

## Research Article

# Collaborating with Parents in Reducing Children's Challenging Behaviors: Linking Functional Assessment to Intervention

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The relationship between a functional assessment-based parent intervention and preschoolers' challenging behaviors was examined in the current study. A single subject design with a multiple baseline across 2 parent-child dyads was implemented. The researchers collaborated with parents to design the FA-based interventions and parents received varying levels of support throughout the study. Results indicate that parents were able to implement the functional assessment-based interventions, and these interventions effectively reduced children's challenging behaviors. In addition, parents continued implementing the intervention strategies following termination of the intervention, and children's challenging behaviors remained low.

## 1. Introduction

Challenging behavior has been defined as any behavior that interferes with children's learning and development, is harmful to children and to others, and puts a child at high risk for later social problems or school failure [1, 2]. Challenging behaviors can be a source of great frustration to teachers, parents, and other caregivers. Early in life challenging behavior is developmentally appropriate, and all children continue to engage in it periodically as they mature. However, some children rely on challenging behavior as a way to get their needs met [2]. Such children may need individualized interventions.

Survey data have suggested that the prevalence of challenging behaviors in young children is about 10% and may be as high as 25% for children from low-income families [3]. Preschoolers with challenging behavior are three times more likely to be expelled from programs than children in grades K-12 [4]. For an estimated 3 to 15 percent of preschool-age children, aggressive and antisocial behavior continues well beyond age 3 [5], and about half of these children are starting down a path that will eventually lead to delinquency and a criminal path in adolescence and adulthood [6]. Thus, the

longer a child continues to use aggressive behavior, the more worrisome it becomes and the more difficult it is to change the behavior. It is therefore important to intervene as early as possible.

While teachers have reported that children's disruptive behavior problems are the biggest challenges they face, these challenges also occur in home settings. In a qualitative study conducted by Fox et al. [7], families reported that problem behaviors invariably impact the family system, routines, and activities. This finding supports the systems perspective which views child and family problems as a result of interrelated family situations rather than a single environmental variable [8]. Given that families may play a role in both shaping and maintaining problem behavior, it seems intuitive that behavior problems should be evaluated in the context of parent-child interactions [9].

Involving parents in designing interventions to treat young children's challenging behaviors seems logical. The family is a child's most valuable resource and it exerts the most powerful influence on a child's development [10]. Parents are experts on their children and about their family's culture and ecology. Parents have unique knowledge about family goals and values, daily and weekly routines, resources and

social supports. Furthermore, children's challenging behaviors influence the quality of interactions with parents and siblings. With the appropriate information and strategies, caregivers can play a pivotal role in helping children with challenging behaviors become more engaged with the environment, learn new skills, and become more independent.

A highly effective intervention approach is one in which the interventionist identifies routines or activities that are difficult for the parent and child and supports the parent in developing new skills or implementing strategies that reduce the child's problem behavior. While involving parents in the intervention process, natural environments such as home and community settings are optimal locations for intervention [11]. Such settings allow the interventionist to observe and analyze complex factors that can affect children's behavior. Intervention approaches should be family centered and focus on improving parents' capacity to read the child's social and emotional cues and facilitate the development of self-regulatory behavior, emotional expression, and problem solving.

Functional assessment-based interventions have been reported to be effective in reducing young children's aggression by changing the establishing operations for the behavior [12]. The purpose of functional assessment is to improve the effectiveness and efficiency of behavioral treatments. Functional Assessment (FA) refers to a set of procedures that are used to explain the relationships between physiological or environmental events and problem behaviors. FA uses interviews, observations, and analysis to define the topography, frequency, and duration of problem behaviors. Through FA, the antecedent events that occur before challenging behaviors and the consequences that maintain the behaviors are identified [13].

In order to design interventions to reduce young children's challenging behaviors several factors must be taken into consideration. Parents are valuable team members whom researchers need to collaborate with to design effective interventions aimed at reducing challenging behaviors. Furthermore, FA, which provides information on the relationships between physiological or environmental events and problem behaviors, can offer beneficial information and assist in the design of effective interventions. FA is a process that can suggest strategies for redesigning environments to improve implementation and adherence by parents [14].

The approach of collaborating with families to implement behavioral interventions using FA is consistent with recommended practice. Previous studies reveal that parent implemented FA-based interventions result in reduced frequencies of challenging behavior by children and increased positive behavioral outcomes (e.g., [15–17]). These results suggest that parent training can facilitate young children's behavior change and reduce undesirable behaviors.

However, rigorous investigations of the relationship between FA-based parent interventions and children's challenging behaviors are rare. One of the advantages of FA-based parent training is that parent involvement is supported and essential. For example, aside from parents implementing the strategies, FA requires parents to participate in interviews and to interact with their children in order for researchers

to gather information regarding the function(s) of their children's challenging behavior. Vaughn et al. [17] and Galensky et al. [18] involved parents in conducting FA and assisting in functional analyses. For example, Vaughn et al. designed an intervention based on a detailed interview with one parent participant and several observations of the 8-year-old boy with a severe disability in the context of two family routines. Similarly, Galensky et al. utilized information gathered from the functional assessment to design mealtime behavior interventions for 3 children between the ages of 2 and 6. While the parents provided information through FA, neither of these studies included parents as partners in designing interventions. With this limited parent involvement, these researchers could not fully consider family routines and values to ensure that the interventions were suitable for the families. This could be a plausible explanation for the inconsistent behavior change realized by some child participants in the studies.

The amount of training and support provided in implementing an intervention may contribute to the efficacy of outcomes realized. For example, Lucyshyn et al. [19] demonstrated intervention strategies for parents by using direct training with the children; modeling of interventions for parents; coaching parents in the use of interventions; engaging in problem-solving discussions, behavioral rehearsal, self-monitoring, and self-evaluation; and fading of support. These procedures involved a more intense training protocol than simply providing prompts and feedback when parents interacted with their children. Lucyshyn et al. noted a functional relationship between implementation of family support and training and socially valid reductions in both total problem behaviors as well as a more intense subset of disruptive and destructive behaviors.

Several methodological limitations exist in studies that focused on parents as interventionists in reducing their children's challenging behaviors. Since parents were the primary intervention agents for their children's problem behavior in studies of this nature, improvements in children's behavior can be assumed to be related to parent behavior. Unfortunately, researchers have noted that treatment integrity is a major limitation of parent training programs (e.g., [18, 19]). For example, Galensky et al. scored 25% of each participant's baseline and treatment sessions for the occurrence of treatment components. All parents were inconsistent in implementing the treatment components. Furthermore, several relevant studies did not report parent data across phases [15, 17, 19, 20]. Parent and child behavior maintenance after the termination of intervention also remains under-investigated. While Marcus et al. [16] reported maintenance data which demonstrated that parents and children were able to maintain positive behaviors after the intervention was terminated, other studies [19, 20] did not include data that supports this result. Other methodological issues, such as treatment fidelity when researchers were training parents on the FA-based interventions and inter-observer reliability on the dependent variables, remain to be investigated.

The purpose of this study was to examine the effectiveness of parent-implemented FA-based interventions in

reducing young children’s challenging behavior. This study extends previous research by addressing the following re-research questions: to what extent are parents able to effectively implement a FA-based intervention, to what extent do parent-implemented interventions derived from FA effectively reduce children’s challenging behaviors, and to what extent are parents able to maintain implementation of the newly learned strategies after completion of the intervention?

**2. Method**

*2.1. Participants and Setting.* Bobbie (pseudonyms are used to ensure anonymity) was 3 years and 5 months old at the start of the study. While no diagnosis was given to Bobbie, he attended a public school for children who are at risk for developmental delays. Bobbie’s mother, who has a Bachelor’s degree in child development, was a single parent and the foster parent for Bobbie and his older sister since they were infants. Bobbie’s mother was concerned about his behavior during transitions, especially the transition to start his nightly bedtime routine. When Bobbie was asked to stop an activity and get ready for bed, he screamed, kicked, hit, and refused to follow through with the directions given. While his mother often gave warnings before a transition by setting a timer, she did not consistently follow through with the routine (e.g., sometimes she would start the routine before the timer went off). Bobbie’s mother often tried to redirect Bobbie when his behavior escalated by skipping components of the bedtime routine such as brushing his teeth and changing his clothes into his pajamas prior to putting him in bed.

Annie (pseudonyms are used to ensure anonymity) was 4 years and 4 months old at the start of this study. She attended a full-time childcare program in town. Annie’s father had a Ph.D. degree in English and worked at a university, and her mother was completing a Ph.D. degree in education. Annie did not have any developmental disabilities, however her parents were concerned about Annie’s challenging behaviors during her nightly bedtime routine. Annie always wanted one of her parents to lay down with her in order to go to sleep. Annie’s parents often honored her requests and laid down with Annie until she fell asleep. However, when Annie’s parents did this, Annie would engage in extended conversations with them instead of going to sleep. If the parents refused to lay down with her, Annie whined and cried for up to 3 hours. Annie often got out of bed to play with toys in her room and sometimes left her room to find her parents. Annie’s parents were concerned about their lack of a consistent bedtime routine for Annie and the fact that she often would not fall asleep until midnight.

This study was conducted in the home settings where participants spent large portions of each day. The parents identified the time of day that their children exhibited challenging behavior on a routine basis. The time identified by the parents served as the context throughout the study. All sessions in which parents interacted with their children during this predetermined routine were videotaped for the purposes of coding and designing interventions.

TABLE 1: Bobbie’s identified challenging behaviors.

Challenging behaviors	Exclude
Cry	Bobbie had a habit of making hiccup sounds that sounded like crying
Kick	
Pinch	
Running away from mother to another room when refusing to follow directions	When running towards where he needed to be (e.g., if mother says let’s go into your room, and he ran into the room)
Hit	
Scream, yell, cry, shake head, “no” or “stop” to refuse to follow request/directions	When saying “no” when asked a yes or no question
Threatens or says destructive things (e.g., “I am going to hit you,” or “I am throwing this away”)	
After mother says good night and leaves the room (out of view of camera), child leaves the room	

*2.2. Design and Measures*

*2.2.1. Study Design.* Single-subject methodology was used in this study. A multiple baseline design [21] across 2 parent-child dyads was selected to investigate behavior change and to control for threats to internal validity between the dependent and independent variables, thus increasing the ability to draw causal inferences.

*2.2.2. Dependent Variables.* Information on outcome measures is presented in Tables 1 to 4. Tables 1 and 3 include child behaviors that were described as challenging by the parents through a functional assessment interview conducted using the *Functional Assessment Interview Form* made available by the Center on the Social and Emotional Foundations for Early Learning [22] and baseline observations using the *Home Observation Card*[23]. Tables 2 and 4 include a list of functional assessment-indicated parent strategies and a list of functional assessment contraindicated parent strategies. Parent positive strategies are defined as strategies derived from the FA (FA-Indicated Strategies). Parent negative strategies (FA-Contraindicated Strategies) are strategies identified during baseline observations, which were deemed ineffective in addressing children’s challenging behaviors.

*2.2.3. Data Collection.* After the first participant, Bobbie, exhibited a stable level of challenging behaviors during the identified routine (6 sessions in baseline), the researcher began parent intervention with Bobbie’s mother while the second child participant, Annie, remained in baseline. After

TABLE 2: Functional assessment indicated and contraindicated strategies for Bobbie's mother.

FA-indicated strategies	FA-contraindicated strategies
Set timer as warning before transition	Did not set timer before transition
Start transition after timer goes off	Start transition before timer goes off
Clean up or activity served as closer to activity (clean up room and toys, turn off timer, turn off tv, etc.)	No clean up or closure to activity
Refer child to picture schedule	No picture schedule
Put on pajamas	Did not put on pajamas
Brush Teeth	No brushing teeth before going to bed
Potty	No potty
Offer child drink of water (above 4 can be done in any order)	Mother did not ask Bobbie if he needed water or child did not take a drink of water before bedtime
Read 2 books	Read less than 2 books
Sing Twinkle Twinkle song	Did not sing Twinkle Twinkle
Music on	No music
Turn off overhead light, say good night and leave Bobbie's room	Left overhead light on
Praise at least once throughout the transition and bedtime routine	No praise throughout the transition and bedtime routine

Bobbie exhibited a stable, low level of challenging behavior in the intervention phase, the researcher began intervention with Annie (10 sessions in baseline). The intervention phase was terminated after session 15 for both participants (9 intervention sessions for Bobbie and 5 for Annie) when both parent and child behaviors were stable.

The length of time for each data collection session was based on parents' identification of times when their children exhibited the highest level of challenging behaviors (e.g., a 30-minute bedtime routine). The researcher wrote field notes immediately after each session; however, the primary data were gathered from videotapes. Partial interval recording, with fifteen-second intervals, was used to code discrete child behaviors (e.g., aggression, demands, and parents' responses to appropriate and inappropriate child behaviors). Parent data were gathered using an occurrence/nonoccurrence checklist to identify behaviors that parents performed (i.e., see left hand column of Tables 2 and 4).

Due to the complexity in determining the dependent variables, all baseline dependent measures were coded after both child and parent behaviors were identified following the completion of the baseline phase for each participating dyad. For both the intervention and maintenance phases, the dependent measures were coded immediately following each session.

### 2.3. Experimental Conditions

**2.3.1. Prebaseline.** An FA was conducted to identify the events in each child's environment that predicted and maintained the challenging behaviors. The researcher completed the parent interview at the participants' homes with the parents. (Interviews were conducted with Bobbie's mother and both of Annie's parents). Each interview lasted approximately 1 hour. The interview was audio-taped to allow the researcher to accurately capture all necessary information. The interview was conducted prior to baseline rather than during the baseline phase to prevent the parents' behavior from being affected by the interview. During the interview the parents discussed their experiences with their children, and behaviors they perceived as problematic. The researcher and the parents together identified each child's target behaviors based on the parents' concerns and the data collected during interviews.

**2.3.2. Baseline.** Following the parent interviews, observations were made of both child participants in their homes during the routines identified by the parents as those in which the children exhibited a high frequency of challenging behaviors. During this phase, parents were asked to interact with their children as they normally did during the routine they selected as being most problematic. The *Home Observation Card* was used to record challenging behaviors, as well as the predictors, consequences, and perceived functions of these behaviors.

**2.3.3. FA Hypothesis and Parent Interventions.** Following the completion of the FA interview and baseline observations (6 sessions for Bobbie and 10 sessions for Annie), data (FA interview, observational data, and videotapes) were reviewed by the researcher and the parents to discuss what triggered and maintained the children's challenging behaviors; possible hypotheses about the function of children's behaviors were generated. The researcher met with the parents for about one hour each and collaboratively generated strategies suitable for the parents to implement to help reduce the children's challenging behavior. A parent training checklist for the purpose of accurately providing the parents with appropriate materials and strategies was created. Training handouts and materials were then created in parent-friendly formats.

Based on the data gathered, the function of Bobbie's challenging behavior was likely to be escaping from bedtime routine (behavioral hypothesis). To address his challenging behaviors, a set of parent-implemented strategies was created to ensure consistency in Bobbie's bedtime routine. These strategies were developed collaboratively between the parent and the researchers. These strategies included providing a visual warning (timer) in preparation for transition to bedtime, using a visual schedule to guide the bedtime routine, and ensuring that all strategies were followed consistently each evening.

Based on the data gathered, the function of Annie's challenging behavior was likely to be gaining access to parent's physical attention (behavioral hypothesis). Parent

TABLE 3: Annie’s identified challenging behaviors.

Challenging behaviors	Exceptions
Out of bed to (i) Play with toys (ii) Get books (Counts as out of bed when one of her feet was not on the bed)	Out of bed to fix blanket, pick up a toy or book that dropped from her bed
Out of room to find mother/father or to see what other members in the family are doing	To use the restroom
Talking to mother/father (i) Carrying on a conversation with parents after parents said good night and left the room (parents were not in Annie’s room but in their room next door to Annie’s) (ii) Talking to the parent who comes back into the room to check on her (iii) Talking to parent who decides to lay down for a little while with her after saying good night (Interval counts as child engaging in challenging behavior when the parent is responding to child’s conversation)	Request that she needs to use the bathroom Talking to self, to her stuffed animals, or reading to self when parents provide reassurance (see Table 4)
Whine and/or cry to request that mother and father be with her because she cannot fall asleep on her own	Mumbles to her stuffed animal that sounds like whining

TABLE 4: Functional assessment indicated and contra-indicated strategies for Annie’s parents.

FA indicated	FA contraindicated
State expectations (i) Stay in bed (ii) No whining (iii) I am next door	Did not state expectations
Water available for child right by bed	No water by bed for child
Overhead light out, lamp on	Overhead light on or no night lamp on
Music on	No music or stories playing on tape recorder
Leave room after saying good night	Laid down with her in room (or return to room) after saying good night to her When child whines
When child whines (i) Reassure that mother/father right next door, she needs to try to go to sleep	(i) Go into room (ii) Agree to stay in room with child (iii) Having a conversation with child

strategies identified to address Annie’s challenging behaviors were stating clear bedtime expectations, providing access to items such as a cup for water to eliminate the need to request parent attention after completing her bedtime routine and offering verbal affirmation without providing access to physical attention.

2.3.4. *Intervention.* At the beginning of the intervention phase, the researcher worked collaboratively with Annie and Bobbie’s parents to design strategies indicated by the

FA process. Information was compiled into parent friendly, step-by-step procedures as to when and how to intervene when challenging behaviors occurred. Written protocols and handouts were used to share strategies with parents. At the end of training, the parents and the researcher generated examples of when and what challenging behaviors the children might exhibit. The researcher and the parents discussed how to interact with the children if the challenging behaviors occurred. Parent training sessions lasted approximately 30 minutes each, and the sessions were videotaped for the purpose of gathering fidelity data.

Since training sessions were conducted immediately before target routines, parents were asked to apply the strategies right after training. The researcher coached parents at this time. Some of the coaching strategies used were affirming parent behavior, modeling a specific strategy, suggesting a specific strategy to use, and providing feedback at the end of the session. Coaching was gradually faded during the intervention phase. Coaching during the targeted routine was terminated by the second to last intervention session for Annie and by the third to last intervention session for Bobbie (i.e., brief feedback was provided at the end of each session prior to thanking the parents and leaving). Parents were provided with feedback at the end of each session using positive reinforcement and suggestions, reviewing video clips of child behavior, and showing parents their graphed data.

The first two sessions after parent training also served as hypothesis testing sessions. At the end of the second session, if the child’s challenging behaviors did not decrease, the FA interview, baseline observation videos, and strategies were reviewed to determine other possible hypotheses or to consider additional strategies. Annie’s challenging behaviors decreased significantly after the first two sessions of the intervention phase; thus, no strategy changes were needed. While

Bobbie's challenging behaviors lessened when compared to the baseline phase, a change was made to his routine based on his mother's suggestion (the addition of music at bedtime) in order to decrease challenging behaviors further.

The length of intervention varied for each child participant depending upon the time needed for the parents to consistently use the FA-indicated strategies and for children's challenging behaviors to decrease and become stable. Parents' behaviors were considered stable when their level of implementing FA-indicated strategies maintained at a consistent level (with 25% difference) for three consecutive sessions.

**2.3.5. Follow-up.** Four weeks after terminating all support, data were collected across dependent measures for four sessions across two weeks. Following each videotaped maintenance session, verbal feedback was provided and parents were shown their own and their child's graphed data. Bobbie's and Annie's parents were given a \$50 Walmart gift card following completion of the fourth maintenance session.

**2.3.6. Parent Interview.** Following the last session of the maintenance phase, parent interviews were conducted by the researcher to gather information regarding parents' perceptions of the intervention. Furthermore, the parents were asked to provide feedback and suggestions regarding the study. Annie's parents were interviewed together while Bobbie's mother was interviewed alone.

**2.4. Interrater Reliability.** To assess inter-rater reliability, all sessions were videotaped, and a second observer coded 23% of the tapes. The reliability tapes were randomly selected across phases (9 sessions total: 4 baseline, 4 intervention, and 1 maintenance). The 9 reliability tapes were balanced across participants: 4 for Bobbie and 5 for Annie. A graduate student in early childhood special education was trained by the researcher to code parent and child behaviors. This student was trained using videos of Bobbie and Annie that were not selected as part of the reliability tapes. During training, the researcher and student reached a criterion of 90% reliability on all behaviors. Inter-rater reliability on randomly selected tapes was 97% for Bobbie's challenging behavior (range: 95.5–98.1%) and 97.9% for Bobbie's mother's FA-Indicated behaviors (range: 91–100%). Reliability for Annie was 98.2% (range: 94.2–100%) and 100% for Annie's parents' FA-Indicated behaviors.

**2.5. Fidelity of Treatment.** To assess fidelity of treatment, the second author conducted fidelity checks to ensure that the researcher followed the parent training procedures aforementioned. Treatment fidelity checklists were developed for each parent training session to insure procedural integrity of the trainings. All three training tapes reviewed. The treatment verification data were 95.4% (21 of 22 items) for Bobbie's mother and 96.4% and 89.2% (27 and 25 out of 28 items) for Annie's parents. These treatment verification data averaged 93.7% across the parents.

### 3. Results

The results provided insightful answers to the three research questions posed in this study. Means and ranges for child and parent behaviors in each phase are presented in Table 5. Data are represented graphically for children and their parents in Figure 1.

**3.1. Parent Behavior.** During baseline, the level of FA-Indicated behaviors was moderate for Bobbie's mother ( $M = 41\%$  of strategies; range, 23–53.8%) and low for Annie's parents ( $M = 17.7\%$  of strategies; range, 0–40%). During the intervention phase, the levels of FA-Indicated behaviors increased dramatically for both sets of parents (Bobbie's mother  $M = 97.4\%$  of strategies; range, 92.3–100%; Annie's parents  $M = 93.3\%$  of strategies; range, 83.3–100%). During three intervention sessions, Bobbie's mother did not perform one of the FA-Indicated behaviors. Two of these sessions were the first two sessions of the intervention phase when the researcher and mother were still modifying Bobbie's bedtime routine. During two intervention sessions, Annie's parents did not perform one of the FA-Indicated behaviors. Both Bobbie's and Annie's parents had several sessions in which they performed all FA-Indicated behaviors (6 of 9 sessions for Bobbie's mother and 3 of 5 sessions for Annie's parents). Coaching was discontinued at the 7th intervention session for Bobbie's mother and at the 4th intervention session for Annie's parents. All parents continued to perform FA-Indicated behaviors above baseline levels after coaching was terminated.

**3.2. Child Behavior.** During baseline, the level of challenging behavior was moderate and accelerating for both Bobbie ( $M = 31.5\%$  of intervals; range, 13.7–48.9%) and Annie ( $M = 35.8\%$  of intervals; range, 11.1–62.8%). During intervention, the level of challenging behavior decreased for both Bobbie ( $M = 6.8\%$  of intervals; range 0–20.2%) and Annie ( $M = 11\%$  of intervals; range, 0–19.3%). During the intervention phase, Bobbie's challenging behaviors gradually decreased during the first three sessions and then remained low for the remainder of the phase. Beginning with the third intervention session, Bobbie's challenging behavior reduced to below 10% and remained there throughout the rest of the intervention phase. (This could be due to the fact that additional changes were made to Bobbie's bedtime routine following the first two sessions of the intervention phase (e.g., having music on to fall asleep)). Bobbie's bedtime routine and schedule were finalized prior to the third intervention session. While Annie's challenging behavior during intervention did not stabilize at the low levels observed for Bobbie, most of her sessions revealed levels of challenging behavior below those observed during baseline. Both children had one session with no challenging behaviors during the intervention phase.

**3.3. Follow-up.** As shown in Figure 1, the parents' FA-indicated behaviors remained high across the four maintenance sessions. Bobbie's mother implemented all FA-indicated strategies in the first three maintenance sessions.

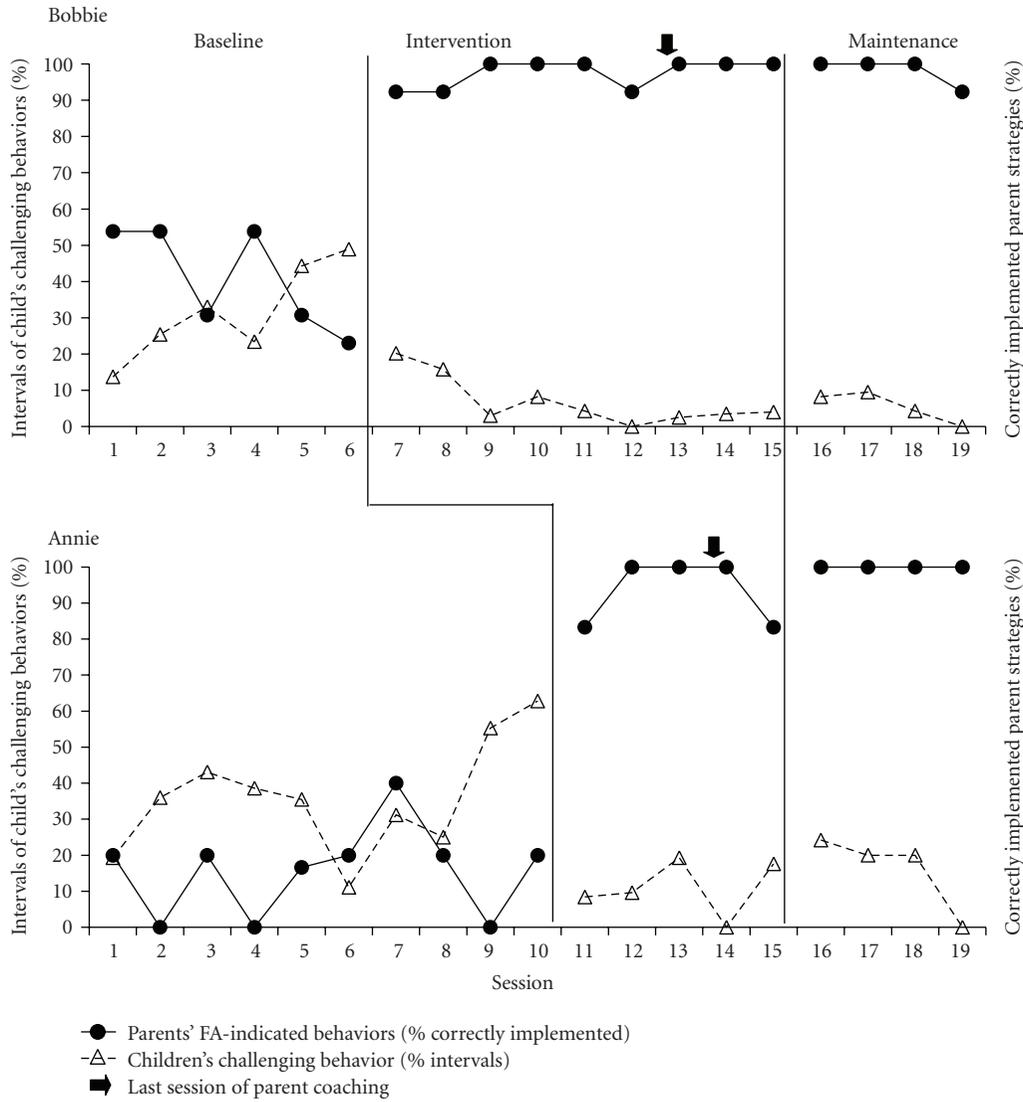


FIGURE 1: Children and parent behaviors.

TABLE 5: Means and ranges for participants' behaviors.

CHILD	(Number of sessions per phase)	% Intervals of challenging behaviors (mean (range))	% FA-indicated strategies performed (mean (range))
		Bobbie	
Bobbie	Baseline (6)	31.5 (13.7–48.9)	41 (23–53.8)
	Intervention (9)	6.8 (0–20.2)	97.4 (92.3–100)
	Maintenance (4)	5.5 (0–9.5)	98.1 (92.3–100)
		Annie	
Annie	Baseline (10)	35.8 (11.1–62.8)	17.7 (0–40)
	Intervention (5)	11 (0–19.3)	93.3 (83.3–100)
	Maintenance (4)	19.5 (0–24.3)	100 (100–100)

During the last maintenance session, Bobbie's mother did not have to refer Bobbie to the picture schedule as he independently performed his bedtime routine without prompts. Thus, while the data indicate that the mother did not achieve 100% during this session, it was appropriate to omit the picture schedule strategy given Bobbie's independent behavior. Annie's parents implemented all FA-indicated strategies during the four maintenance sessions.

Both children's level of challenging behavior during the maintenance phase reflected levels close to those observed during the intervention phase. Bobbie's behaviors ( $M = 5.5$ ; range, 0–9.5%) remained low and under 10% of intervals for all four maintenance sessions, with no challenging behaviors observed during the last session. Annie's behaviors ( $M = 19.5$ ; range, 0–24.3%) remained lower than baseline, with no challenging behaviors observed in the last session as well.

#### 4. Discussion

This study was designed to extend the literature on working with parents to reduce their children's challenging behaviors. The major gaps identified in the literature included limited evidence of FA, minimal parent collaboration in designing interventions, and infrequent parent outcome data. In addition, much of the current literature does not include maintenance data on parent and child behaviors. Results of the current study indicate that parents were able to effectively implement an FA-based intervention and the parent-implemented interventions derived from FA effectively reduced children's challenging behaviors (see Figure 1). For both child participants, their challenging behaviors were inversely related to their parents' implementation of FA-indicated strategies. The results indicate that when parents implemented FA-indicated strategies, children's challenging behaviors decreased and remained low throughout the intervention phase. Contrary to previous studies, which reported unstable child outcome data (e.g., [15, 16, 18]), the results of this study demonstrate consistently low levels of challenging behavior following parent training. These results provide strong support for a causal relationship between parent-implemented strategies and a reduction in children's challenging behaviors.

The current study also extends previous research through the inclusion of systematic parent training and support. Contrary to previous studies, which varied in reporting the level of parent training on strategies and supporting parents throughout the intervention phase (e.g., [17, 19]), in the current study, parent training was systematic, and coaching and support were provided during and after intervention sessions. During one of the intervention sessions, Bobbie's mother shared that the coaching and support made her feel more confident and competent. Thus, with minimal support provided during training (approximately 1 hour) and feedback given throughout most of the study (approximately 5–10 minutes following most sessions), parents were able to implement FA-based interventions that resulted in child behavior changes. The procedures were based on changing many antecedents as well as using some consequence

strategies such as descriptive feedback. By structuring the antecedents, child behavior changed dramatically and the amount of time parents spent in routines (i.e., transition and bed time) was reduced. Additionally, parents did not need to implement all of the antecedents once challenging behaviors decreased (i.e., using the visual schedule with Bobbie).

The maintenance outcomes observed in the current study parallel findings described by Koegel et al. [20] and Marcus et al. [16]. Decreasing and maintaining low rates of challenging behaviors can be attributed to parents' continuous use of FA-indicated strategies. For example, Bobbie's mother did not have to direct his attention to the picture schedule at the end of the study because Bobbie had learned his bedtime routine and needed less prompting and support. Furthermore, anecdotal information revealed that Bobbie's desirable behaviors during his bedtime routine transferred to new situations. Bobbie's mother also reported that her son whined less throughout the day because their routines were now more consistent and she provided him with warnings more often.

Annie's parents maintained their use of FA-indicated strategies during the maintenance phase at 100%, and Annie's behaviors remained fairly low throughout the phase. Annie engaged in no challenging behavior during the final session of the study. Annie's mother was pleased with the results of the study and stated:

The study forced us to think about our practices and behaviors and routines. Having this study validated to me that it's okay for me to tell Annie to go to bed. She is in preschool all day and it's really hard to say to her "it's bedtime, go to bed." I want to spend time with her.

Annie's parents also reported that since Annie's bedtime routine had become more consistent, she was now waking up happier and whining less often.

The positive outcomes of this study can be attributed to the process of collaborating with parents throughout the investigation. When parents were involved in both designing and implementing interventions, children's challenging behaviors were reduced to low levels. This further extends previous research of this nature. For example, Harding et al. [15] did not involve parents in the process of designing the interventions and reported that their treatment was ineffective for one of two child participants. Similarly, Galensky et al. [18] did not involve parents in designing interventions and reported that their intervention was only effective for 2 of 3 child participants. As stated in Allen and Warzak [14], parents may not adhere to recommended strategies because of factors such as generalizability and social acceptability. When parents play a role in designing interventions, these issues that directly relate to parent adherence to the interventions are more likely to be addressed. The current study supports collaborating with parents to design interventions that match a family's needs, values, and child-rearing philosophy.

*Limitations.* This study has a few limitations, including the fact that only 2 parent-child dyads participated. Additional dyads would allow the researchers to draw stronger causal inferences between the independent and the dependent variables. Since both families were Caucasian and both mothers had backgrounds in child development, these demographic factors limit the generalizability of the study. A more diverse population might yield different results. Also, the generalizability toward children with disabilities is unclear due to the fact that neither child participant had a diagnosed disability.

One of the criteria of single subject methodology is to code target behaviors after each session and prior to the start of next session [21]. The design of this study did not enable the researchers to code baseline data immediately after each session. Unlike previous research, which identified the dependent variables through FA and functional analysis prior to beginning baseline (e.g., [24, 25]), in the current study baseline data were used to ensure accurate identification of the dependent variables. This is not consistent with typical single subject studies. Finally, as the intervention was a combination of several parent-implemented strategies, it is impossible to determine if any one strategy (i.e., praise, transition warnings, or routine consistency) used in isolation would have effected changes in child behavior.

*Implications for Future Research.* Several factors need to be considered when conducting home-based parent implemented intervention research in the future. Greater diversity of participants might yield better generalizability. Researchers also must consider the complexity of family values and routines in designing home-based interventions [26]. While a specific strategy might have much research and evidence to support its effectiveness, parents might be unwilling to implement the strategy due to their child rearing values and philosophy. The complexity of defining and coding target behaviors also needs to be addressed. While challenging behaviors have been studied for many years, targeting parent behaviors as the primary dependent variable has not been systematically studied. Identifying parent behaviors prior to intervention that are considered “FA-indicated and not FA-indicated” can be challenging. This requires extensive observation of parent-child dyads to determine what is considered FA-indicated and not FA-indicated. Finally, studying parent behaviors that are linked with child outcomes is worthy of further investigation.

*Implications for Practice.* The results of this study provide promising implications for parents as well as practitioners who work with young children with challenging behaviors. Parent involvement with their children with challenging behaviors is critical. Since parents spend a significant amount of time with their children, collaborating with parents to design interventions is a promising approach to help reduce children’s challenging behaviors. The importance of linking FA data to interventions cannot be ignored. FA, which focuses on the identification of variables that influence the occurrence of problem behaviors, is needed to guide

parents and practitioners in determining what strategies might be most effective in addressing children’s challenging behaviors. At the present time, functional assessment is not systematically used when designing interventions to reduce young children’s challenging behaviors [18]. Data from this study successfully demonstrate the positive effects of linking functional assessment information with parent-implemented strategies.

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