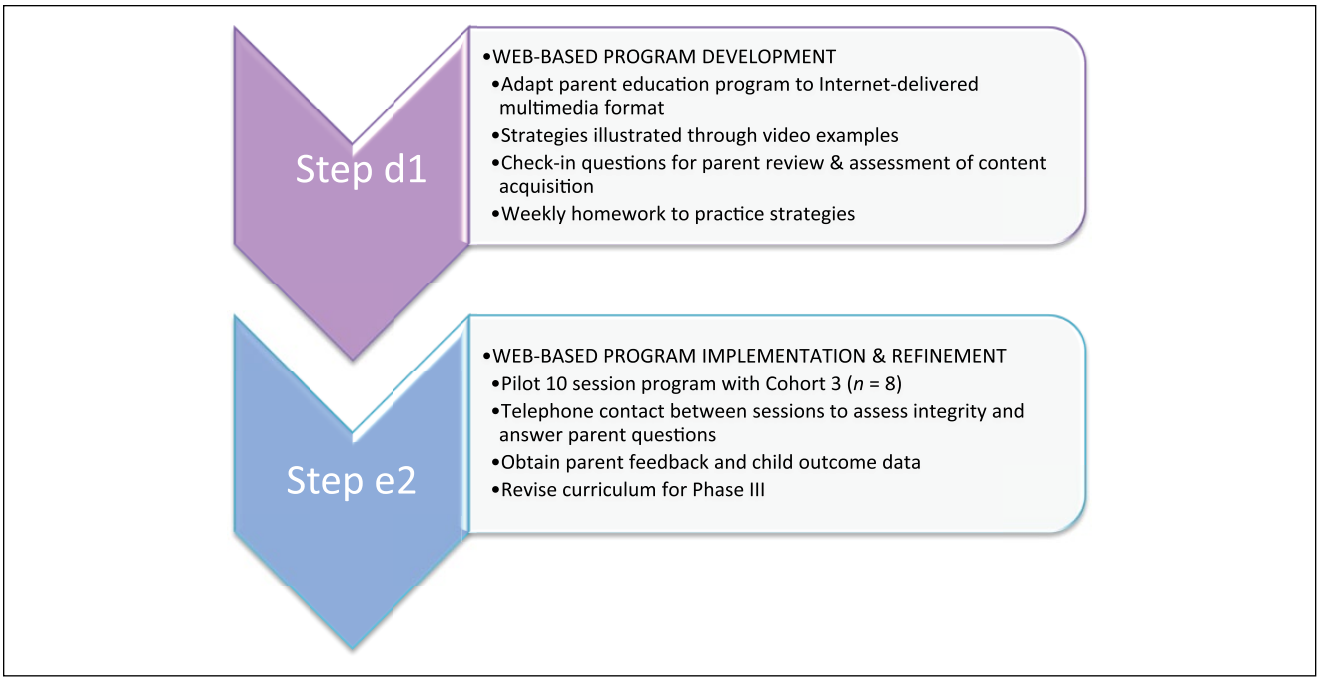

Figure 2. Steps to PEAK iterative treatment development Phase 2.
Note. PEAK = Promoting Engagement With ADHD Pre-Kindergartners.

critical for success, feedback from parents and community members was collected at each step to ensure that the program was user-friendly, engaging for families, and addressed issues families might experience.

Step 1: Modifying BPT Program

Using literature of effective practices (e.g., Charach et al., 2011; Eyberg, Nelson, & Boggs, 2008; Garland, Hawley, Brookman-Frazee, & Hurlburt, 2008), feedback from previous parents who had completed a similar program, and input from a CDT, a 20-session BPT program (DuPaul & Kern, 2011; Kern et al., 2007) was streamlined into a 10-session program (see Table 1). The original 20-session program focused on providing parents with behavior management skills, strategies to promote early literacy and numeracy, and guidelines for enhancing child safety. The program content was delivered through didactic instruction accompanied by PowerPoint slides, video clips, modeling, and role-plays over the course of 20, 2-hr sessions that convened across 12 months. These sessions included Introduction to ADHD, Functional Behavioral Assessment (FBA), Accident Prevention, Preacademics and Transitioning to Kindergarten, and modified versions of 11 community parent education sessions (Community Parent Education [COPE]; Cunningham, Bremner, & Secord, 1998).

Revisions to this 20-session program were completed after convening a CDT of 12 individuals, including parents, preschool teachers/directors, physicians, psychologists, social workers, and special educators, from the local/regional community who worked in some capacity with young children. Prior to a face-to-face meeting, each CDT member reviewed materials (e.g., session descriptions, PowerPoint slides, parent handouts) from two to three sessions to evaluate the content and then completed an online survey regarding the relevance, importance, feasibility, and potential for parent engagement with the materials. CDT members then met face-to-face to exchange feedback with the research team. At this meeting, the CDT was divided into small groups of two or three members wherein a research team member led discussion around feedback data regarding the two or three sessions team members previously reviewed with the goal of generating ideas for refining, changing, and modifying the existing materials. Once consensus was attained in the small group, a large group discussion occurred with all CDT members and the research team. The large group discussed ideas generated by the small groups and reached a consensus pertaining to session content, materials, and sequence for 10-session program. Main discussion points included how our research team could (a) streamline the content, (b) modify sessions to increase parent engagement with BPT, (c) match parent expectations to intervention, and (d) use knowledge of family characteristics to increase engagement with intervention.

At the conclusion of the CDT meeting, the refined 10 sessions for the program (Promoting Engagement With ADHD Pre-Kindergartners [PEAK]) included (1) Introduction to

Table 1. Original and Revised Versions of PEAK Behavioral Parent Training.

20-Session Program	10-Session Program
1. Opening (Purpose and Overview of Program)	1. Introduction to ADHD
2. Introduction to ADHD	2. Attending, Rewards, and Ignoring
3. Attending and Rewards	3. General Behavior Management
4–6. FBA I: Finding the Problem; FBA II: Identifying Patterns: FBA III: Developing a Plan	4. Problem-Solving Approach
7. Home Safety	5. Preventive Interventions
8. Teaching Early Literacy	6. Instructive Interventions
9. Teaching Early Numeracy	7. Response Strategies
10. Balanced Attending/Planned Ignoring	8. Extending What Works to Community Settings
11. Transitional Warnings/When-Then Statements	9. Promoting Early Academic Skills
12. Planning Ahead	10. Effective Communication
13. Time Out from Positive Reinforcement	
14–15. Point Systems I & II	
16. Planning Ahead II	
17. Home–School Communication	
18. Problem-Solving	
19. Transitioning to Kindergarten	
20. Closing Session (Program Summary)	

Note. PEAK = Promoting Engagement With ADHD Pre-Kindergartners; ADHD = attention-deficit/hyperactivity disorder; FBA = Functional Behavioral Assessment.

ADHD; (2) Attending, Rewards, and Ignoring; (3) General Behavior Management Strategies; (4) Problem-Solving Approach; (5) Preventive Interventions; (6) Instructive Interventions; (7) Response Strategies; (8) Extending What Works to Community Settings; (9) Promoting Early Reading and Math Skills; and (10) Effective Communication Strategies. In addition, the CDT members helped generate ideas regarding how to best deliver the content of each session, such as video examples, role-play, and small group activities.

Step 2: Pilot Face-to-Face Implementation With Family Cohort 1

The modified 10-session program was piloted over 10 weeks with six families comprising Cohort 1. We recruited families by contacting local preschools, day care centers, and pediatrician offices and using social media (e.g., Facebook) to describe the project. A total of 26 families initiated contact with members of Project PEAK (i.e., phone calls, emails, in person) to express interest in participation. Of these families, six (a) had children who met research criteria for participation, (b) provided informed consent, and (c) agreed to complete all BPT sessions. Specifically, children met the following criteria for inclusion: (a) had a chronological age between 3-0 and 5-11; (b) scored at or above 90th percentile on one or more subscales pertaining to ADHD on the parent and preschool teacher completed *Conners Early Childhood Rating Scale* (CERS; Conners, 2009), indicating high levels of inattentive, impulsive, and/or overactive behavior; (c) met *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM-IV-TR*; APA, 2000) criteria for ADHD based on parent diagnostic interview; and (d) had significant impairment due to symptoms based on parent report on the Columbia Impairment Scale (Bird et al., 1993). To assure a homogeneous sample, children who potentially had other primary disabilities (e.g., autism) or those who had a global ability standard score of less than 80 on Differential Ability Scale (DAS-II; Elliott, 2007) were excluded.

For each cohort, one or two doctoral students in special education or school psychology delivered session content to parents. Each face-to-face session was audiorecorded and later assessed using a treatment fidelity checklist for program adherence by one of the principal investigators. Fidelity was at or above 90% for prescribed session content across both face-to-face cohorts (i.e., Cohorts 1 and 2). To measure the success of this pilot program, multiple measures were collected, including (a) attendance at BPT sessions; (b) pre- and posttreatment parent ratings of child behavior (e.g., Conners); (c) parent acceptability/feasibility ratings for each session and the overall program; (d) parent acceptability of intervention strategies using the Intervention Rating Profile-15 (IRP-15; Martens, Witt, Elliott, & Darveaux, 1985); and (e) focus group discussion with principal investigators following the last session.

Measures. Attendance was counted if a parent was physically present at the scheduled BPT session. Acceptability and feasibility were measured by asking parents to complete

brief weekly rating forms related to session content for the week. Parents were asked to rate the content of the sessions (e.g., the content about setting expectations was acceptable) as well as the use of the session materials (e.g., "Based on the information about setting expectations I feel that I can use these strategies at home"). At the conclusion of the program, parents also completed an overall program evaluation form rating the importance of session content and their overall perception of the program. This form used a 6-point Likert-type scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) to answer the following questions: (a) The topics covered in this training program were well matched to my child's difficulties, (b) The strategies covered in this training improved my child's behavior, (c) The strategies taught in the training program can be easily incorporated into our daily routines, (d) My family benefited from this training program, (e) I would recommend this program to other parents of children with behavioral difficultiesm, and (f) This program is worth the time and effort.

Parents also rated the acceptability of recommended intervention strategies using the IRP-15 (Martens et al., 1985). The IRP-15 is a 15-item questionnaire that measures treatment acceptability and has demonstrated high internal reliability, Cronbach's alpha = .98 in previous research. Participants rated their agreement or disagreement with each statement on a 6-point Likert-type scale. For example, items include "The interventions I learned are acceptable for my child's problem behavior" and "I like the procedures used in the interventions I learned." Parents completed the IRP-15 at the conclusion of the program.

The CERS (Conners, 2009) includes six behavior scales containing 115 items. For screening purposes, scores at or beyond the 90th percentile on the Inattention/Overactivity subscale were used for inclusion in the study. The internal consistency, test–retest reliability, and criterion-related validity of the CERS are all at or beyond accepted standards (Conners, 2009). Teacher ratings using the CERS were collected prior to the first parent session to determine eligibility. The CERS parent version was completed by parents to determine eligibility and, once eligible, was collected pretreatment (i.e., at the beginning of the first BPT session) and posttreatment (i.e., within 1–2 weeks of completing the final BPT session) to assess change due to the intervention. Three behavior scales were of primary interest, including Inattention/Overactivity, Defiant/Aggressive Behaviors, and Global Index: Restless-Impulsive. Standard scores on each scale were used as dependent variables.

A focus group discussion was held with principal investigators following the last BPT session. At least one parent from all six participating families attended the focus group. Several broad questions were used to guide focus group discussion and solicit input without being suggestive: (a) What is your perception of the parent education program? (b) Are there any ways to improve the parent education program? (c) What strategies that you learned during the program have helped your child and how did they help? and (d) What challenges do you continue to have with your child? A graduate student took notes during the focus group, which also was audiorecorded for later reference, if needed. Within 1 week of the focus group, the research team met to review the notes. We were particularly interested in consensus (i.e., a recommendation made by more than one family); however, because of the relatively small group size, each recommendation was discussed and considered. We incorporated all feedback that enhanced parent understanding of program content and/or their ability to implement intervention strategies.

Program outcomes and revisions. Average attendance for Cohort 1 was 85% with 100% of families attending at least half of the sessions. In addition, there was a change in mean behavioral ratings on the CERS from pre- to posttreatment in multiple areas. For ratings on the Inattentive/Hyperactive subscale, scores decreased from pretest ($M = 97.6$) to posttest ($M = 83.25$). Ratings on the Defiance-Aggression subscale also decreased from pretest ($M = 98.16$) to posttest ($M = 75.75$). In addition, ratings on the Global Index: Restless-Impulsive subscale decreased from pretest ($M = 98.67$) to posttest ($M = 77.5$). Mean parent ratings of acceptability of program content and feasibility of recommended strategies ranged from 5.0 (Sessions 1 through 6) to 5.5 (Sessions 7 and 10) on a 6-point Likert-type scale. The mean IRP-15 rating was 5.35 on a 7-point Likert-type scale. These scores indicated that, overall, parents found session content, prescribed strategies, and the ability to use session content acceptable. Coupled with high parent engagement with BPT, data suggested acceptability of the program was high. As a result of focus group feedback, we revised the 10-session program by (a) reducing the variety of content presented in Session 9 to focus primarily on Dialogic Reading (Whitehurst et al., 1988) and embedding math skills in everyday activities, (b) moving some content (e.g., reward strategies) from one session (Session 8) to another (Session 3) to increase coherence/continuity, (c) limiting the amount of transitional advice (e.g., Individualized Education Program [IEP], 504) discussed in Session 10 because parents could obtain this information elsewhere, (d) increasing examples of how to implement intervention strategies in community settings across sessions, (e) removing most COPE videos and replacing with more program-specific examples of strategies, and (f) making minor changes to content/organization/sequence of presentation slides.

Step 3: Revised Face-to-Face Program Implementation With Family Cohort 2

The revised PEAK program was implemented with a second cohort of seven families over a 10-week period.

Recruitment efforts for Cohort 2 were the same as those for Cohort 1 and included contacting local preschools, day care centers, and pediatrician offices and the use of social media. These efforts resulted in 25 families who indicated interest in participating. Of these families, seven met the same inclusion (e.g., *DSM-IV-TR* diagnostic criteria for ADHD) and exclusion criteria (e.g., low DAS score) used for Cohort 1.

Goals for Step 3 included obtaining parent feedback regarding the revised session content and sequence as well as understanding and feasibility of recommended strategies to further revise and improve the program. To collect this information, parents in Cohort 2 completed the same measures and forms as parents in Cohort 1. At least one parent from all seven families also participated in focus group discussion following the last education session. Identical to Step 2, notes were taken and the focus group was audiorecorded, which was followed by a research team meeting to identify ways to enhance the program based on parent recommendations. As with Cohort 1, sessions were audiorecorded to assess treatment fidelity, which met or exceeded 90% for all sessions.

Results. Average attendance for Cohort 2 was 78% with 71.4% of parents attending at least half of the sessions. Similar to results seen in Cohort 1, there was a change in mean behavioral ratings on the CERS from pre- to posttreatment in multiple areas. For the Inattentive/Hyperactive subscale, ratings of behavior problems decreased from pretest (M = 96.5) to posttest (M = 81). Ratings on the Defiance-Aggression subscale also decreased from pretest (M = 90.33) to posttest (M = 83.83). In addition, ratings on the Global Index: Restless-Impulsive subscale decreased from pretest (M = 93) to posttest (M = 82.67).

Mean parent ratings of acceptability of program content and feasibility of recommended strategies ranged from 4.98 (Session 2) to 5.58 (Session 5) on a 6-point Likert-type scale. The mean total IRP-15 score was in the moderate range, 5.65 on a 7-point Likert-type scale. These scores indicated that, overall, parents found session content and the ability to use session content acceptable; parents liked the program and believed it was effective. Parents liked having the opportunity to discuss ideas with the session leader. Furthermore, responses indicated that parents believed that 10 weeks was an appropriate length and scheduling sessions on a routine basis was helpful.

As expected, the focus group generated fewer suggestions for changes at this juncture. Some suggestions for change included having more example videos of strategies, providing an online forum for participants to discuss what did and did not work, and providing concise summary sheets of strategies for later referral. In addition, parents indicated several areas they felt the program did not address (e.g., dealing with problem behaviors in the school setting, including getting teacher feedback, and not knowing how to modify charts if the child did not understand the strategy). These recommendations were incorporated into the final revision.

When asked about the potential of using an online format to deliver BPT, parents indicated they believed it would be more difficult to engage with the program due to less interaction (between instructor as well as other parents), lack of child care, and worry that children would overhear the content. Nevertheless, they believed an online format would provide flexibility for multiple parents to complete sessions together or at different times during the week. Parents suggested a hybrid format where some sessions would be face-to-face and others online to get the benefits of interaction and the flexibility of an online format along with scheduling specific times when web sessions would need to be completed.

Step 4: Development and Refinement of Online Delivery Platform

The goal of developing the online program was to enhance parent access and engagement with BPT by adapting the revised PEAK program to Internet-delivered multimedia format. The revised face-to-face curriculum was converted to an online program through a collaborative process between a technology specialist and the project research team consisting of the principal investigators and advanced graduate students. In addition, a professor of instructional technology and a senior research scientist with specific experience in developing interactive Internet interventions were consulted during the development phase of the online program. Later, CDT members met on one occasion to view the initial online version of the parent education program and provide feedback to improve the web-based sessions and help make implementation with parents more successful.

In the online format, content was delivered via a session leader who presented the material using PowerPoint slides. Strategies were illustrated through video examples that were identical to those delivered in face-to-face sessions. In addition, parents were given check-in questions that requested information about strategies used (e.g., "Give one or two examples of how you set expectations for your child this past week," "What response strategy did you use this past week?") and assessed the extent to which parents implemented strategies taught the previous week (e.g., "In the last week, I was able to use a teaching strategy during my daily routine"). Weekly homework assignments were provided to practice strategies (e.g., "Use the preventative strategy that you picked for your plan at home this week," "This week, try to use your community behavior management plan").

Step 5: Implementation of Online Program With Family Cohort 3

The process of implementing and refining the online program followed a similar method to the implementation and refinement of the face-to-face program. A third cohort of eight families participated in pilot implementation of 10 online sessions over a 10- to 12-week period. Several families required an additional week or two to complete all sessions. Recruitment efforts were the same as for previous cohorts and included contacting local preschools, day care centers, and pediatrician offices and the use of social media. These efforts resulted in 38 families who indicated interest in participating. Of these families, eight met the inclusion criteria used for selection of participants for the prior two cohorts.

Advanced graduate students in school psychology or special education served as consultants for families in the online program across the 10 sessions. The consultants called the parents weekly to review the strategies presented during the most recently completed online session (i.e., to assess and promote treatment fidelity) and answer any specific questions participants had while completing the sessions. Measures collected for evaluation of the online program were the same as for the two face-to-face cohorts except that these were completed online (rather than in person) and included specific questions regarding the acceptability and feasibility of the online platform. The degree to which parents accessed and completed online modules was recorded electronically. Five parents also participated in a face-to-face focus group in which these same issues were discussed with investigators. As with Steps 2 and 3, notes were taken along with audiorecording and recommendations were discussed during a subsequent research meeting.

Results. Parents in Cohort 3 completed an average of 94.5% of online education sessions with 100% of parents completing at least half of the sessions. In addition, there was a change in mean behavioral percentage ratings on the CERS from pre- to posttreatment in multiple areas. For the Inattentive/Hyperactive subscale, ratings of behavioral problems decreased from pretest ($M = 96.33$) to posttest ($M = 85.86$). Ratings on the Defiance-Aggression subscale also decreased from pretest ($M = 87.63$) to posttest ($M = 81.24$). In addition, ratings on the Global Index: Restless-Impulsive subscale decreased from pretest ($M = 95.22$) to posttest ($M = 82.86$).

Mean parent acceptability ratings for program content and feasibility of recommended strategies ranged from 5.03 (session 5) to 5.32 (session 6) on a 6-point Likert-type scale. The mean total IRP-15 score was in the moderate range, 5.28 on a 7-point Likert-type scale. These scores indicated that, overall, parents found session content, prescribed strategies, and the ability to use session content acceptable.

During focus group discussion, parents indicated that, overall, they felt the PEAK program was helpful and they appreciated the flexibility of choosing when to complete sessions. A noted limitation was that because they completed sessions alone, they noted a lack of interaction with others to connect with and share ideas. In addition, a few technical issues were discussed (e.g., difficulty loading some slides, losing spot in session content if signed out), but these were decidedly minor. Furthermore, when asked about their reactions to having a facilitator calling to check in each week, parents thought it was helpful, but hard to find time to schedule check-in calls. Parents also reported they liked the honest dialogues with consultants and felt more comfortable speaking by phone than posting questions online. It should be noted that consultant support was varied based on parent need (e.g., just a check-in vs. more involved strategy review). Parents reported having more need for phone call discussions in the beginning of the program with less need as they became more comfortable. Overall, parents indicated the consultant check-ins helped keep them on track with session completion and treatment implementation. Last, when asked if they were offered a choice between an online or face-to-face program, only one family chose face-to-face (reportedly due to comfort); the others preferred the flexibility and review opportunities afforded by the online format.

Based on information obtained from this cohort, the online PEAK program was further refined, which primarily focused on addressing program glitches in the electronic program and expanding content and examples. For instance, videos were added to provide examples of how to address tantrums. In addition, more information regarding balanced attending with children of different ages was added, as parents requested this information in the follow-up feedback session. Finally, because some parents reported that siblings were confused about why some intervention procedures (e.g., reward system) were being used for children with ADHD, information was added to help parents explain ADHD and associated intervention strategies to their child's siblings.

Discussion

This article describes the successful implementation of an iterative treatment development and field-testing process for modifying an efficacious BPT program for ADHD while enhancing parent engagement with intervention. We demonstrated the utility of modifications to an iterative treatment development process implemented by Kern et al. (2011) for secondary school students with emotional and behavioral difficulties to address the needs of a different population (young children with ADHD) and setting (i.e., home rather than school). To promote parent engagement with intervention, we adapted a preexisting BPT program

by cutting time commitment for parents by 50% to a total of approximately 15 hr. The latter is lower than most BPT programs for children with ADHD (e.g., Bor, Sanders, & Markie-Dadds, 2002; Jones et al., 2007; Matos, Bauermeister, & Bernal, 2009; Sonuga-Barke, Daley, Thompson, Laver-Bradbury, & Weeks, 2001; Thompson et al., 2009; Webster-Stratton et al., 2011) that typically average approximately 20 to 25 hr of treatment.

Parent engagement with the PEAK program was strong as indicated by two primary measures. First, parent attendance at face-to-face PEAK sessions was uniformly high (on average, completed 80% of sessions) with nearly 75% of parents attending at least half of the program. This compares very favorably with attendance rates for prior studies with this population and is a substantial improvement over the 37% attendance rate for the 20-session version of this program used in prior studies (DuPaul, Kern, et al., 2013; Kern et al., 2007). In addition, session completion rates obtained in the current study are higher than those found in the Multimodal Treatment of ADHD (MTA) study (i.e., 63% for behavior therapy only; 61% for combined pharmacotherapy and behavior therapy; MTA Cooperative Group, 1999), as well as Strategies to Enhance Positive Parenting (STEPP) program (i.e., 77% attended, 52.6% from beginning to end of session; Chacko, Wymbs, Chimiklis, Wymbs, & Pelham, 2012), a BPT program designed specifically to enhance family treatment engagement. Furthermore, parent completion of online PEAK sessions was even higher (near 95%) with all parents completing at least half of the program; thus, conversion of PEAK to an online format achieved greater parent access as intended. One variable that might have contributed to high parent engagement was the contact and coaching provided between sessions. During focus groups, parents indicated the weekly check-ins were helpful. A substantial amount of research with teachers indicates that coaching increases implementation fidelity (Kretlow & Bartholomew, 2010). Additional research is needed to empirically evaluate the contribution of this component of the program and determine whether there are similar positive effects with parents.

As a second indicator of parent engagement with BPT, parents for both face-to-face and online formats rated the program as at least moderately acceptable and also reported recommended strategies to be acceptable and feasible. There appeared to be little difference in program and intervention acceptability between the two delivery formats. Although not uniformly reported across prior BPT studies, the obtained level of parent acceptability is commensurate with what prior investigative teams have found (e.g., Matos et al., 2009; Webster-Stratton et al., 2011).

Parents reported reductions in children's ADHD symptomatic behavior as well as defiance and aggression as a function of PEAK program participation with average reductions of between 1 to 2 standard deviations on CERS subscales. The magnitude of reductions is similar to what has been found in prior face-to-face (Rimestad et al., 2016) and online (Franke et al., 2016) BPT studies for preschoolers with ADHD, albeit posttreatment ratings were still in the clinical range for most children and there was interindividual variability regarding treatment effect size. It may be that longer-term use of behavioral strategies is needed to achieve additional reductions and families may require periodic booster support to maintain treatment fidelity.

Focus group discussions indicated that parents found the program to be helpful, worthwhile, and supportive with little difference in this perception between delivery format groups. Interestingly, parents who fully completed face-to-face sessions preferred that format relative to online delivery while the reverse was true for most parents who fully completed the online program. Future research should seek to identify family demographic and parent functioning variables that may predict preference and positive response for BPT delivery format.

Limitations

Conclusions based on this treatment development study are limited by several factors. First, the study was conducted with a relatively small sample from one geographic location, thus limiting external validity. Second, assessment relied heavily on parent report that may be subject to bias given that parents were the primary treatment agents. Third, some parents in the online group completed sessions in clusters due to scheduling issues and therefore may have had limited opportunity to practice prescribed intervention strategies between sessions. This limited practice may have precluded greater improvement in child behavior.

This study evaluated an innovative approach to the development of a behavioral intervention program with extensive parent involvement for young children with ADHD, albeit in the context of an uncontrolled investigation. As such, it is open to threats to internal validity regarding child behavior outcomes given the lack of randomization and a control group. Thus, we followed the final intervention development phase with a pilot randomized controlled trial of face-to-face versus online delivery of PEAK in a sample of 46 parents of young children with ADHD. Findings indicated statistically significant impact of both forms of treatment delivery (relative to a wait-list control condition) on parent knowledge of behavioral procedures, parent fidelity with prescribed strategies, and parent ratings of child hyperactive-impulsive behavior, self-regulation, and mood/affect (DuPaul et al., 2017). Parent engagement with BPT was high for both treatment conditions with session attendance/completion rates of 80% or greater. Few differences in outcomes were found between the two treatment conditions and both were deemed acceptable by parents. Thus, subject to further investigation with larger, more

socioeconomic and ethnically diverse samples, the PEAK program appears efficacious for addressing the behavioral challenges exhibited by young children with ADHD.

Recommendations for Practice, Policy, and Research

Findings from this treatment development study have important implications for practice, policy, and research. First, early childhood special educators need to be aware that young children exhibiting behaviors symptomatic of ADHD are likely to benefit from parent implementation of home-based behavioral interventions. Although parent-implemented strategies may not directly impact children's behavior in preschool settings, they can reduce challenging behaviors in home and community settings and also may alleviate parent stress related to those behaviors. Second, early childhood special educators should make families aware that BPT could be helpful and assist them in locating and gaining access to services in the community or online. Given the limited access that parents of young children with ADHD have to these services (Visser et al., 2016), it is critically important for educators to assist parents with this process. Third, if parents participate in BPT, educators can work with them to implement consistent behavioral strategies across home and preschool settings. Ongoing communication and supportive collaboration should increase the probability that children will experience clear expectations and contingencies that are similar across home and school.

Educators can also collaborate with mental health professionals to advocate for increased availability of and insurance coverage for BPT services. Unfortunately, there is a large gap between need for and availability of BPT in most communities outside large urban centers (Visser et al., 2016). Early childhood special educators could potentially fill some of this niche provided they receive training in BPT service provision. Dissemination of online BPT programs like PEAK may also address this gap in services.

Further research on BPT for young children with ADHD is necessary in several directions. Additional studies are needed to examine the relative effects of face-to-face and online delivery formats in the context of a randomized controlled trial with large, diverse samples that are representative of the general population. As mentioned previously, it would be helpful to identify variables that predict parent preference and engagement with specific delivery formats. Furthermore, it would be important to consider the type and amount of support parents may need in the context of online BPT (e.g., time on telephone to discuss strategies and trouble-shoot implementation challenges). Finally, the possible use of hybrid delivery formats that include a combination of face-to-face and online education should be considered, especially as a means to promote engagement with a therapist and other participating families.

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