SOJNR
Southern Online Journal of Nursing Research

Volume 9 – Number 4 www.snrs.org

Parent Involvement in Functional Assessment of Problem Behaviors Related to ADHD as a Basis for Intervention Selection

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Abstract

Background: Behavioral parent training (BPT) is a well-established, empirically validated treatment for children with attention deficit hyperactivity disorder (ADHD). Interventions focus on teaching parents how to identify and modify environmental factors that may be maintaining their child's problem behavior. Recent literature suggests that assessment of behavior function as a basis for intervention selection, tailored to the individual child, improves treatment effectiveness.

Objectives: To evaluate the efficacy of in-home functional behavior assessment of problem behaviors associated with ADHD as a basis for intervention selection on parent and child behaviors, and parenting self-efficacy.

Study Design: Three children and their mothers participated in the study. Single-subject experimentation methods were used to assess the reinforcement function of problem child behaviors and evaluate intervention effects. Frequency counts of parent and child behavior were obtained from videotaped sessions during assessment and intervention phases. The data were analyzed for each mother-child dyad using graphs and visual analyses.

Results: The FBA clearly identified a maintaining function for problem child behavior and positive intervention effects were demonstrated on parent and child behaviors, as well as parenting self-efficacy, for two of the three mother and child participants.

Conclusion: Parent involvement in home-based functional behavior assessment and intervention design was effective and valued by two participating families. The findings support and extend previous research and have clinical implications for mental health nurses who plan and implement interventions for families of children with ADHD.

Introduction

Attention deficit hyperactivity disorder (ADHD) is a prevalent, chronic, pervasive childhood disorder characterized by developmentally inappropriate levels of activity, frustration tolerance, impulse control, organizational skills, attention span, concentration, and distractibility.[1] In addition to the core symptoms of ADHD, a significant proportion of children with ADHD display secondary or co-morbid behavior difficulties that adversely affect interpersonal relationships with family and peers, as well as academic achievement.[2] ADHD is also highly comorbid with the other disruptive behavior disorders, oppositional defiant disorder (ODD) and conduct disorder (CD), both of which are predictive of persisting, serious problems in adolescence and adulthood.[3-6] Parents of children with ADHD report higher levels of stress in their role as parents and a diminished sense of parenting competence.[7]

Theoretical Framework and Key Concepts

Defining Self-Efficacy and Its Theoretical Origins

Self-efficacy, a key component of Bandura's social-cognitive theory, refers to a person's sense of mastery in performing specific tasks required to attain desired outcomes.[8] According to self-efficacy theory, a person's beliefs in their capabilities affect their problem-solving facility and how much stress and frustration they experience in demanding situations, as well as their motivation to persevere in the face of adversity. Over the past 20 years, a number of researchers have examined self-efficacy beliefs in the context of parenting and how they affect disciplinary style, satisfaction with the parenting role, and child treatment outcomes.[9-11] Parenting self-efficacy beliefs refer to a parent's expectations of the degree to which he or she is able to perform competently and effectively as a parent. Low parenting self-efficacy has been shown to correlate strongly with ineffective and coercive discipline practices, high levels of parental stress and depression, and poor child treatment outcomes, in particular, among parents of children with ADHD and co-morbid behavior disorders.[12-15]

Self-Efficacy and Parent Training

Parent training approaches to child management, based on behavioral social learning theory, are designed to teach parents how to identify and modify those aspects of the child's social environmental that contribute to, maintain and exacerbate problem behavior.[16,17] Most behavioral parent training (BPT)

programs do not specifically address parents' cognitions about their ADHD children and parenting. However, while literature demonstrates low parenting sense of competence predicts poor treatment outcome, BPT has also been found to enhance the self-efficacy beliefs for parents of children with ADHD.[18-20] In view of the empirical and theoretical support for the critical role of parenting self-efficacy beliefs, further research is clearly needed to address BPT components that are most likely to enhance self-efficacy in the parental domain when parents experience a lack of personal self-efficacy as related to their parental role.

According to the tenets of self-efficacy theory, as outlined by Bandura,[21] positive self-efficacy beliefs develop through experiences in performing task behaviors successfully, observing others succeed through sustained effort, and building self-confidence in the capacity to succeed. BPT formats that actively involve parents in the therapeutic process and structure opportunities for success in parent-child interactions following skills instruction have been shown to enhance parenting self-efficacy beliefs and child treatment outcomes.[18,22] Hence, existing BPT literature emphasizes partnership with parents in assessment and intervention design, and training components that include modeling, role-play and practicing of skills, and supportive feedback, with the goal of increasing parenting competencies and perceptions.

Behavioral Treatment of ADHD

Parent Training Interventions

The current treatment approach for ADHD, based on a large evidence base and reflected in clinical practice guidelines, is that a combination of stimulant medication and behavioral intervention is the optimal treatment package for ADHD.[23-29] Empirically validated behavioral treatments for ADHD include parent training and classroom interventions with the common goal of modifying environmental factors that may be maintaining problem child behavior. Behavioral parent training (BPT) has a long established history as a cost-effective treatment for teaching parents how to identify and manipulate the antecedents and consequences of child behavior, target problematic behavior, reward desirable behavior through praise, positive attention and tangible rewards, and decreased undesirable behavior through planned ignoring, time out, and other nonphysical discipline techniques. Current BPT formats typically involve 8 to 12 group or individual sessions with a therapist, utilize treatment manuals, and emphasize a collaborative approach that includes active parental involvement.[16,30,31] Overall, BPT studies consistently report improvements for children with ADHD, in several important areas, most notably parent ratings of child behavior, observed negative parent-child behaviors, and parents' perceptions of stress and competence in their parenting role.[18,30]

Despite the substantial, convincing evidence base supporting the efficacy of BPT for ADHD, not all families of children with ADHD benefit equally from BPT, and

there is a great deal of variability in effectiveness for individual children.[18] While group-based BPT may be more cost-effective and provide opportunities for social support from other group members, findings of meta-analytic reviews of BPT studies suggest that individualizing BPT design to match parent/child characteristics increases positive outcomes with socially disadvantaged families (e.g., low income, less educated, single parent), mothers with depressive symptoms, and families of children with more severe behavior problems.[22,32] Most published BPT research to date has been limited to between-group designs, which fail to address individual differences in ADHD symptoms and comorbid behavior problems, as well as individual responses to BPT interventions.[31,33]

Functional Behavior Assessment

Over the past two decades, researchers have pursued an assessment methodology called functional behavioral assessment (FBA) that identifies the reinforcement function of problem behavior as a basis for prescribing interventions tailored to the individual child.[34,35] Specifically, FBA procedures identify the conditions that are associated with the occurrence of problem behavior (antecedents) and the events that result from occurrences of the behavior (consequences) that reinforce it.[36] Identifying the maintaining antecedent and consequences conditions for problem behavior allows for the development of interventions that discontinue reinforcement of the behavior and teach the child alternative responses that serve the same or similar functions. A substantial experimental literature exists supporting the efficacy of FBA for designing effective intervention programs for individuals with developmental disabilities in clinical settings.[37,38] Although, comparatively less, there is growing empirical support for the efficacy of FBA with typically developing children that includes children with ADHD and comorbid behavior disorders. [39-43]

Parent Involvement in Behavior Assessment and Intervention

To date, most FBA research targeting typically developing children, including children with ADHD-related behavior problems, has been confined to clinical or school settings, largely related to the high degree of control afforded by these environments.[44] Further, research on FBA and interventions has relied primarily on the use of trained clinicians as therapists, with family involvement favored but restricted to the initial phases of problem identification.[45] Although most BPT protocols teach parents how to identify and modify environmental events associated with problem behavior, this research has primarily focused on skills acquisition, not intervention design that is linked to the results of FBA. A study conducted by McNeil, Watson, Henington, and Meeks[46] involved parents in both FBA and BPT intervention design with positive treatment effects but was clinic-based, limited to children with disabilities, lacked methodological clarity, and did not evaluate generalization to the home setting.

Current literature emphasizes partnership with parents in FBA and BPT protocols, as well individualized intervention plans, yet applications of FBA to home settings with parents involved in linking assessment information to intervention design are lacking. Such collaboration between parents and clinicians may enhance the effectiveness and efficiency of BPT for families of children with ADHD who are more likely to benefit from individualized treatment. This study addresses knowledge gaps pertaining to parent involvement in FBA and intervention design for ADHD-related problem behavior. The purpose of the study was to evaluate the efficacy of in-home FBA of problem behaviors associated with ADHD as a basis for intervention selection on parent and child behaviors, and parenting self-efficacy.

Methods

Participants

The research protocol was approved the university's Institutional Review Board. Mothers of three children with ADHD were recruited through a child psychiatrist in a community-based practice. Parental informed consent and child assent were obtained for each family. Mothers were a) primary caregivers who had resided with the child on a continual basis for 12 months or longer b) able to read at the 9th grade level, and c) not experiencing any sensory or intellectual deficit, or acute psychiatric disorder. Child participants were a) between 7 and 8 years of age, b) diagnosed with ADHD according to *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR) criteria,[1] c) on stimulant medication, d) exceeded established cut off scores for a disruptive behavior disorder on the Eyberg Child Behavior Inventory (ECBI),[47,48] and e) were not experiencing any sensory impairment, language delay, pervasive developmental disorder, intellectual deficit, or psychosis. A brief description of each mother-child dyad follows. For reasons of confidentiality, pseudonyms are used rather than actual child names.

Corey

Corey, a Caucasian male, was 8 years, 3 months old when enrolled in the study and diagnosed with ADHD and ODD. He was in third grade, in a regular educational placement, with no academic concerns reported despite problems completing homework in the evenings. His mother, recently separated, was employed in a temporary, full-time position as an officer bookkeeper. His father lived close by and had weekly visitation that varied according to his work schedule as a law enforcement officer. Corey had four siblings, two, aged 15 and 16, from his mother's first marriage and two, aged 6 and 8 years old, from her second marriage.

According to his mother, Corey's problem behaviors at home consisted of refusal to follow commands or directions regarding routine activities (e.g., getting dressed in the morning, cleaning up his room, going to bed) and homework, and

getting off task. Noncompliant behaviors were characterized as talking back and repeatedly making excuses, with a progression to tantrums (e.g., yelling, crying, throwing things, dropping to the floor, leaving the room) when the Julie persisted with a request or demand. Off task behaviors included looking around, fiddling with task material, or engaging in a preferred activity. These behaviors were reported to occur daily with a high degree of frequency in the morning, while making preparations for school, and in the evening when mother returned from work. Corey's medications included Concerta 36 mg. q a.m. and Tenex 0.5 mg. at 4 p.m., which his mother indicated helped subdue his activity level to some degree but did not make him more focused or compliant with chores or homework.

Christina

Christina, a Caucasian female, was 7 years, 3 months of age and diagnosed with ADHD, ODD, and obsessive compulsive disorder (OCD). She was in second grade, in a regular educational placement, and although not experiencing academic difficulties, behavior problems had resulted in several suspensions. She lived with her mother, father, a 4 year old sister, and her paternal grandmother. Her mother was not employed outside the home and her father worked two jobs, night shift as a correctional office and part-time days at a plant nursery. Cristina's mother described her behavior problems at home as disrespectful back talk, temper tantrums, and destructiveness when she was asked to do something (e.g., a chore, homework), denied a request (e.g., told "no"), or reprimanded for her behavior. She also fought with her younger sister over toys and according to her mother bullied and physically hurt her. These behaviors were more likely to occur when mother interrupted her to do something while engaged in a preferred activity and tended to escalate when mother threatened to spank her or take something away (e.g., play items, plans for an outing). Tantrums included laughing, spitting, whining, crying, destroying play or task material, and running out of the house. Her mother stated that some days were worse than others, which she attributed to mood swings unaffected by events in the household. Efforts to discipline her consisted of repeated reprimands and warnings, and when these were not effective, spanking on the bottom over the knee.

Cristina had recently been discharged from an inpatient child psychiatric facility prior to her enrollment in the study. Her mother stated this admission was precipitated by a tantrum in the car with her parents in which she had become "hysterical", chewing and swallowing a mouth full of crickets used for fishing tackle, laughing hysterically, and attempting to open the door and jump out of the vehicle. This was Christina's first admission to an inpatient setting and lasted seven days. Cristina's medications included Adderall, 20 mg. at 7:30 a.m. and 12 noon, Adderall 10 mg. at 4 p.m., Tenex 1 mg. q a.m. and 4 p.m., Depakote 250 mg. q a.m. and h.s., and Risperdal .25 mg. h.s. The Depakote and Risperdal had recently been added during her hospitalization. Her mother indicated the

medications reduced the severity of her mood swings but behavior problems persisted.

Jordie

Jordie, an African American male, was 7 years, one month old and diagnosed with ADHD and ODD. He lived with his mother, who was 6 months pregnant, and his 4 year old brother. His mother was employed in a full-time basis in a clerical position. His father lived out of state and was not in contact with Jordie or his mother. Jordie was enrolled in a regular second grade class but his academic progress was hindered by ongoing behavior problems requiring frequent removal from the classroom and school suspensions. He attended an after school program at the Boy's and Girl's Club, where he was described as frequently defiant and aggressive with staff and other children.

Jordie's mother indicated noncompliant and aggressive behaviors were her primary concerns at home. Noncompliance consisted of refusal to initiate or complete a request and refusing to accept "no", responding with "smart talk" (e.g., calling her names, stating "you're going to kill me"). Aggression included throwing or breaking things, hitting or biting his mother or younger brother, and running out of the room or the house. Mother described these behaviors as "constant", occurring daily, but more intense and severe in the evening when she returned from work. She indicated that efforts to ignore her son's back talk and persist with a request or refusal were usually not effective and frequently resulted in warnings that she would "get the belt" and then spankings.

Jordie had recently been discharged from an inpatient child psychiatric facility prior to his enrollment in the study and had one 3-day admission during the course of the research project, between the FBA assessment and pre-treatment baseline sessions, following a school incident. Both admissions occurred following incidents at school in which Jordie became aggressive toward his teacher, striking and biting her, and then attempted to leave the school grounds. Jordie was maintained on Depakote ER 750 mg. at bedtime throughout his participation in the study. His mother indicated that stimulant medication had been tried before, resulting in loss of appetite, insomnia, and dramatic mood swings in the evening, and although his psychiatrist highly recommended a trial of antipsychotic medication, she was not agreeable to this alternative.

Setting and Materials

The FBA and BPT sessions were conducted in the participants' homes, in a room that facilitated uninterrupted interactions between the PI, parent and child (e.g., no television) and allowed videotaping to occur in an unobtrusive area. The materials employed were specific to each child participant and included items and activities which the child enjoyed at home such as art work, toys, hand held

video games, and word puzzles, as well as homework assignments provided by the child's teacher.

Dependent Variable Measurement

Dependent variable measures in the study were parent and child behaviors, parenting self-efficacy, and treatment acceptability. These measures and their properties are summarized in Table 1. Direct observation and measurement of three to four target behaviors for each parent and child participant were conducted under the FBA conditions, pre- and post-BPT interventions, and at follow-up (1- and 3-mo). These behaviors were identified during pre-assessment interviews with parents and operationally defined for observation purposes. Table 2 provides operational definitions for target parent and child behaviors. Commands, critical statements and labeled praise were observed and measured for each mother. Additionally, unlabeled praise and positive affect were measured for Christina's and Jordie's mother, respectively, but not Corey's mother. Similarly, appropriate and inappropriate behaviors were measured for each child participant but off-task behavior was observed for Corey and Christina only, and aggressive behavior for only Jordie.

The observational data was collected from videotaped segments of in-home sessions using a 10-sec partial interval-recording procedure in which a target behavior was recorded as having occurred if it was observed for any part of the interval. The videotaping was conducted using a miniature video-camcorder unobtrusively placed on a on a tripod in the corner of the room. The PI and a research assistant, who was blind to the assessment and intervention conditions, independently coded the data. Interobserver agreement (IOA) was collected for 36% of all sessions and calculated by dividing the sum of agreements by disagreements and multiplying by 100. IOA agreements for frequency counts of target parent and child behaviors averaged 93% across all sessions.

In addition to direct observation measurement, two well-established instruments, the Achenbach Child Behavior Checklist (CBCL) and ECBI, measured parents' perceptions of child problem behavior pre- and post-BPT interventions.[49,50] On the CBCL, only the Externalizing Behaviors and Total Behavior Problem scores were used; on the ECBI both the Intensity and Total Problem scores were used (see Table 1). The Parenting Sense of Competence Scale (PSOCS)[51] was used to evaluate parents' satisfaction and sense of competence in their parenting role. Parents completed the Treatment Acceptability Rating Form-Revised (TARF-F)[52] following BPT interventions.

Research Design: Description and Rationale for Using Single-Subject Experimentation

Single-subject experimental (SSE) methods, derived from the discipline of applied behavior analysis, were used in this study. Key features of SSE designs

are the introduction and manipulation of an independent variable under controlled conditions, and repeated (continuous) measurement of target behaviors.[53] This experimental design has an extended tradition in applied and clinical behavioral research and is the methodology of choice when the purpose of the study is to establish the efficacy of new interventions, characteristics of individual participants vary widely, and/or representative sampling of individual behaviors is difficult to achieve.[54-56] A fundamental assumption guiding SSE research is that because behavior occurs at the level of the individual, the study of human behavior should have as its goal the understanding of the individual's interactions within his or her environment.[57] When that is accomplished, the question of generalizing empirical findings from one or a few individuals to a larger group can be addressed by replicating across participants.

Although SSE designs are sometimes referred to as "small-N research", it should be noted that the designation *single subject* does not imply only one participant participates in the study; it simply means that all data collection and analysis are conducted on the data from individual participants.[58] Instead of comparing one participant's pre-post difference to that of another, as in the control group design, SSE designs use the participant's behavioral baseline as his or her own control and compares measures of the participant's behavior during the baseline period to measures of behavior following one or more intervention phases. Data are collected continuously by directly observing the target behaviors throughout baseline and intervention conditions. If behavior improves in an intervention period relative to baseline, one may conclude that the individual benefited from the intervention. SSE design are a good fit for initial efficacy studies because they examine whether a specific intervention has a clear replicable effect on a focal behavior, allow individualization of interventions across participants, measure changes at multiple time points, and require fewer resources than clinical trials.[56]

The FBA of problem behavior in this study used a multielement design, which involves a rapid alternation of experimental conditions within a relatively short period of time. This SSE design is most commonly used with FBA because it is an efficient way to separate out and assess the effects of several potential sources of reinforcement, or experimental conditions (e.g., attention [parental], escape from tasks [homework], tangible [access to play materials]), on child behavior.[37] Rates of behavior observed during these experimental conditions are compared to those during a control or free play condition to determine which test conditions is associated with the highest rate of problem behavior, relative to the others. In this study a brief 90-min FBA format was used.[59]

The effects of BPT interventions were evaluated using a baseline-treatment or AB design, characterized by repeated measures of behavior both prior to and following each intervention and at follow-up. This SSE design was used because it does not require reversal or withholding an intervention to demonstrate experimental control, allows for individualization of interventions across

participants, and measures intervention effects at multiple time points, enabling careful analysis of intervention effects for each participant.[54,56]

Data Collection and Procedures

The Principal Investigator (PI), a Clinical Nurse Specialist in psychiatric/mental health nursing with extensive experience in the assessment and treatment of ADHD, implemented the FBA and BPT protocol. The data collection sequence for the FBA and BPT are depicted in Figure 1. After parental consent and child assent was obtained, an assessment interview based extensively on the Functional Analysis Interview Form developed by O'Neill, Horner, Albin, Storey, & Sprague[60] was conducted to solicit information about situations in which problem behavior occurred (e.g., request to complete chores, completing homework). The protocol included questions to identify preferred toys or activities and age-appropriate homework assignments for the FBA. Parents also completed the CBCL, ECBI, and PSOCS instruments at this time. The brief FBA was divided into four 10-min test conditions and two 5-min replication conditions with a 5-min break in between. FBA sessions were videotaped and then coded to record frequency data on the occurrence or nonoccurrence of target parent and child behaviors.

The BPT interventions were developed in collaboration with each parent participant, based on the reinforcement functions of problem behavior identified in the FBA. Before introducing the interventions, baseline data (12-min) was obtained with the parent and child under the same FBA condition that yielded the highest rate of problem behavior (e.g., seated work). The BPT data collection sequence and intervention implementation are summarized in Figure 1. Parents implemented each intervention for 2 weeks respectively with home visits scheduled during intervening weeks to review progress and troubleshoot. In keeping with a collaborative model, parents were encouraged to suggest ways in which they might adapt the intervention to the particular circumstances of their home setting and the child's temperament to be more effective. Videotaped parent and child behavior data was collected (12-min) at each in-home visit during BPT and at 1- and 3-mo follow-up (maintenance). The CBCL, ECBI, and PSOCS were also administered to collect secondary data regarding child behaviors and parenting self-efficacy at these times.

Results

The purpose of the study was to evaluate the efficacy of in-home functional assessment of problem behaviors related to ADHD as a basis for BPT intervention selection. All three mother and child participants completed the entire 8- to 10-week in home FBA and BPT protocol; Jordie and his mother were not available for follow-up observations and measurement due to withdrawal from the study after Child and Family Services became involved with the family.

Visual analysis is an integral part of SSE methodology; hence, behavior frequency data were graphed for visual inspection.[61] The FBA yielded clinically relevant findings that were then incorporated into intervention design for the BPT. Further, examination of videotapes and graphed data throughout the BPT made it possible for the mothers to see effects of specific intervention components on their own behavior as well as child responses. This information is not clearly ascertained when examining results of group statistical analysis.

Figures 2-5 presents the results of the functional assessment and intervention implementation for Cory and his mother. These graphs were chosen as examples to illustrate graphed data obtained from the FBA and BPT of each mother-child dyad. Definitions of parent and child behaviors were previously presented (Table 2). As the bar graphs show in Figure 2 - 3, frequency rates for parental commands and critical statements were highest for Corey's mother during the escape condition when he was asked to complete a writing assignment, and lowest during the free play condition. In a corresponding pattern, levels of inappropriate and off task behavior were highest for Corey during the escape condition and lowest during free play. These findings indicated that the reinforcement function of problem behavior for Corey was avoidance or escape from academic demands.

Interventions developed in collaboration with Corey's mother, based on the results of the FBA, included lowering the aversiveness of task directives issued by his mother, attention breaks contingent on appropriate, on-task behavior, and reinforcement of on-task behavior with labeled praise. Figure 4-5 displays mother and child behaviors during baseline, following intervention implementation and at follow-up. The graphed data demonstrates that as the interventions were introduced, parental commands decreased progressively while critical comments were virtually eliminated after the first intervention. Praise on the other hand increased incrementally and remained relatively high at follow-up. The interventions were also associated with an incremental increase in appropriate child behavior by Corey, while levels of inappropriate behavior decreased considerably after the first intervention was introduced and remained low.

The results of the FBA for the other two mother-child dyads, unlike those of Corey and his mother, indicated that inappropriate child behavior was most strongly maintained by parental attention. Escape from assigned tasks, while secondary, was also associated with undesirable behavior. The interventions for Christina and her mother focused on the increasing amount and quality of praise, as well as issuing more effective commands, with positive treatment effects for both Christina and her mother. Interventions for Jordie and his mother emphasized demonstrations of positive affect and attending skills with only minimal positive changes observed in Jordie's mother and an escalation in noncompliant and aggressive behaviors on the part of the Jordie.

Parents' ratings of child behavior on the CBCL and ECBI, employed as secondary measures of BPT effectiveness, were consistent with direct observation measures in demonstrating improvements for Corey and Christina, but not for Jordie. Parenting self-efficacy, as measured by the PSOCS, was low for Corey and Christina's mother prior to BPT but increased considerably; in contrast, Jordie's mother reported higher levels of parenting satisfaction and self-efficacy than either mother before BPT and these scores did not change significantly after treatment. Similarly, Corey and Christina's mothers rated treatment acceptability as high on the TARF-R, whereas Jordie's mother's ratings were relatively low.

Discussion

In this study mothers were active participants in conducting a home-based FBA as a basis for intervention selection for ADHD-related problem behaviors, which they successfully implemented with their children. The FBA clearly identified a maintaining function for problem behavior for the three child participants and positive intervention effects were observed for two of the three mother and child participants that were maintained at 1- and 3-mo follow-up.

The results of the study offer support for the efficacy of functional assessment-based interventions for ADHD- related problem behaviors, in the home setting, with parental involvement. Since most FBA studies involving typically developing children, to date, have been conducted in clinical or school settings by trained clinicians, this home-based application extends previous research on FBA and suggests possible directions for future work. Further, the findings support the potential benefit of intervention implementation that is linked to the results of BFA in the natural context that problem behaviors occur, with parents assuming responsibility for intervention. The approach of collaborating with the parents to develop and implement interventions based on the reinforcement function of problem behavior in this study is consistent with best practice themes in the positive behavioral support and BPT literature.[18,45]

The FBA yielded several noteworthy observations. Graphed data indicated that Corey's disruptive behavior was primarily maintained by escape from seated academic work, while access to parental attention was more reinforcing for Christina and Jordie. Not surprisingly, all three mothers issued higher rates of commands and critical statements, relative to other conditions, during the escape and attention conditions in which problem behaviors occurred most frequently. Most significant was the virtual absence of positive attention in the form of praise provided by parent participants when child behavior was appropriate. These findings concur with previous research that has shown that when parents of children with ADHD experience persistent problem controlling their child's behavior, they often become more directive and negative in their parenting style.[18,19,29] This tendency is exacerbated when comorbid ODD is present as was the case for each participant in this study.

Given the dramatic improvements in parent and child behavior following BPT for Corey and Christina, the failure to observe positive treatment effects for Jordie and his mother is significant and warrants comment. Both Corey and Christina's mothers were highly receptive to assessment feedback and acknowledged a need to modify their approach to child behavior if desired changes were going to occur. Also, although both mothers admitted they were frustrated and lacked patience with their children, both indicated that positive parent-child interactions continued to occur on a daily basis in the home and both expressed favorable expectations regarding potential treatment effects. It is likely that these attitudes enhanced their investment in the treatment process and contributed to its effectiveness. Jordie's mother, on the other hand, had difficulty accepting that her interaction style could be having undesirable effect and held fast to her belief that Jordie's behavior was motivated by a desire to "taunt" her and that he derived satisfaction from making her angry. She also stated that she felt emotionally alienated from her son due to the chronic and severe nature of his behavior problems and voiced skepticism that changing her approach with her son could have a desired effect. Her reluctance to accept that she may in part be contributing to the maintenance and exacerbation of her child's behavior problems made it difficult to engage her in the intervention development process and may have contributed to the poor treatment outcome. It may also be that her level of stress and the multiple demands in her life contributed to her difficulty becoming fully engaged and resolute in her efforts during the treatment phase of the study. Since the needs of this family clearly exceeded the scope of the study, a referral was made to Children and Family Services for additional assistance and support.

Another interesting difference in the parent data before and after BPT was evident in the PSOC scores, which evaluated each parent's sense of satisfaction and competence in the role of parent. Corey and Christina's pre-treatment scores were considerably lower than Jordie's mother and this was consistent with their expressions of frustration and disempowerment in not being able to manage their child's behavior effectively. In contrast, Jordie's mother's scores reflected a higher level of parenting self-esteem, which was reflected in her assertions that she was a knowledgeable and effective disciplinarian. She sustained a firm belief that her parenting practices were not a contributing factor in maintaining her son's noncompliance and aggression and referred to his behavior problems at school and in the after school program as evidence of this. Her confidence in her parenting practices may have made it difficult for her to be receptive to feedback from the PI during the assessment summary session. Further, her belief that she was not responsible for her son's behavior problems could certainly have diminished her investment in the intervention component of the study. Conversely, Corey and Christina's self-disclosure of lack of satisfaction and efficacy may have contributed to their increased receptivity to investigator information and suggestions and their proactive involvement in intervention development. Their PSOC scores at follow-up indicated a significant

improvement in parenting satisfaction and efficacy while Jordie's mother's scores did not change.

Treatment acceptability ratings indicated that the intervention procedures were highly approved of by Corey and Christina's mothers but Jordie's mother's ratings were less positive. Follow-up research with parents has shown that treatment acceptability influences whether or not people continue to use an intervention; high treatment acceptance predicts that long-term continuation is more likely.[62] Thus, the high acceptability ratings obtained from Corey and Christina's mothers in the study suggests that these parents would continue to use the assessment-based interventions to reinforce appropriate behavior over the long term. Jordie's mother's low acceptability ratings, on the contrary, offer further evidence that the interventions were not compatible with the family's needs.

Implications for Practice

Parents raising children with ADHD report higher levels of stress in their role as parents and a diminished sense of parenting competence.[7] The assessment-based intervention protocol used in this study actively engaged the mothers as co-therapists in a nonblaming, reciprocal relationship and structured opportunities for positive parent-child interactions in a setting the mother and child were familiar with. The mothers were coached on how to implement the interventions using instruction, modeling, role-play and feedback. Mother and child behaviors were videotaped and coded data was examined on an ongoing basis so that the mothers were able to see the changes in their behavior and their child's as they occurred. The positive treatment outcomes, including increased parenting self-efficacy, for two of three mothers in this study, build on existing BPT literature and provide support for self-efficacy theory in the context of parenting.[18,22] Further consideration of this approach in future BPT research is clearly warranted, using a larger sample and between-group designs.

Limitations

Although well suited to initial efficacy studies such as this one, the SSE design is limited by the small number of participants, compromising generalizability of results, and yields little information on comparative outcomes of alternative interventions and what proportion of children with ADHD would benefit. Multiple SSE studies by independent researchers would be necessary to confirm the efficacy of in-home FBA as a basis for intervention selection for children with ADHD. Also, although maintenance effects were evaluated at 3-months follow-up for two of the families, the study did not provide information on long-term outcomes of the interventions. Finally, the absence of father involvement raises questions regarding potential differences in assessment data and intervention effects.

Implications for Practice

While preliminary, the results of this study have clinical implications for mental health nurses who plan and implement interventions for families of children with ADHD and other behavior disorders. Assessment and intervention in the home setting may be the preferred and/or most appropriate modality for some families. Advanced practice nurses are well qualified to work collaboratively with families to assess the reinforcement function of their child's problem behaviors and design interventions that specifically address the environmental conditions (e.g., task demands, parent attention) that are maintaining these behaviors. Barriers to participation in BPT such as scheduling, transportation, disability, child involvement, and resistance may be mitigated when the nurse visits the family in the home and actively engages the parents to participate. An individualized assessment-based intervention protocol such as the one used in this study has the potential to enhance treatment adherence and improve outcomes that are durable for some families of children with ADHD.

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Table 1

Measurement of Dependent Variables: Parent and Child behaviors, Parenting Self-Efficacy, Social Validity

Measures	Properties of measures
Measures of parent & child behaviors	
Observations of parent-child interactions	Videotaped FBA & BPT sessions; frequency counts of target parent

(Videotaped FBA & BPT sessions)	and child behaviors
Achenbach Child Behavior Checklist (CBCL)[49]	118 items, 3-point scale; age-standardized T-scores for externalizing behaviors and total behavior problem used
Eyberg Child Behavior Inventory (ECBI)[50]	36 items, 7-point scale; age standardized T-scores for intensity and total behavior problems used
Measurement of parenting self-efficacy	
Parenting Sense of Self-Efficacy Scale (PSOC)[51]	17 items, 6-point scale; higher scores reflect greater parenting self-esteem
Measurement of treatment acceptability	
Treatment Acceptability Rating Form- Revised (TARF-R)[52]	20 items, 7-point scale; higher ratings represent greater acceptability of treatment

Table 2

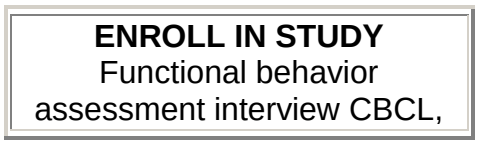
Operational Definitions for Parent and Child Behaviors

Behavior	Operational Definition
	Parent
Command	A direct order in the imperative structure, not a question, which specifies the child behavior and in which the parent is visually oriented toward the child (e.g., “Do this math problem”)
Critical statement	Any statement of disapproval of the child’s attributes, activities, or choices (e.g., “You’re making a mess”)
Unlabelled Praise	A verbalization that contains evaluative words or phrases but does not indicate a

	specific behavior, activity, or product of the child (e.g., Good girl).
Labeled praise	Verbalizations that express a favorable evaluation of a specific behavior, activity, or product of the child (e.g., “I like it when you pick up your stuff”).
Positive affect	Nonverbal positive behaviors directed toward the child (e.g., a smile, hug).
	Child
Appropriate behavior	On-task behaviors, including reading (silent or oral), speaking at a conversationally normal volume, following parental directions within 5-sec, making eye contact with t he parent, working on assigned tasks, and asking questions relevant to the task or directions.
Off task behavior	Low intensity behavior such as looking away from the task (daydreaming) or playing with task materials or other objects.
Inappropriate behavior	Noncompliant or disruptive behavior, including vocalizing louder than conversational speech, whining, crying, yelling, or tantrums, actively refusing to perform the assigned task, asking questions irrelevant to the task directions, and attempting to leave the room.
Aggressive behavior	Aggression toward others including verbally threatening harm to others, throwing objects at others, pushing others with flat hand, kicking by swinging one or both legs back, and pushing others with closed fist.

Figure 1

Data Collection Sequence



ECBI, & PSOC completed by parents Videotaped baseline sessions until stable

FUNCTIONAL BEHAVIOR ASSESSMENT (FBA)

Instructions to parents

4 FBA conditions (10-min) 2 Replication conditions (5-min)

- Free play – Child has access to play materials& interactions with parent, no demands are placed on child.
- Escape – Parent asks child to complete academic seatwork or chore independently; contingent on occurrence of inappropriate/off-task behavior, parent removes material, turns away from child until behavior ceases, then returns it with request to get back to work.
- Attention – Child asked to sit & wait quietly while parent does something, e.g., writing a shopping list; parent ignores appropriate behavior but contingent on inappropriate behavior, provides a disapproving comment (reprimand) until behavior stops.
- Tangible – Child again asked to wait while parent does something but this time parent places a favorite item (e.g., hand-held video game) in sight; when disruptive behavior occurs, parents gives child play item until behavior stops& then removes it.
- Replication – Conditions associated with highest & lowest rates of disruptive behavior repeated.

BEHAVIORAL PARENT TRAINING (BPT)

Review results of FBA with parents

Interventions (3) developed based on FBA

Videotaped baseline sessions until stable

- Demonstration & narration of intervention with child by PI
- Role play practice with parent and PI in role of child
- Parent implements interventions 1, 2, 3 sequentially x 2 weeks each
- Home visits weekly to address problems with intervention implementation, provide feedback & guidance to parent
- Parent completes CBCL, ECBI, PSOC and TARF-R after BPT
- Follow-up at 1- and 3-mo (maintenance)

Figure 2

Results of Functional Behavior Assessment for Corey's Mother

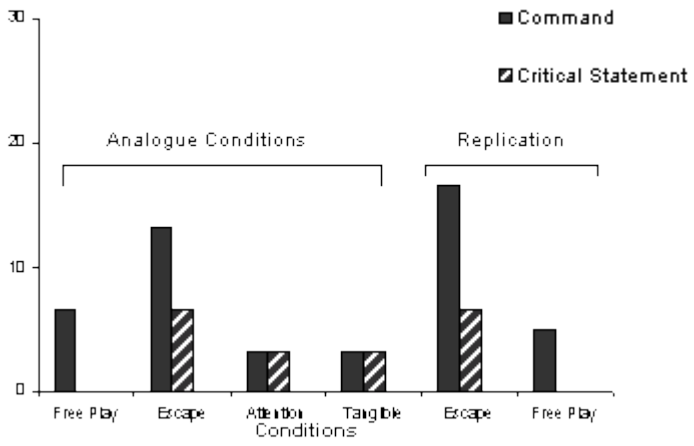


Figure 3

Results of Functional Behavior Assessment for Corey

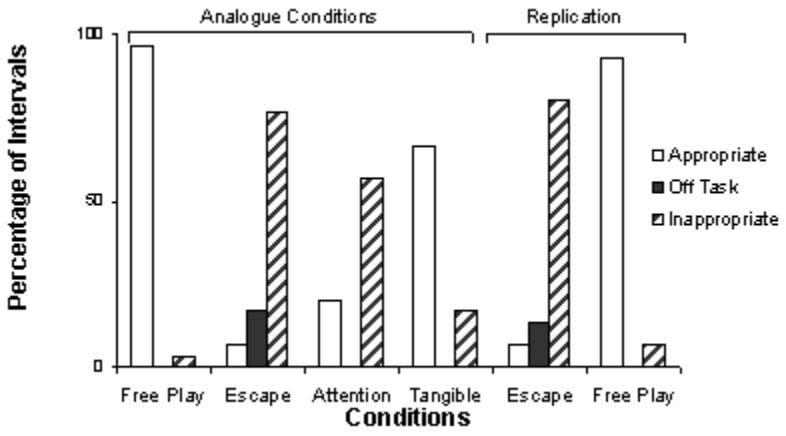


Figure 4

BPT Intervention Effects for Corey's Mother

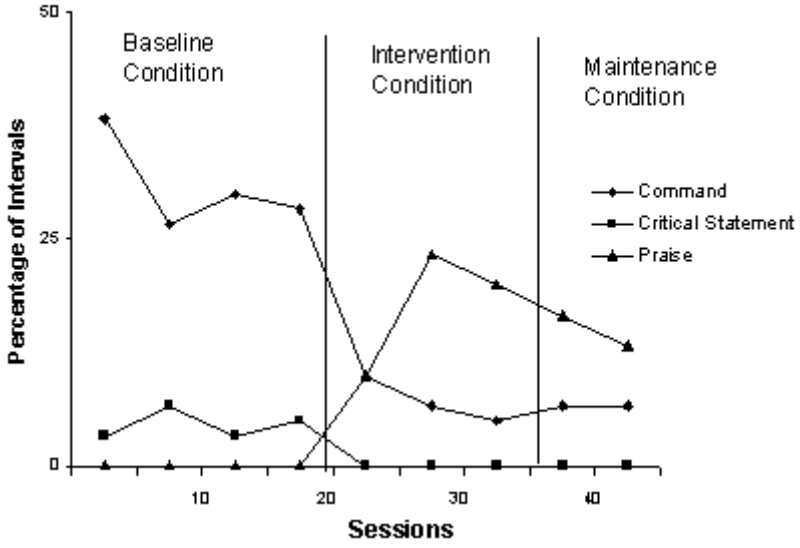
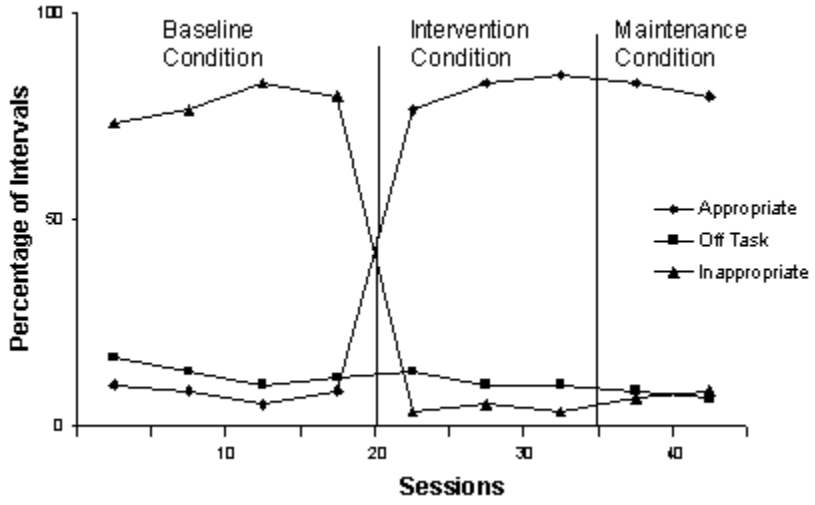


Figure 5

BPT Intervention Effects for Corey


Baseline Condition
Intervention Condition
Maintenance Condition
Percentage of Intervals
100
50
0
10
20
30
40
Sessions
Appropriate
Off Task
Inappropriate