COMPARING THE EFFECTS OF HOME VERSUS CLINIC-BASED PARENT TRAINING FOR CHILDREN WITH AUTISM

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Research with parents on managing child problem behavior typically measures either child or parent behavior. This study was designed to evaluate the effectiveness of training parents to implement a function-based behavior intervention plan (BIP) in a non-trained natural environment utilizing a Multiple Probe Design across Participants. Participants included four parent-child dyads. Measurement variables included parents’ use of effective and ineffective strategies and child problem behavior. Intervention involved training parents to understand and implement the BIP using effective strategies, modeling the effective procedures, and providing feedback following parent implementation of procedures. Results showed that the intervention was very effective in promoting skill generalization of parents and decreasing child problem behavior. The findings have implications for research and clinical practice.
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THE EFFECTIVENESS OF TRAINING PARENTS TO CHANGE THEIR BEHAVIOR TO REDUCE THE EFFECT OF PARENT TRAINING ON SKILL GENERALIZATION DESIGNED TO DECREASE THE PROBLEM BEHAVIORS OF CHILDREN WITH AUTISM

Introduction

Autism is a developmental disorder that presents many challenges to parents as well as teachers, therapists, and other professionals. Problem behavior such as aggression, tantrums, and self-injury can make dealing with a child with ASD very challenging even for professionally trained individuals. Although there is no cure for ASD, a number of interventions implemented in clinics, schools, and homes have been empirically documented to be effective (Horner, Carr, Strain, Todd, & Reed, 2002). Since the 1980s, applied behavior analysis (ABA) has been shown to be effective in the reduction of problem behavior and in facilitating acquisition of new skills for children with ASD (Lovaas, 1987). This study aimed to extend that analysis to parent training.

According to Hagopian (2007), about “half of children diagnosed with autism will display some level of problem behavior, and a high percentage of those will require treatment by a professional” (p. 43). It has been noted that the most common problem behaviors of children with ASD include tantrums (76%), aggression (56%), stereotypy (14%), and self-injury (11%; Horner et al., 2002). The Committee on Educational Interventions for Children with Autism (2001) recommended that educators and caretakers will better understand the cause of problem behavior if they consider the child’s perspective of what the child might be trying to communicate through the use of problem, instead of appropriate, behavior. However, the cause of problem behavior is complex and effectively addressing problem behavior requires specific training, the lack of which could create further stress among parents.
Parent education and support needs to be an imperative component of any intervention for improving the family’s daily living situation (Briesmeister & Schaefer, 2007). Parental involvement in the intellectual, social, and emotional development of children with ASD is vitally important to their growth (Shriver & Allen, 2008). In addition, parents believe they can and should play an instrumental part in their child’s intellectual development (Lovaas, 1987; Sallows & Graupner, 2005). Parents report “that the training they received was the most effective service in contributing to their child[ren]’s growth” (Hume, Belline, & Pratt, 2005, p. 195). The use of intensive home-based parent training is an effective way to decrease the moderate to severe problem behavior of children with ASD (O’Reilly & Dillenburger, 2000).

Harris (1984) found a number of “clinical problems” (p. 127) that need to be examined more fully emerge during and after parent training. Among other problems, when parents do not systematically implement behavioral interventions, the development of desirable behaviors in children with ASD may be impeded. When parents neglect to generalize or to implement the training for intervention over time, adverse effects on the children may follow (Harris, 1984).

One of the main drawbacks of current research is the lack of focus on generalization training for parents. Generalization is defined as “the occurrence of relevant behavior under different non-training conditions” (Stokes & Baer, 1977, p. 350). Although a multitude of variables can greatly impact the behavior of children with ASD, the question of whether parents can be taught to implement effective instructional and behavioral skills with their children in natural settings still needs to be explored.

Cooper, Heron, and Howard (1987) noted that generalization of treatment effects is significant to the long term success of parent training. In addition, “treatment generalization is a particularly important issue in parent training because parents often report difficulty managing a
range of problem behaviors in different settings and sometimes with more than one child” (O’Reilly & Dillenburger, 2000, p. 763). The skills learned by children with ASD in the clinic or school are not always easily applied to the home and vice versa. New behaviors learned in one setting may not easily or naturally transfer to another for either parents or children. In addition, problem behavior that may be diminished within the school environments may nonetheless continue to occur at home and vice versa (Reeve, Reeve, Townsend, & Poulson, 2007). Further, parent behavior may not generalize from the training setting to the natural setting (Miller & Sloane; 1976).

In their seminal parent training study, Koegel, Glaahn, and Nieminen (1978) had expected that after a parent watched a brief demonstration, he or she would be able to teach the child with ASD a new behavior. However, Koegel et al. observed no generalization to new behaviors occurred and alluded to parents being unable to use the same teaching strategies observed during the demonstration to teach a new skill to their children at home. Koegel et al.’s finding may explain why parents do not often analyze and address their own child with ASD’s problem behavior even after following observation or training of a behavioral intervention plan with a child other than their own child (Crockett, Fleming, Doepke, & Stevens, 2007; Horner et al., 2002).

In addition, Lovaas and Koegel (1973) and Bruder and Bricker (1985) had long since established that parents were active participants in implementing interventions with children with ASD. However, generalization of training has not been equally addressed by researchers (Bolton & Mayer, 2008), for examining the relationship between parent training and their ability to generalize the learned skills to the natural settings or routines associated with the child’s problem behavior.

In 1976, Miller and Sloane questioned the usefulness of expecting parents to be able to
generalize skills from one setting to another; their concerns were based on the evaluation of five parents that had received training. Miller and Sloane concluded that parents were able to generalize their newly learned behaviors in the home setting only minimally, even though the home setting was similar to the training environment. Not surprisingly, significant changes in parent behavior had not been observed in the training setting.

More recently, Crockett et al. (2007) evaluated parents’ abilities to generalize skills learned during effective training techniques beyond the clinical setting where the training occurred. Crockett et al. included two parents as participants and found that following parent training, the two parents were able to teach their children new skills by using discrete trial training. Thus, Crockett et al. recommended initiating further research to determine if similar effects would be present when training occurs in naturalistic environments.

Little documentation for parent generalization of training to the natural setting exists in the literature. When implementing BIPs with their children with ASD to help their children behave more appropriately in natural settings, parents need to be able to generalize their new skills to natural settings.

Evidence-Based Practices for Training

The use of ABA to create function-based interventions has been found to be most effective for reducing problem behavior displayed by children with ASD (Eikeseth, 2001; Harris & Handleman, 2000; Healy, O’Connor, Leader, & Kenny, 2008; Sheinkopf & Siegel, 1998). Biddy, Eikeseth, Martin, Mudford, and Reeves (2002) stated that the quality of training needed to implement ABA interventions effectively with those working with children with ASD in general is not addressed adequately in the literature. However, Sarokoff and Sturmey (2004) produced results from providing instructions, modeling, rehearsal, and feedback to with the
teachers participating in their training program. Sarokoff and Sturmey taught the teachers effective skills for providing instructions, modeling, rehearsal, and feedback in order to implement discrete-trial teaching. Unfortunately, many of these training procedures have not been applied to parent-training programs until recently (Lafasakis & Sturmey; 2007), and the efficacy of parents generalizing parent-training models into their natural setting needs to be established.

Recent research addressing parent training focuses primarily on child behavior instead of the parent’s behavior, and the training facilitates the skill acquisition of children with ASD rather than decreases in problem behavior incidents. This focus has been demonstrated in research regarding training parents to use errorless academic compliance training (Ducharme & Drain, 2004). Ducharme and Drain (2004) found parents made a number of academic and nonacademic requests of their children with ASD. When the children complied with requests, they received positive reinforcement from the parents. The tasks were then ranked according to the likelihood of compliance, with 1 indicating high compliance behavior and 4 indicating low compliance behaviors. For as long as 6 months after treatment, study participants maintained a consistent level of academic compliance behavior for multiple areas of behavior (Ducharme & Drain, 2004). Ducharme, Sanjuan, and Drain (2007) reported equivalent results for mothers of children with Asperger syndrome (a disorder found within ASD) who successfully engaged their children in compliance training.

Lucyshyn et al. (2007) conducted a 10-year longitudinal, multiple baseline study to evaluate the effects of a function-based BIP across four settings with one child with ASD and severe problem behavior. Generalization of the intervention was promoted to parents through activities which included (a) implementation checklist to self monitor, (b) guided practice, and (c)
encouragement to use strategies in non-trained environments. However, the reduction of child’s problem behavior was the only dependent variable, and parental behavior and generalization of training were not directly evaluated. Lucyshyn et al. also measured the social validity of the intervention which was verified by parents as being at a high level.

To date, not enough documentation on the relationship between parent training for decreasing CPB and generalization of parent skills from one setting to another has been published. Crockett et al. (2007), McConnell (2002), and Wolery and Garfinkle (2002) recommended that more research be conducted to assess the methods used in training parents for intervening with their children with ASD. Thus, the purpose of the present study will be to fill in the gap in the current research by evaluating what procedures and what type of training setting will be most effective for parent training and for generalization of training skills to the natural setting. Specifically, the study will compare the effectiveness of parent generalization of training skills to decrease CPB when training is provided in a home-based setting versus a clinic-based setting.

Research Questions

1. Will the problem behavior of the child with autism decrease in the natural environment as a function of parent training?
2. Is home-based training more effective than clinic-based training for teaching parents to implement a function-based behavior intervention plan for a child with autism?
3. To what extent will parent training on the home- or clinic-based setting facilitate the generalization of skills to the natural environment associated with child problem behavior?

Methods

This section describes the research methodology utilized for the pilot and the replication.
studies. A pilot study was first conducted to evaluate the effectiveness of parent training on decreases in the problem behavior of children with autism in natural environments. The specific purpose of the pilot study was to test efficacy of the measurement variables, the research design, the intervention, and the data analysis procedures. Following documentation of the effect of intervention for the participants in the pilot study, a replication study was implemented to validate the findings for additional participants.

Participants and Setting

Participant selection. A total of four parent-child dyads were selected to participate in this study. Parents volunteered to participate in response to a flyer circulated in local school districts, clinics, resource agencies, and online postings on Parent Support Group chat rooms. A total of four out of nine dyads met the inclusion criteria. The inclusion criteria were: (1) the parent participant(s) must have a child already diagnosed with ASD that was receiving autism services in a local public school; (2) the child with ASD must display problem behavior during at least one activity routine (e.g., bed-time, bath-time, meal-time, transition-time) in the home environment; (3) the parent participant(s) must commit to parent training sessions either at home or in the clinic and be willing to implement the intervention in either of these settings as demonstrated; and (4) the child with ASD must be between 2 to 15 years of age and reside at home with the participating parent(s). No exclusion criteria were established regarding any demographic variables including gender, race, or ethnicity as long as the inclusion criteria were met.

Of the four parent-child dyads selected to participate in this research, two dyads participated in the pilot study and the other two participated in the replication study. Care was taken to ensure that the parent-child dyads were comparable on variables that could influence the
outcomes of the study, including socio-economic factors, severity of the child’s disability, and the family composition (e.g., single-parent versus two-parent family).

Setting. Two parent-child dyads were selected to receive parent training within the home setting, and the other two dyads received training in a clinical environment. The participants were assigned to receive training at home or the clinic based upon who returned the informed consent letter first. For both studies, the participants that returned the informed consent letter first were selected to receive parent training at home whereas the participants who returned the informed consent letters second received training at the clinic. This was necessary to ensure that the settings were selected randomly.

The parent training sessions in the home setting were implemented within a simulated (i.e., artificial) routine to allow for testing for generalization of effective strategies to the natural routine. For example, meal time may have been practiced at a different dining table and a room than the typical location for this routine. Parent training sessions implemented in the clinical setting were completed in a room measuring 210 square feet with a one-way mirror for observation. For example, when meal time was practiced in the clinic, a simulated setting with a table, chairs, and food was provided. The effects of both home-based and clinic-based training were assessed during the natural routine in the home environment.

Participants. Two parent-child dyads participated in the pilot study. Dyad A included Christian (8 years) and his mother (35 years) and Dyad B included Matt (6 years) and his mother (39 years). Two additional parent-child dyads participated in the replication study. Dyad C included Ryan (8 years) and his mother (37 years) and Dyad D included Kenny (6 years) and his mother (41 years).

Prior to this study, all child participants emitted problem behavior during meal time as
indicated by parent report and FBA procedures. All of the children demonstrated delayed expressive language and used approximately five sign language approximations and had limited receptive language skills. Additional information regarding participant characteristics is provided in Table 1.

<Insert Table 1 here>

**Measurement**

*Parent behavior.* The parent behaviors measured included very specific actions and discrete behavior analytic strategies identified as essential for decreasing child problem behavior (CPB) regardless of the setting. These strategies have been documented in the literature on ABA as evidence-based practice for intervening with parents or teachers of students with problem behavior. The strategies were antecedents (i.e., events that occur before the child’s behavior) or consequences (events that occur after the child’s behavior) designed to prevent problem behavior and maintain appropriate behavior. These strategies were further delineated as effective and ineffective with respect to preventing or maintaining child problem behavior. The effective strategies were incorporated into the Behavior Intervention Plan (BIP) that was developed for each child. An operational definition with examples of Parent Effective Strategies (PES) and non-examples or Parent Ineffective Strategies (PIS) is presented in Table 2 (Parent Strategies Checklist).

<Insert Table 2 here>

Parent behaviors were recorded using the Parent Strategies Checklist designed to document the occurrence or non-occurrence of discrete parent responses (see Table 2). This checklist was completed by the primary and secondary observers using video recordings made during the training and probe sessions in the natural setting. Based on the ABA literature, parents
using PES were more likely to elicit appropriate child behavior whereas parents using PIS were more likely to elicit CPB. The notation of a plus symbol ("+") was recorded to indicate occurrence of PES or PIS whereas a minus symbol ("-" ) was recorded to indicate non-occurrence of these responses. For example, during any given interval of time, a parent could display ("+"") both PES and PIS or not display ("-" ) either response. At the end of each observation period, the total number of occurrences and non-occurrences of PES and PIS were added to generate a percentage for target behavior per observational session.

*Child problem behavior (CPB).* CPBs were individually identified based on the responses that interrupted the daily mealtime routine for each child, for example, delay in coming to the table after making a request, getting up from table, flopping to the floor, keeping head below table, and climbing on table. These target behaviors were identified individually through the Functional Behavior Assessment (FBA) procedures completed for each child prior to initiation of any experimental condition (Cooper et al., 1987). These responses were measured (probed) during baseline and intervention in the natural setting. Examples and non-examples of problem behavior and the related unit of measurement for each child participant are provided in Table 3.

<Insert Table 3 here>

*Measurement Procedures*

*Equipment and materials.* Parent training and observations in the home and clinic settings were recorded using a digital video camcorder. A video camcorder and compatible SD cards were provided to each dyad. The SD cards recorded data for 2 to 4 hours at a time.

*Direct observations.* Direct observations of target responses were conducted in the home and clinic environments with each parent-child dyad, respectively, during the meal-time routine during both baseline and intervention conditions. Direct observations to measure response
generalization were conducted by video recording parent and child responses during training in the simulated setting as well as during the natural routine in the home setting. Because meal-time was a routine that occurred daily at home, families were asked to video-record any three events during the week instead of three recordings on the same day. This recording provided a sample (probe) of events that occurred during a specific routine. By using probe data, the demands on the time and effort of participants appeared to be reasonable and allowed for flexibility within their family schedules. Probe data were collected throughout the baseline and intervention phases at home during meal-time and following parent training sessions which occurred either in the clinic or in the simulated setting at home.

**Interobserver agreement.** Procedures for training data collectors and measuring interobserver agreement (IOA) were established to ensure reliability of data across all the experimental conditions of the study. These procedures are described below.

Two graduate students (one primary and one secondary observer) assisted with the collection and coding of data and assessment of agreement between the two observers (i.e., IOA). Both observers were certified behavior analysts with extensive coursework and practical training in data collection prior to being hired for this study. Also, each observer received an average of 5 hours of direct training in data collection procedures specific to measurement of target responses for the participants in this study. In addition, the primary observer was also trained to record data on the fidelity of implementation of intervention. Data collection for baseline was not initiated until the primary and secondary observers achieved an IOA score of least 90% for three consecutive training sessions.

IOA was measured for 25% of all observations distributed throughout the experimental phases of the study. An event was counted as an agreement if both primary and secondary coders
recorded occurrence or nonoccurrence of discrete target responses. For comparing the measurement of CPB in the replication study (Dyad C & D) due to behavior recorded as latency and duration. The IOA was recorded as “agreement” if an occurrence or nonoccurrence was recorded within a 3-second window of time. The IOA was calculated by dividing agreements by the sum of agreements plus disagreements with the resulting value multiplied by 100 to obtain a percent (%) value. The outcomes of IOA for each dyad are as follows: Dyad A, \(m=95.9\%\); range 92-100\%) Dyad B, \(m=93.83\%\); range 93.5-94.2\%), Dyad C \(m=100\%), and Dyad D, \(m=98.6\%\); range 96-100\%).

**Research Design**

A Multiple Probe Design across Participants (Barlow & Hersen, 1984; Tawney & Gast, 1984) was utilized to demonstrate a functional relationship between the independent variable (parent training) and dependent variables (parent implementation of the BIP in the natural setting leading to a reduction in CPB). The design included two phases, i.e., baseline and intervention, both which are described in detail in the experimental procedures below. The data for parent and child responses were visually displayed on an individual scale to allow for a comparison between the baseline and intervention conditions. The results of the effect of intervention are illustrated separately for the pilot study (i.e., Dyads A and B) and the replication study (i.e., Dyads C and D). Decisions regarding the phase change were based on the stability of parent behavior.

**Experimental Procedures**

*Functional behavior assessment (FBA).* The Functional Assessment Screening Tool (FAST; Iwata, 2002) that has a structured interview protocol was completed with each parent to identify the function of child problem behavior. This was followed by a direct observation of problem behavior in the natural (meal-time) environment using the A-B-C method (Cooper et al.,
Both procedures were utilized to identify behavioral functions in order to develop a function-based BIP for each child. Following completion of the FBA procedures, behavioral objectives were identified for each dyad in order to develop an effective parent training program.

**Baseline.** Baseline probe data were collected for each participant prior to implementing parent training in the natural routine in the home environment using the measurement system described above. During this experimental condition, no attempts were made to alter or manipulate parent or child behavior.

**Intervention.** The parent training (intervention) was implemented in a staggered manner across the two dyads (one at home and another in the clinic). In other words, after the baseline demonstrated a stable pattern for the first dyad, the intervention was implemented with the first parent while the baseline for the second dyad was held constant. When the interventions with the first dyad were observed to be effective based on an ongoing visual analysis of data, intervention with the next dyad was initiated.

The implementation of the intervention involved two stages. First, a behavior intervention plan (BIP) based on the function of the child’s problem behavior was developed. Second, parent training sessions were conducted to teach parents how to implement the BIP to address their child’s problem behavior during the meal-time routine. PES were incorporated in the BIP as critical responses for decreasing CPB. Parents were also informed about each PIS that needed to be eliminated in order to decrease child problem behavior.

Following collection of baseline data and generating information regarding the functions of CPB based on the FBA procedures, a BIP was developed in collaboration with the parents. The BIP included (1) problem behaviors identified by function (social mediated, negatively or positively reinforced behavior, or automatic, negatively or positively reinforced behavior); (2)
operationally defined topographies of problem behavior; and (3) explanations of antecedent and consequence strategies that needed to be displayed and eliminated for decreasing CPB.

Following the development of a BIP for each child, parent training procedures were implemented with each dyad in a staggered manner in a simulated routine as noted above. For example, because meal time was the targeted routine, the training sessions were simulated at a different time of day, such as snack time instead of dinner time. When training was conducted in the clinic, a mock setting with a table, chairs, and food was provided. When training was provided in the home environment, a mock setting was created by using a different table in a different room than the equipment used in the natural routine.

Dyads A (pilot study) and C (replication study) received parent training in the home environment. Dyads B (pilot study) and D (replication study) received parent training in the clinical setting. The effectiveness of parent training was then evaluated (probed) within the natural dinner routine for each dyad using the same checklist that was used during baseline.

The first training session for each dyad included several components. It started with reviewing the BIP with the parent and differentiating between effective and ineffective strategies for addressing CPBs. In addition, some common ABA terminology noted on the BIP (e.g., antecedents, behavior, consequence, and reinforcement) were also reviewed with specific and individualized examples and non-examples. Each parent was also provided a checklist of strategies to use and not use during the meal-time routine. The parents were encouraged to use this checklist throughout the mealtime routine to enable them to monitor the strategies they were implementing with their children.

Following the discussion on the use of the parent checklist, the interventionist first modeled the use of effective strategies with the child during the simulated meal-time routine.
After the demonstration, the parent was asked to practice the use of effective strategies with the child during the session. The interventionist gave the parent immediate feedback to confirm the correct usage of PES or to correct the use of PIS being implemented by the parent. This training session lasted for approximately 60 minutes. To ensure consistent implementation of intervention across all four dyads, the interventionist reviewed the Fidelity Checklist before and during the training to ensure all components of training were delivered accurately. These components are further described in the next section.

The second training (approximately 50 minutes in duration) for each dyad was utilized to provide the parents with direct feedback regarding video-records of observed responses during the probes in the natural setting following initial training and to address any questions or concerns. For example, two of the four parents inquired if they could fade the reinforcement being used during meal-time after observing decreases in CPB. In response to this question, the interventionist reviewed the benefits and risks with each parent to determine the importance of reinforcement for maintaining the individual child’s appropriate behavior during meal time. In both cases, the parent agreed that the reinforcement was an effective strategy that was still needed within their routine to maintain the child’s appropriate behavior.

Following each training session, the parent was provided with a camcorder and SD memory card to record three meal-time sessions. The three natural setting routines were selected by the parents based on their convenience within 10 days of parent training. Parents were given opportunities to practice using the camcorder with the interventionist and were provided with the user’s manual. In addition, parents were given permission to and encouraged to call the interventionist on the phone at anytime regarding the operation of the camcorder.

During the pilot study, the interventionist drove to the participant’s home and picked up
the camcorder and then transported it to the primary observer. Toward the end of the pilot study this process was altered by having the parents mail the camcorder directly to the primary observer. This adjustment allowed for data coding and subsequent parent training to be scheduled in a time-efficient manner. The modified procedure was instituted for the replication study because it was preferred by participants as well. Of note, the parents were not asked to pay for any of the mailing expenses and were instead issued a FEDEX account number.

In order to ensure the fidelity of implementation of intervention procedures, the primary observer recorded data on the interventionist’s behaviors for all eight training sessions (two per dyad) on the use of specific responses implemented by the interventionist with the parent during training sessions. These responses included: (1) interventionist demonstrates routine with child, (2) interventionist prompts and confirms parent behavior with child, (3) parent demonstrations of the procedures identified in the Parent Behavior Checklist while the interventionist provided parent with critical feedback necessary to maintain acquired skills or practice newly learned skills, (4) interventionist allowing parent to demonstrate working hands-on with child during the training routine, (5) training setting being different than targeted natural environment, and (6) interventionist being present to provide any assistance or guidance to the parent in case of occurrence of CPB. The interventionist also referred to the same checklist while conducting parent training to ensure implementation of intervention with fidelity. The fidelity of implementation of intervention was calculated to be 100% across all eight training sessions and was evaluated with a fidelity checklist indicating the five training components.

Results

This study investigated the effectiveness of parent training for enabling parents to implement a function-based BIP during the meal-time routine associated with high rates of CPB.
in a home-based versus clinic-based setting. Evaluating the effect of the parent training in a simulated setting on the generalization of skills by parents into the natural environments were key variables of interest in the study. Data were collected for three dependent variables for each dyad, including the percentage of the PES and PIS demonstrated by parents and the amount of CPB as a function of parents’ use of strategies. This section provides a description of the findings derived from the pilot and replication study. Specifically, a visual analysis of data is presented followed by the presentation of the effect size. An interpretation of results in relation to the research questions are presented in the discussion section.

Visual Analysis of Data

Visual analysis has been defined as the systematic examination of graphic data to identify meaningful change in behavior and to determine the extent to which behavior change can be attributed to the manipulation of the independent variable or intervention (Cooper et al., 2006). Data were evaluated to assess changes in the behavioral patterns of the three dependent variables in this study (e.g., PES, PIS, and CPB) by evaluating the trend, level, immediacy of effect, overlap, and variability.

Visual analysis for the pilot study (Dyads A and B). The intervention (parent training) appeared to have been highly effective as illustrated in the pilot study graph for increasing PES, decreasing PIS and CPB for Dyads A and B as evaluated using the five properties of visual analysis. Through visual analysis, the dependent variables were observed to significantly change following intervention from baseline.

Dyad A’s data indicated an increase in trend for PES and a decreasing trend for both PIS and CPB. Lower levels of PIS ($m=13.75$) and CPB ($m=23.56$) were observed during the intervention phase when compared to baseline (PIS, $m=77.0$; CPB, $m=82.33$). A higher level of
PES ($m=94.13$) during the intervention phase was evident compared to baseline PES ($m=33.0$). Data showed immediate effect of intervention when compared to baseline data. The last data point of PIS (77%) and CPB (1.18 rate per minute) in baseline to the first data point in the intervention phase of PIS (11%) and CPB (0.09 rate per minute) appear to demonstrate the effectiveness of intervention. Additionally, an increase of the first data point in the intervention phase of PES (100%) from the last baseline data point PES (11%) was also observed. The absence of overlap across the phase also indicated the effectiveness and strength of the intervention. No variability in the intervention data was demonstrated for this dyad which illustrated stability in the pattern of PES, PIS, and CPB.

Dyad B’s data indicated an increasing trend for PES and a decreasing trend for both PIS and CPB. Lower levels of PIS ($m=17$) and CPB ($m=.18$) were documented for the intervention phase when compared to baseline (PIS, $m=83.3$; CPB, $m=1.3$). A higher level of PES ($m=100$) during the intervention phase was evident when compared to baseline PES ($m=33.3$). Data showed immediate effect of the intervention when compared to baseline. The last data point of PIS (87.5%) and CPB (74.07%) in baseline to the first data point in the intervention phase of PIS (0%) and CPB (28.26%) demonstrated the effectiveness of parent training. In addition, an increase of the first data point in intervention phase of PES (100%) from the last baseline data point PES (25%) was observed. The absence of overlap across the phase indicated the effectiveness and strength of the intervention. No variability in the data for this dyad was demonstrated which illustrated stability for PES, PIS, and CPB.

Visual analysis for the replication study (Dyads C and D). The intervention (parent training) was deemed to be highly effective as illustrated in the replication study’s graph presenting the data of Dyad C and D and as evaluated using the five properties of visual analysis.
Through visual analysis, the dependent variables PES, PIS, and CPB were observed to significantly change following intervention from baseline.

Dyad C’s data showed an increasing trend for PES and a decreasing trend for both PIS and CPB. Lower levels of PIS ($m=0$) and CPB ($m=18.87$) during the intervention phase when compared to baseline (PIS, $m=91.66$; CPB, $m=105.3$) were observed. A higher level of PES ($m=100$) during the intervention phase was evident compared to baseline PES ($m=12.5$). Immediacy of effect was illustrated in the immediate drop from the last data point of PIS (87.5%) and CPB (82 seconds) in baseline to the first data point in the intervention phase of PIS (0%) and CPB (30 seconds). The increase of the first data point in intervention phase of PES (100%) from the last baseline data point PES (12.5%) was observed. The absence of overlap across the phase indicated the effectiveness and strength of the intervention. The variability the data for this dyad illustrated stability for PES, PIS, and CPB.

Dyad D’s data indicated an increasing trend for PES and a decreasing trend for both PIS and CPB. Lower levels of PIS ($m=6.25$) and CPB ($m=.47$) during the intervention phase when compared to baseline (PIS, $m=87.5$; CPB, $m=37.42$) were observed. A higher level of PES ($m=95.31$) during the intervention phase was evident compared to baseline PES ($m=35.0$). Immediacy of effect was illustrated in the immediate drop from the last data point of PIS (87.5%) and CPB (50%) in baseline to the first data point in the intervention phase of PIS (0%) and CPB (1.5%). Additionally, an increase of the first data point in the intervention phase of PES (100%) from the last baseline data point PES (25%) was observed. The absence of overlap across the phase indicated the effectiveness and strength of the intervention. The variability of the data for this dyad illustrated stability for PES, PIS, and CPB.
Measurement of Effect Size

In addition to conducting a visual analysis of data, the Effect Size was utilized to evaluate the magnitude of the effect of intervention on the dependent variables when compared to baseline levels. Measurement of effect size is a standardized measure and has been recommended to exemplify evidence-based practice in single-subject research (Horner et al., 2005). For the purpose of this study, effect size ($d$) were calculated to determine the effect of parent training on the three dependent variables PES, PIS and CPB. The effect size was measured by using Cohen’s $d$ (standardized mean difference), which has been recommended for evaluating non-overlap data across experimental conditions (Parker & Hagan-Burke, 2007). The formula used for obtaining the $d$-index Effect Size was: $d = \frac{\text{Mean of intervention} - \text{Mean of baseline}}{\text{Standard Deviation pooled}}$. The formula used to calculate Effect Size was:

$$d_{\text{pooled}} = \sqrt{\frac{M_{\text{(INT)}} - M_{\text{(BL)}}}{\frac{[(n_b - 1) \ (Sd_b)^2] + [(n_a - 1) \ (Sd_a)^2]}{n_b + n_a - 2}}}$$

The criteria for evaluating the magnitude at which dependent variables may have changed due to the effect of intervention and not any extraneous variable is: Small ($d = .25$); medium ($d = .50$); large ($d = 1.0$ or greater).

Effect size of intervention on parent behavior. To evaluate the magnitude of parent training on the dependent variables, the effect size ($d$) was calculated for PES and PIS for the three categories of home-based training, clinic-based training, and overall (total) effect size for all parent participants for both settings. The effect size for PES for home-based training ($d = 5.48$), clinic-based training ($d = 6.50$), and overall ($d = 5.25$) demonstrated a large magnitude implying the effectiveness of intervention procedures in producing behavior change of.
participants. The effect sizes for PIS for home-based training \( (d = 5.80) \), clinic-based training \( (d = 4.45) \), and overall \( (d = 4.65) \) showed significant decreases in undesired practices used by participants. These calculations provide confirmation that the intervention significantly impacted parent behavior and the effect was large in magnitude (see Table 5).

*Effect size of intervention on child behavior.* To evaluate the magnitude of parent training on child problem behavior, the effect size \( (d) \) of CPB for each individual child was calculated. The individual effect size for CPB for Christian \( (d = 2.40) \), Matt \( (d = 3.99) \), Ryan \( (d = 2.40) \), and Kenny \( (d = 5.07) \) confirmed that the intervention with their parents produced a significant change in [decreases in] child problem behavior with a large magnitude (see Table 4).

<Insert Table 4 here>

**Discussion**

Results of this study (both the pilot and replication stages) illustrated the effectiveness of parent training as an important variable for decreasing the problem behaviors of children with ASD. Previous studies addressing parents of children with ASD focused primarily on the reasons that parent training needs to be an integral part of treatment programs (Briesmeister & Schaefer, 2007). Researchers also investigated the effects of having a child with ASD on levels of parental stress (Baker-Ericzén, Brookman-Frazee, & Stahmer, 2004; Herring et al., 2006; Tomanik, Harris, & Hawkins, 2004; Wolf, Noh, Fisman, & Speechley, 1989). While the literature has supported the need to teach parents effective skills for working with their children with ASD (Briesmeister & Schaefer, 2007; Harris, 1984; Hume et al., 2005; O’Reilly & Dillenburger, 2000; Shriver & Allen, 2008), much of the literature has been limited by two aspects: (1) dependent variables being designed to assess changes only in child behavior instead of including evaluations of change in parent behavior; (2) measurement of child behavior being focused on
skill acquisition, not CPB, as a function of parent training. This study was conducted to fill these gaps in the existing literature by focusing on both the measurement of parent behavior and on the evaluation of the effect of parent training for reducing CPB. Additionally, the results have demonstrated the effectiveness of the parent training procedures regardless of the training location. The following discussion addresses the impact of parent training in the home versus the clinical setting.

Home-Based Versus Clinic Based Training

The first objective of this study was to investigate if the location of training played a significant role in skill acquisition by parent participants. This question allowed for isolating this variable and evaluating the influence it had on providing quality parent training for decreasing problem behaviors within a natural routine. Results of the study showed that both home-based and clinic-based parent training were equally effective in decreasing CPB; as depicted in Figures 1 and 2. This finding contributes to the parent training literature in that it appears to be the first study to demonstrate the significant effects of parent training on decreasing CPB regardless of training location.

In this study, a reduction of CPB was observed for all four child participants as a function of parent training. The location of the training did not significantly impact either parent behavior or CPB. The components and process of the training significantly, and with large effect, impacted both parent behavior and the reduction of CPB. The parent training strategies used within this study were drawn from previous research (Ducharme & Drain, 2004; Lafasakis & Sturmey, 2007; Lerman, Tetreault, Hovanetz, Strobel, & Garro, 2008; Lucyshyn et al., 2007; Sarokoff & Sturmey, 2004). The six selected components that were utilized during the parent training intervention in this study included: (1) very clear and specific instructions to parents; (2)
a parent checklist designed to prompt parent behavior; (3) modeling the specific effective practices for parents; (4) providing guided practice in a simulated setting; (5) providing direct feedback to the parents after observing parent behavior; and (6) providing opportunities to parents to generalize learned skills to the natural environment. These six components are detailed below with consideration to their notable contributions to the success of the study.

Delivery of Clear and Specific Instructions

As detailed in the methods section, a BIP was constructed for each child to identify the individual topography, function, and plan for addressing problem behavior during the selected daily routine. During the initial parent training session the BIP was reviewed and specific instructions were delineated to the parent regarding how to address CPB. The instructions presented to the parent were not general solutions or recommendations but instead were an outline of what (action or observable behavior) the parent needed to perform to prevent or manage CPB. These instructions defined not just the behaviors (PES) the parent needed to use but also those (PIS) that parents needed to refrain from using during the routine. In addition, these instructions clearly told parents at what point, during the routine they needed to implement PES. To guide parents, PES were classified into the two categories of antecedent-based and consequent-based strategies. The antecedent PES were implemented prior to the occurrence of CPB, and the consequent PES were implemented following the occurrence of either CPB or appropriate child behavior.

Parent Checklist

Once specific instructions were given, the parent was provided with a Parent Checklist to reference at any time before, during, or after the meal time routine to monitor their own behavior. This checklist clearly labeled the behaviors to display (examples) and the ones not to
display (non-examples). This checklist served as a prompt to enable parents to implement the effective antecedent and consequent strategies with accuracy and forgo the use of ineffective strategies.

**Modeling Specific Effective Practices for Parents**

The interventionist first modeled with the child and for the parent, both PES and PIS, prior to the parent implementing the strategies. Behavior modeling allowed the parents to see the demonstration of the strategies and to understand how to execute these as listed on the Parent Checklist. Additionally, the interventionist reported that parents actively asked questions while referring to the Parent Checklist for clarification during the modeling portion of the training. Anecdotal notes also showed that parents were surprised at how well the child responded to the implementation of the PES by the interventionist, which most likely increased their confidence in implementing the strategies with their own children.

**Guided Practice in a Simulated Setting**

Each parent participant directly engaged with their child in a simulated setting to practice PES, both modeled by the interventionist and listed on the Parent Checklist. During the simulation, the interventionist was present and provided verbal and physical prompts, as needed, to guide parents’ implementation of PES. For example, if the child engaged in appropriate behavior and the parent did not present positive reinforcement, the interventionist pointed to the reinforcement to prompt the parent. In another example, if the child engaged in CPB, such as throwing food, and the parent did not address the child’s CPB, the interventionist verbally prompted the parent to remove the reinforcement item and have the child pick up the food that had been thrown on the floor or the table.
Direct Feedback from Interventionist

In addition to prompts being provided during training, the interventionist provided immediate parent feedback about the strategies being implemented. This feedback included positive praise such as “good job, Mom” and corrective feedback such as “make sure to reinforce him with ____ once he takes a bite.” Anecdotally, the parents noted their appreciation for receiving direct feedback during the prime moment because the immediate feedback helped them remember what to do when the interventionist was not present during the natural routines where generalization was expected.

Opportunities to Generalize Learned Skills to the Natural Environment

Following each training session, the parent was given the assignment to video record themselves in the natural routine implementing PES as practiced in the simulated routine. Because the parent knew there was a need to demonstrate PES in the natural routine without the interventionist present, it is possible that this task may have contributed to their diligence due to accountability to the overall quality of the training sessions in the simulated settings. The interventionist observed that the parents expressed a sense of accomplishment and empowerment once they successfully implemented PES during the natural routine. Parents expressed that they used PES in other situations or routines with success. Further, parents reported their surprise and excitement at how well their child generalized their behavior from the simulated setting to the natural setting.

Each of these components of training with feedback and reflection contributed to the success of parents’ changing their behavior, as supported by the results illustrating the decrease of PIS and increase of PES following the intervention. The six components as a unit were found to be effective and deserve consideration for inclusion in parent training models.
Generalization of Skills to the Natural Environment

The second objective of this investigation was to determine if parents could generalize skills learned in the simulated setting to the natural setting. This question was warranted due to the multiple studies surmising barriers associated with generalizing skills of both parents and children with ASD (Bolton & Mayer, 2008; Handleman & Harris, 1980). In addition, while this topic has been recommended for research in the literature, it has not been adequately studied to date (Crockett et al., 2007; McConnell, 2002; Wolery & Garfinkle, 2002). The results of this study, as illustrated in Figures 1 and 2, showed successful generalization of desired parent behavior to the natural setting following intervention, which in turn led to decreases in CPB. One possible explanation for successful generalization of parent behaviors from the training environment to the natural environment involved the selection of relevant physical and contextual stimuli (Handleman & Harris, 1980). The physical stimulus materials (e.g., table, chairs, utensils, food items, and preferred reinforcers) remained consistent across the two environments for both the parents and children as did the actions of parents associated with these stimuli. Both types of environmental cues were necessary for emitting the desired responses.

Parent Generalization

It was evident from the results of this study that all four parents generalized newly learned skills from the training to the natural meal-time environment. Contextual stimuli introduced during the training sessions that allowed parents to be successful in the natural environment included the parent checklist, having the necessary materials present before starting the routine, the sequential and predictable nature of the routine, and opportunities for practicing learned skills on a daily basis. These factors have been suggested in existing research as critical for producing generalization effects (Koegel et al., 1978; Robbins, Dunlap, & Pleinis, 1991;

*Relation Between Parent and Child Behavior*

The third and final objective of this research study was to determine if problem behavior displayed by a child with autism would decrease in the natural environment as a function of parent training. Many previous studies have confirmed the importance of a function-based intervention for decreasing problem behavior for children with ASD (Baer, Wolf, & Risley, 1987; Carr, 1977; Day, Horner, & O’Neill, 1994; Eikeseth, 2001; Howard, Sparkman, Cohen, Green, & Stanislaw, 2005; Lovaas, 1987; Sallows & Graupner, 2005; Smith, Groen, & Wynn, 2000; Zachor, Ben-Itzchak, Reinovich, & Lahat, 2007). However, as mentioned previously, it appears that the relationship between parent and CPBs have not been directly and concurrently measured when evaluating the effects of parent training as an independent variable and instead have focused on the child’s skill acquisition (Moes & Frea, 2000; Ducharme & Drain, 2004). Whereas previous studies (Lucyshyn et al., 2007) have measured only child behavior to evaluate the effectiveness of behavioral parent training, this study incorporated measurement of both child and parent behavior with the recognition that the parent training could not be identified as effective without documenting a functional relationship between parent and child behavior.

As illustrated in the results, parent training directly impacted decreases in CPB across all four child participants. CPB was reduced as a function of systematic changes in the parent’s use of PES which generalized from training to the natural environment. During baseline, all four parents demonstrated PIS at higher levels and PES at lower levels than during the intervention phase. In addition, all four children demonstrated higher occurrences of CPB during baseline than during the intervention phases. In other words, when PIS decreased and PES increased, decreases were observed in the occurrence of CPB as well.
**Implications for Practice**

Due to the increasing number of children with ASD being identified and the problem behaviors often associated with this diagnosis, many families will continue to face challenges with CPB in the home environment. The findings of this study can be utilized to support several initiatives regarding both professionals and parents. First, the use of function-based BIPs offer parents the successful tools necessary for reducing CPB in the home environment (Griest & Forehand, 1982; Lucyshyn & Albin, 1993; O’Reilly & Dillenburger; Hieneman & Dunlap, 2001). Professionals working within the home need to be aware of the benefits for training a parent to acknowledge that the child’s behavior can be explained through understanding the motivation (function) of the behavior rather than operating under the assumption that CPB is a function of the child’s disability (Hieneman & Dunlap, 1999; Horner et al., 2002; Odom et al., 2003; Wolery & Dunlap, 2001). This awareness is fundamental to the development of appropriate interventions. Similarly, parents should advocate for their children’s BIP to be founded on the function of problem behavior with the addition of distinct plans for teaching functionally equivalent replacement behaviors. BIPs should also include modifications in the environment (e.g., antecedent and consequent events) without which CPB may not decrease (Carr et al., 1994; McGee, Morrier, & Daly, 1999).

Second, due to the lack of effective parent training models currently available in the literature (Crockett et al., 2007; Dunlap, Hieneman, Knoster, Fox, Anderson & Albin, 2000; Grindle, Kovshoff, Hastings, & Remington, 2009; Lafasakis & Sturmey, 2007; McConnell, 2002; Wolery & Garfinkle, 2002), the six components described in this study may be considered for facilitating successful parent training. Today, many professionals are asked to conduct parent training but are provided with little guidance regarding procedures that need to be utilized for
sustained effects (Day et al. 1994; Horner et al., 2002). Professionals need to recognize that training parents to intervene with children involves a different set of skills than implementing interventions with children. By utilizing the six parent training components, professionals could create guidelines or models for the delivery of parent training in a systematic and structured manner. Setting these expectations with parents seems to be critical to the likely successfulness of parent training. In addition, when parents seek parent training, they need to ask questions pertaining to what the structure of training looks like, what their role as the parent will be, and what will be the expected results of the training that will impact their daily lives. If professionals cannot describe a plan detailing how the training will be conducted, then it may be better to find an alternative for training to ensure expectations are clearly communicated between the two parties. Parents should be affirmed that they are vitally important to any intervention’s success; therefore, their perspectives and concerns must be addressed as part of the training plan.

Third, professionals developing home intervention plans must seek to understand CPB by evaluating parent behavior as a maintaining variable. Interventions should then be implemented while keeping in mind the limitations of the environment (Albin, Lucyshyn, Horner & Flannery, 1996; Dunlap & Fox, 1996). For example, if a family lives in an apartment versus a house, or the parent is single versus married, the intervention itself may differ even if the functions of behavior are the same. The question should not be “what will work to address behavior” but “how will the behavior be addressed within the context of the family”? Parents need to be able to evaluate their own behavior and identify what things in the environment can be set up to help them implement effective strategies within their current context.

**Recommendations for Future Research**

- The study might be systematically replicated with additional participants to determine the
effectiveness of the research design and intervention procedures in producing a similar clinical effect as this study for both parents (primary recipients of intervention) and their children (secondary recipients of intervention).

• The findings of this study may be extended by evaluating the effects of parent training and generalization of the use of effective strategies by parents across multiple routines within the home environment, for example, bath-time, bed-time, and transition times.

• Further evaluation of the effectiveness of each of the six components included in the parent training intervention might be conducted to evaluate the relative effect of individual versus combined components on behavior change outcomes.

• As suggested in the literature and supported by the findings of this study, there is a need to further evaluate the implementation of a function-based BIP by parents in the home environment where both parent and child behavior are measured to evaluate the effect of intervention.

• Future research might focus on developing a model for intervention to facilitate the procedures for implementing parent training to effectively address the problem behaviors of children with Autism.
Table 1

*Participant Characteristics*

<table>
<thead>
<tr>
<th>Dyad</th>
<th>Parent Characteristics</th>
<th>Child Characteristics</th>
<th>Routine</th>
<th>Training Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pilot Study</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (Christian)</td>
<td>35 years old</td>
<td>8 years old</td>
<td>Meal Time</td>
<td>Home</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>Hispanic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 child</td>
<td>0 Siblings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primary Language: English</td>
<td>Non-Verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>Autism Diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Masters Degree</td>
<td>Self-Contained Classroom</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employed</td>
<td>ABA Therapy: Public Center</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B (Matt)</td>
<td>39 years old</td>
<td>6 years old</td>
<td>Meal Time</td>
<td>Clinic</td>
</tr>
<tr>
<td></td>
<td>Caucasian</td>
<td>Caucasian</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 child</td>
<td>0 Siblings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primary Language: English</td>
<td>Non-Verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>Autism Diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelors Degree</td>
<td>Self-Contained Classroom</td>
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<td></td>
<td>Employed</td>
<td>ABA Therapy: Private</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Replication Study</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C (Ryan)</td>
<td>37 years old</td>
<td>8 years old</td>
<td>Meal Time</td>
<td>Home</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>African American</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 child</td>
<td>2 Siblings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primary Language: English</td>
<td>Non-Verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>Autism Diagnosis</td>
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<td>Self-Contained Classroom</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employed</td>
<td>ABA Therapy: Public School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D (Kenny)</td>
<td>41 years old</td>
<td>6 years old</td>
<td>Meal Time</td>
<td>Clinic</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>African American</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>2 child</td>
<td>1 Siblings</td>
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<td></td>
<td>Primary Language: English</td>
<td>Non-Verbal</td>
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<td></td>
<td>Homemaker</td>
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<td></td>
</tr>
</tbody>
</table>
### Table 2

*Parent Strategies Checklist Form*

<table>
<thead>
<tr>
<th>Session: __________________</th>
<th>Type of Session: Baseline / Intervention / Training</th>
<th>Observer:________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total % _____</td>
</tr>
</tbody>
</table>

#### Antecedents Strategies

<table>
<thead>
<tr>
<th>Objective</th>
<th>Operational Definition</th>
<th>Parent Effective Strategies (PES)</th>
<th>Parent Ineffective Strategies (PIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parent gives clear instructions during routine</td>
<td>Parent sets expectations by using declarative language when communicating to child.</td>
<td>“Sit down”</td>
<td>“Are you hungry?”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Take a bite”</td>
<td>“Don’t do that.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“It’s time to eat”</td>
<td>“You need to finish”</td>
</tr>
<tr>
<td>2. Materials are present</td>
<td>Materials needed for the dinner routine are available.</td>
<td>Parent present.</td>
<td>Light is off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dinner at the table with utensils.</td>
<td>Child’s shirt is off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reinforcers are visible from where Child is sitting.</td>
<td>Reinforcers not visible from where Child is sitting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light on.</td>
<td>Child is asked to sit without dinner on the table.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child’s shirt is on.</td>
<td></td>
</tr>
<tr>
<td>3. Appropriate environmental cues are clear within the environment</td>
<td>Child knows expectations of appropriate behaviors to complete routine.</td>
<td>A chair is clearly indicates where to sit by meal being in front of it.</td>
<td>Meal is not on the table to show Child where to sit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appropriate silverware is set by dinner (spoon- soup, chicken- fork, finger food- no utensils)</td>
<td>Several utensils that are not need for the meal are present.</td>
</tr>
<tr>
<td>4. Preference assessments are conducted prior to each routine</td>
<td>Child’s reinforcers are identified before the routine begins.</td>
<td>Dinner may or may not be on the table.</td>
<td>Preference Assessment is not completed prior to routine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Value of reinforcers are assessed before he begins to eat.</td>
<td></td>
</tr>
</tbody>
</table>

#### Consequent Strategies

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description</th>
<th>Parent Effective Strategies (PES)</th>
<th>Parent Ineffective Strategies (PIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>5. Reinforcement is delivered differentially</td>
<td>When Child does the appropriate (prompted or not prompted) behavior reinforcement matches the effort of the behavior.</td>
<td>Reinforcer is tangible.</td>
<td>Reinforcement is praise only.</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
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</tr>
<tr>
<td></td>
<td>A behavior is done with prompts so the reinforce delivered is a bite of a preferred food.</td>
<td>A behavior is evoked without prompts so the reinforce delivered is 3 bites of a preferred food.</td>
<td>Reinforcement is not given based on effort of behavior. For example reinforcement of one bit of preferred food is always given.</td>
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<tr>
<td>6. Reinforcement is received by the child (Did the child take it or engage with it?)</td>
<td>Child takes the reinforcer when offered.</td>
<td>He accepts it by eating it, or engaging in it.</td>
<td>He puts it down.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>He walks.</td>
</tr>
<tr>
<td></td>
<td>Parent blocks Child from engaging in problem behavior</td>
<td>Physically does not allow him to get out of chair.</td>
<td>Allows him to get up from his chair without attempting to block.</td>
</tr>
<tr>
<td>7. Parent redirects problem behavior</td>
<td>Following problem behavior - Parent redirects using one verbal prompt and then physically guide with verbal prompt</td>
<td>For example “sit in your chair” – no response- the next verbal statement “sit in your chair” should be accompanied by physical redirection.</td>
<td>Verbal redirects are repeated.</td>
</tr>
<tr>
<td>Dyad</td>
<td>Problem Behavior/ Function</td>
<td>Measurement</td>
<td>Examples</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------</td>
<td>-------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Pilot Study</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (Christian)</td>
<td>Interrupting meal time</td>
<td>Rate per minute</td>
<td>Flopping on floor, getting out of chair during routine, pushing items away, turning off lights</td>
</tr>
<tr>
<td></td>
<td>(function: escape)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B (Matt)</td>
<td>Off task Behavior</td>
<td>Percent Intervals</td>
<td>Standing up, head below table, grabbing mom, hugging mom, hitting or rubbing head with hand, on table or on mom, throwing food on floor, self stimulatory behaviors</td>
</tr>
<tr>
<td></td>
<td>during time</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(function: escape)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Replication Study</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C (Ryan)</td>
<td>Delay in following parent instruction to come to meal time (function: escape)</td>
<td>Latency</td>
<td>Continuing to engage in his preferred activity, such as using the computer, elope from his mother, shutting the doors</td>
</tr>
<tr>
<td>D (Kenny)</td>
<td>Out of seat during meal time (function: escape)</td>
<td>Duration</td>
<td>Standing in front of the seat, walking away from the table, jumping, or putting one knee in the seat</td>
</tr>
</tbody>
</table>
### Table 4

**Checklist to Evaluate the Fidelity of Implementation of Parent Training**

<table>
<thead>
<tr>
<th>Components</th>
<th>Definition</th>
<th>Questions to Confirm</th>
<th>Y/N/NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interventionist demonstrates routine with child</td>
<td>The interventionist worked hand son with the child during the routine</td>
<td>1. Did the interventionist work directly with the child?</td>
<td>_____</td>
</tr>
<tr>
<td>2. Interventionist prompts and confirms parent behavior with child</td>
<td>Trainer gives additional cues to guide parent as needed and gives verbal confirmation to praise parent</td>
<td>2. Did trainer give verbal feedback to parent?</td>
<td>_____</td>
</tr>
<tr>
<td>3. Parent demonstrates intervention while trainer provides feedback</td>
<td>Parent implements child’s BIP</td>
<td>3. Did parent use tangible reinforcement?</td>
<td>_____</td>
</tr>
<tr>
<td>4. Parent works hands-on with child</td>
<td>Parent directly interacts with child</td>
<td>4. Did parent work hands-on with child?</td>
<td>_____</td>
</tr>
<tr>
<td>5. Training setting is different than targeted natural environment</td>
<td>Training setting is a simulated setting</td>
<td>5. Is the training setting different than the natural setting?</td>
<td>_____</td>
</tr>
<tr>
<td>6. Trainer is present</td>
<td>Trainer is within the room</td>
<td>6. Is the trainer in the room?</td>
<td>_____</td>
</tr>
</tbody>
</table>
Table 5

*Effect Sizes (σ) for PES, PIS, and CPB by Parent Behavior and Child Behavior Conditions*

<table>
<thead>
<tr>
<th>Dyad</th>
<th>PES σ</th>
<th>PIS σ</th>
<th>CPB σ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parent Behavior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home-Based Training</td>
<td>A, C</td>
<td>5.48</td>
<td>5.8</td>
</tr>
<tr>
<td>Clinic-Based Training</td>
<td>B, D</td>
<td>6.50</td>
<td>4.45</td>
</tr>
<tr>
<td>Combined Training</td>
<td>A,B,C,D</td>
<td>5.25</td>
<td>4.64</td>
</tr>
<tr>
<td><strong>Child Behavior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian</td>
<td>A</td>
<td>2.40</td>
<td></td>
</tr>
<tr>
<td>Matt</td>
<td>B</td>
<td>3.99</td>
<td></td>
</tr>
<tr>
<td>Ryan</td>
<td>C</td>
<td>2.40</td>
<td></td>
</tr>
<tr>
<td>Kenny</td>
<td>D</td>
<td>5.07</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Magnitude of ES (σ): Small (d = .25); medium (d = .50); large (d = 1.0 or greater).
Figure 1: Behavior Change Across Parent-Child Dyads During Parent Training in the Pilot Study. This figure illustrates parent effective strategies (PES), parent ineffective strategies (PIS), and child’s problem behavior (CPB) using a Multiple Baseline Probe Design across Dyads.
Figure 2. Behavior Change Across Parent-Child Dyads During Parent Training in the Replication Study. This figure illustrates parent effective strategies (PES), parent ineffective strategies (PIS), and child’s problem behavior (CPB) using a Multiple Baseline Probe Design across Dyads.
References


APPENDIX A

FUNCTIONAL ASSESSMENT SCREENING TOOL (FAST)
FUNCTIONAL ASSESSMENT SCREENING TOOL (FAST)

Name: Jon              Age: 6              Date: 07/20/2009              Behavior Problem: Running

To the Interviewer: The Functional Analysis Screening Tool (FAST) is designed to identify a number of factors that may influence the occurrence of problem behaviors. It should be used only as an initial screening tool and as part of a comprehensive functional assessment or analysis of problem behavior. The FAST should be administered to several individuals who interact with the person frequently. Results should then be used as the basis for conducting direct observations in several different contexts to verify likely behavioral functions, clarify ambiguous functions, and identify other relevant factors that may not have been included in this instrument.

To the Informant: After completing the section on “Informant-Person Relationship,” read each of the numbered items carefully. If a statement accurately describes the person’s behavior problem, circle “Yes.” If not, circle “No.” If the behavior problem consists of either self-injurious behavior or “repetitive stereotyped behaviors,” begin with Part I. However, if the problem consists of aggression or some other form of socially disruptive behavior, such as property destruction or tantrums, complete only Part II.

Informant-Person Relationship

Indicate your relationship to the person:  ___x___Parent  _____Teacher/Instructor  _____Residential Staff  _____Other

How long have you known the person?  _6___Years  _____Months

Do you interact with the person on a daily basis?  ___x___Yes  _____No

If “Yes,” how many hours per day? ___18_____ If “No,” how many hours per week? _______

In what situations do you typically observe the person? (Mark all that apply)

___x___Self-care routines  _____Academic skills  ___x___Meals  ___x___When (s)he has nothing training to do

___x___Leisure activities  _____Work/vocational  ___x___Evenings  _____Other: _______________

training

Part I. Social Influences on Behavior

1. The behavior usually occurs in your presence or in the presence of others  [Yes]  [No]

2. The behavior usually occurs soon after you or others interact with him/her in some way, such as delivering an instruction or reprimand, walking away from (ignoring) the him/her, taking away a “preferred” item, requiring him/her to change activities, talking to someone else in his/her presence, etc.  [Yes]  [No]
3. The behavior often is accompanied by other "emotional" responses, such as yelling or crying
   Yes  No

Complete Part II if you answered “Yes” to item 1, 2, or 3. Skip Part II if you answered “No” to all three items in Part I.

Part II. Social Reinforcement

4. The behavior often occurs when he/she has not received much attention
   Yes  No

5. When the behavior occurs, you or others usually respond by interacting with the him/her in some way (e.g., comforting statements, verbal correction or reprimand, response blocking, redirection)
   Yes  No

6. (S)he often engages in other annoying behaviors that produce attention
   Yes  No

7. (S)he frequently approaches you or others and/or initiates social interaction
   Yes  No

8. The behavior rarely occurs when you give him/her lots of attention
   Yes  No

9. The behavior often occurs when you take a particular item away from him/her or when you terminate a preferred leisure activity (If “Yes,” identify: playing with sand going to park)
   Yes  No

10. The behavior often occurs when you inform the person that (s)he cannot have a certain item or cannot engage in a particular activity. (If “Yes,” identify: playing at the park)
    Yes  No

11. When the behavior occurs, you often respond by giving him/her a specific item, such as a favorite toy, food, or some other item. (If “Yes,” identify: hugs and trip to park)
    Yes  No

12. (S)he often engages in other annoying behaviors that produce access to preferred items or activities.
    Yes  No

13. The behavior rarely occurs during training activities or when you place other types of demands on him/her. (If “Yes,” identify the activities: self-care academic work other)
    Yes  No

14. The behavior often occurs during training activities or when asked to complete tasks.
    Yes  No

15. (S)he often is noncompliant during training activities or when asked to complete tasks.
    Yes  No

16. The behavior often occurs when the immediate environment is very noisy or crowded.
    Yes  No

17. When the behavior occurs, you often respond by giving him/her brief “break from an ongoing task.
    Yes  No

18. The behavior rarely occurs when you place few demands on him/her or when you leave him/her alone.
    Yes  No
Part III. Nonsocial (Automatic) Reinforcement

19. The behavior occurs frequently when (s)he is alone or unoccupied  
   Yes  No

20. The behavior occurs at relatively high rates regardless of what is going on in his/her  
    immediate surrounding environment  
   Yes  No

21. (S)he seems to have few known reinforcers or rarely engages in appropriate object  
    manipulation or “play” behavior.  
   Yes  No

22. (S)he is generally unresponsive to social stimulation.  
   Yes  No

23. (S)he often engages in repetitive, stereotyped behaviors such as body rocking, hand or finger  
    waving, object twirling, mouthing, etc.  
   Yes  No

24. When (s)he engages in the behavior, you and others usually respond by doing nothing (i.e.,  
    you never or rarely attend to the behavior.)  
   Yes  No

25. The behavior seems to occur in cycles. During a “high” cycle, the behavior occurs frequently  
    and is extremely difficult to interrupt. During a “low” cycle the behavior rarely occurs.  
   Yes  No

26. The behavior seems to occur more often when the person is ill.  
   Yes  No

27. (S)he has a history of recurrent illness (e.g., ear or sinus infections, allergies, dermatitis).  
   Yes  No
**Scoring Summary**

*Circle the items answered “Yes.” If you completed only Part II, also circle items 1, 2, and 3.*

<table>
<thead>
<tr>
<th>Likely Maintaining Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  2  3  4  5  6  7  8</td>
</tr>
<tr>
<td>1  2  3  9  10 11 12</td>
</tr>
<tr>
<td>1  2  3  14 15 16 17 18</td>
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<tr>
<td>19 20 21 22 23 24</td>
</tr>
<tr>
<td>19 20 24 25 26 27</td>
</tr>
</tbody>
</table>
APPENDIX B

BEHAVIOR INTERVENTION PLANS (BIP) FOR THE DYADS
Behavior Intervention Plan (BIP)

Participant: Dyad A, Christian

Routine: Meal Time               Natural Setting: Dining Room                     Training Setting: Home

TOPOGRAPHY OF PROBLEM BEHAVIORS

What is the form of the problem behaviors?

Behaviors interrupting meal routine: flopping on floor, getting out of chair during routine, pushing items away, and turning off lights.

SUMMARY OF F.A.S.T

<table>
<thead>
<tr>
<th>Likely Maintaining Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  2  3  4  5  6  7  8</td>
</tr>
<tr>
<td>Social Reinforcement (attention)</td>
</tr>
<tr>
<td>1  2  3  9  10  11  12  13</td>
</tr>
<tr>
<td>Social Reinforcement (access to specific activities/items)</td>
</tr>
<tr>
<td>1  2  3  14  15  16  17  18</td>
</tr>
<tr>
<td>Social Reinforcement (escape)</td>
</tr>
<tr>
<td>19 20 21 22 23 24</td>
</tr>
<tr>
<td>Automatic Reinforcement (sensory stimulation)</td>
</tr>
<tr>
<td>19 20 24 25 26 27</td>
</tr>
<tr>
<td>Automatic Reinforcement (pain attenuation)</td>
</tr>
</tbody>
</table>

Interpretation: The FAST results indicate the functions of behaviors as listed above as follows; attention (3), access to specific activities or items (6), escape (7), sensory stimulation (3), and pain attenuation (0).

FUNCTION: Escape from meal time

Which variables are maintaining the problem behaviors?

Overview: When Christian is asked to engage in the meal time routine he displays many behaviors that interrupt the routine and serve as escape. He will also want access to other items or activities to get out of the routine.

Behavioral Objective: Christian will decrease behaviors during meal time. As measured by the occurrence (rate) of problem behavior as defined above.

Parent Objective: Parent will increase implementing Effective Strategies and decreasing Ineffective Strategies. As measured by the percent of strategies implemented per session.
<table>
<thead>
<tr>
<th>Antecedent Strategies</th>
<th>Replacement Behaviors</th>
<th>Consequences Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>(What to do <strong>prior</strong> to Problem Behavior?)</td>
<td>(What do I <strong>teach</strong> instead?)</td>
<td>(What to do <strong>following</strong> problem behavior?)</td>
</tr>
<tr>
<td>- Provide a visual cue that it is meal time.</td>
<td>➔ <strong>TEACH</strong> the learner to stay seated during meal time and eat independently.</td>
<td>- If Christian engages in any of the above mentioned behaviors, redirect him to the appropriate task. In addition, attempt to block all problem behavior.</td>
</tr>
<tr>
<td>- Have the meal on the table before Christian sits down.</td>
<td>➔ <strong>Reinforcement of Alternative Responses (DRA):</strong> this procedure includes providing the student with an alternative method of receiving reinforcement for appropriate behavior. - the learner may gain access to a tangible, or activities he prefers by engaging in meal time.</td>
<td>- If necessary use a physical prompt to guide compliance.</td>
</tr>
<tr>
<td>- Do a preference assessment of reinforceers and have the reinforcement visible.</td>
<td></td>
<td>- Deliver reinforcement once Christian independently complies with the demand and ceases escape behavior.</td>
</tr>
</tbody>
</table>
Behavior Intervention Plan (BIP)

Participant: Dyad B, Matt

Routine: Meal Time Natural Setting: Kitchen Table Training Setting: Clinic

TOPOGRAPHY OF PROBLEM BEHAVIORS

What is the form of the problem behaviors?

Behaviors interrupting meal routine: off task behavior (standing up, head below table, eloping from table, grabbing mom, hugging mom, hitting or rubbing head with hand, on table, or on other items, throwing food on floor, self stimulatory behaviors (e.g. hand in front of face)

SUMMARY OF F.A.S.T

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</tbody>
</table>

Likely Maintaining Variable

- Social Reinforcement (attention)
- Social Reinforcement (access to specific activities/items)
- Social Reinforcement (escape)
- Automatic Reinforcement (sensory stimulation)
- Automatic Reinforcement (pain attenuation)

Interpretation: The FAST results indicate the functions of behaviors as listed above as follows; attention (5), access to specific activities or items (7), escape (8), sensory stimulation (3), and pain attenuation (0).

FUNCTION: Escape from meal time

Which variables are maintaining the problem behaviors?

**Overview**- When Matt is asked to engage in the meal time routine he displays many behaviors that interrupt the routine and serve as escape to competing reinforcers (sensory stimulation and access to preferred items). He will also want access to other items or activities to get out of the routine.

**Behavioral Objective**: Matt will decrease behaviors during meal time. As measured by the occurrence (partial interval recoding) of problem behavior as defined above.

**Parent Objective**: Parent will increase implementing Effective Strategies and decreasing Ineffective Strategies. As measured by the percent of strategies implemented per session.
| **Antecedent Strategies**  
(What to do *prior* to Problem Behavior?) | **Replacement Behaviors**  
(What do I *teach* instead?) | **Consequences Strategies**  
(What to do *following* problem behavior?) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide a visual cue that it is meal time.</td>
<td>➔ TEACH the learner to stay seated during meal time and eat independently.</td>
<td>• If Matt engages in any of the above mentioned behaviors, redirect him to the appropriate task. In addition, attempt to block all problem behavior.</td>
</tr>
<tr>
<td>• Have the meal on the table before Matt sits down.</td>
<td>➔ Reinforcement of Alternative Responses (DRA): this procedure includes providing the student with an alternative method of receiving reinforcement for appropriate behavior. - the learner may gain access to a tangible, or activities he prefers by engaging in meal time.</td>
<td>• If necessary use a physical prompt to guide compliance.</td>
</tr>
<tr>
<td>• Do a preference assessment of reinforcers and have the reinforcement visible.</td>
<td></td>
<td>• Deliver reinforcement once Matt independently complies with the demand and ceases escape behavior.</td>
</tr>
</tbody>
</table>
Behavior Intervention Plan (BIP)

Participant: Dyad C, Ryan

Routine: Meal Time  |  Natural Setting: Kitchen Table  |  Training Setting: Home

**TOPOGRAPHY OF PROBLEM BEHAVIORS**

**What is the form of the problem behaviors?**

Behaviors beginning the meal routine: delays transitioning to meal time

**SUMMARY OF F.A.S.T**

<table>
<thead>
<tr>
<th>Likely Maintaining Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Reinforcement (attention)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Social Reinforcement (access to specific activities/items)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Social Reinforcement (escape)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Automatic Reinforcement (sensory stimulation)</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic Reinforcement (pain attenuation)</td>
<td>19</td>
<td>20</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td></td>
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</tr>
</tbody>
</table>

Interpretation: The FAST results indicate the functions of behaviors as listed above as follows; attention (3), access to specific activities or items (5), escape (8), sensory stimulation (0), and pain attenuation (0).

**FUNCTION: Escape from meal time**

**Which variables are maintaining the problem behaviors?**

**Overview** - When Ryan is asked to engage in the meal time routine he displays many behaviors that delay transitioning from his preferred activities.

**Behavioral Objective:** Ryan will decrease behaviors transitioning to meal time. As measured by the latency of transition.

**Parent Objective:** Parent will increase implementing Effective Strategies and decreasing Ineffective Strategies. As measured by the percent of strategies implemented per session.
<table>
<thead>
<tr>
<th><strong>Antecedent Strategies</strong> (What to do <strong>prior</strong> to Problem Behavior?)</th>
<th><strong>Replacement Behaviors</strong> (What do I <strong>teach</strong> instead?)</th>
<th><strong>Consequences Strategies</strong> (What to do <strong>following</strong> problem behavior?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide a audible cue that it is meal time with a verbal warning.</td>
<td>➔ <strong>TEACH</strong> the learner to stay seated during meal time and eat independently.</td>
<td>• If Ryan engages in any of the above mentioned behaviors, redirect him to the appropriate task. In addition, attempt to block all problem behavior.</td>
</tr>
<tr>
<td>• Have the meal on the table before Ryan sits down.</td>
<td>➔ <strong>Reinforcement of Alternative Responses (DRA):</strong> this procedure includes providing the student with an alternative method of receiving reinforcement for appropriate behavior. - the learner may gain access to a tangible, or activities he prefers by engaging in meal time.</td>
<td>• If necessary use a physical prompt to guide compliance.</td>
</tr>
<tr>
<td>• Do a preference assessment of reinforcers and have the reinforcement visible.</td>
<td></td>
<td>• Deliver reinforcement once Ryan independently complies with the demand and ceases escape behavior.</td>
</tr>
</tbody>
</table>
Behavior Intervention Plan (BIP)

Participant: Dyad D, Kenny

Routine: Meal Time               Natural Setting: Kitchen Table               Training Setting: Clinic

TOPOGRAPHY OF PROBLEM BEHAVIORS

What is the form of the problem behaviors?

Behaviors interrupting meal routine: standing up

SUMMARY OF F.A.S.T

<table>
<thead>
<tr>
<th>Likely Maintaining Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 Social Reinforcement (attention)</td>
</tr>
<tr>
<td>1 2 3 9 10 11 12 13 Social Reinforcement (access to specific activities/items)</td>
</tr>
<tr>
<td>1 2 3 14 15 16 17 18 Social Reinforcement (escape)</td>
</tr>
<tr>
<td>19 20 21 22 23 24 Automatic Reinforcement (sensory stimulation)</td>
</tr>
<tr>
<td>19 20 24 25 26 27 Automatic Reinforcement (pain attenuation)</td>
</tr>
</tbody>
</table>

Interpretation: The FAST results indicate the functions of behaviors as listed above as follows; attention (1), access to specific activities or items (1), escape (5), sensory stimulation (5) and pain attenuation (2).

FUNCTION: Escape from meal time

Which variables are maintaining the problem behaviors?

Overview- When Kenny is asked to engage in the meal time routine he elopes from the routine to seek reinforcement (sensory stimulation).

Behavioral Objective: Kenny will decrease behaviors during meal time. As measured by the duration of problem behavior as defined above.

Parent Objective: Parent will increase implementing Effective Strategies and decreasing Ineffective Strategies. As measured by the percent of strategies implemented per session.
| **Antecedent Strategies**  
(What to do **prior** to Problem Behavior?) | **Replacement Behaviors**  
(What do I **teach** instead?) | **Consequences Strategies**  
(What to do **following** problem behavior?) |
|---|---|---|
| • Have the meal on the table before Kenny sits down.  
• Do a preference assessment of reinforcers and have the reinforcement visible. | → **TEACH** the learner to stay seated during meal time and eat independently.  
→ **Reinforcement of Alternative Responses (DRA):** this procedure includes providing the student with an alternative method of receiving reinforcement for appropriate behavior.  
  - the learner may gain access to a tangible, or activities he prefers by engaging in meal time. | • If Kenny engages in any of the above mentioned behaviors, redirect him to the appropriate task. In addition, attempt to block all problem behavior.  
• If necessary use a physical prompt to guide compliance.  
• Deliver reinforcement once Kenny independently complies with the demand and ceases escape behavior. |
APPENDIX C

R. DYAD: PARENT GUIDELINES
## R. Dyad: Parent Guidelines

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description</th>
<th>What to DO</th>
<th>What NOT to do</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antecedent</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Parent gives clear instructions during routine | Parent sets expectations by using declarative language when communicating to child. | “Sit down”  
“Take a bite”  
“It’s time to eat” | “Are you hungry?”  
“Don’t do that.”  
“You need to finish” |
| **Antecedent**                                 |                                                                             |                                                                            |                               |
| Materials are present                          | Materials needed for the transition to the dinner table.                    | Dinner at the table with utensils.  
Reinforcers are visible.  
Timer is in an audible location. | Ryan is asked to sit without dinner on the table.  
Reinforcers are not visible.  
Timer is not used.         |
| **Antecedent**                                 |                                                                             |                                                                            |                               |
| Appropriate environmental cues are clear within the environment | Ryan knows expectations of appropriate behaviors to complete routine. | A chair is clearly indicates where to sit by meal being in front of it.  
Appropriate silverware is set by dinner (soup-  
chicken- fork, finger food- no utensils)  
Timer is set. | Meal is not on the table to show Ryan where to sit.  
Several utensils that are not need for the meal are present.  
Timer is not used.         |
| **Antecedent**                                 |                                                                             |                                                                            |                               |
| Reinforcement is promised                      | Ryan is offered a promise as a reinforcer when asked to go to dinner.       | Reinforcer is offered as a promise for going to the table quickly.          | Reinforcer is not offered.     |
| **Consequence**                                | When Ryan transitions                                                       | Reinforcer is tangible.                                                     | Reinforcement is praise only.  |
**Reinforcement**

- **Reinforcement is delivered contingently**
  - quickly without problem behavior reinforcement is delivered
  - Reinforcement is delivered if problem behavior (eloping, playing on the PC, etc…) does not occur.
  - Reinforcement is given after problem behavior.

**Consequence**

- **Reinforcement is received by the child**
  - Ryan takes the reinforcer when offered.
  - He accepts it by eating it, or engaging in it.
  - He puts it down.

- **Consequence**
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  - He accepts it by eating it, or engaging in it.
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  - He puts it down.

**Parent blocks child problem Behavior**

- Mom blocks Ryan from engaging n problem behavior
  - Physically does not allow him run away or engage in other activities.
  - Reinforcer (promise) if not delivered.
  - Allows him to run or engage in other activities without attempting to block

**Redirects problem behavior**

- Following problem behavior
  - Parent redirects using one verbal prompt and then physically guide with verbal prompt
  - For example “sit in your chair” – no response- the next verbal statement “sit in your chair” should be accompanied by physical redirection.
  - Verbal redirects are repeated more than 2 x without prompting.
APPENDIX D

EXTENDED LITERATURE REVIEW
EXTENDED INTRODUCTION AND LITERATURE REVIEW

Autism is a developmental disorder that presents many challenges to parents as well as teachers, therapists, and other professionals. Problem behavior such as aggression, tantrums, and self-injury can make dealing with a child with an autism spectrum disorder (ASD) very challenging even for professionally trained individuals. Although there is no cure for ASD, a number of interventions have been tested in clinics, schools, and homes that have been shown to be effective (Horner, Carr, Strain, Todd, & Reed, 2002). Since the 1980s, applied behavior analysis (ABA) has been shown to be effective in the reduction of problem behavior and in facilitating acquisition of new skills for children with ASD (Lovaas, 1987). This study aimed to extend that analysis to parent training.

Autism falls into the diagnostic category of pervasive developmental disorders. According to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition Text Revision* (DSM-IV-TR; American Psychiatric Association, 2000), ASD is characterized by (a) qualitative impairment in social interaction, (b) qualitative impairment in communication, and (c) restricted repetitive and stereotyped patterns of behavior, interests, and activities. With respect to social interactions, children with ASD typically do not acquire or mimic common social cues such as facial expressions and body postures, fail to engage in meaningful activities with their peers, and lack an awareness or understanding of the role of emotions in social interactions with others (American Psychiatric Association, 2000). With respect to communication, children with ASD tend to show delays in language acquisition (particularly, in expressive language acquisition), have difficulties maintaining conversations with others, and develop a private or idiosyncratic language all their own (American Psychiatric Association, 2000). With respect to patterns of behavior, children with ASD typically conform to established, sometimes nonfunctional routines, develop restricted interests and
preoccupations, and show certain motor mannerisms like hand flapping or rocking (American Psychiatric Association, 2000). The impact of these characteristics on educators and caretakers is compounded by an increasing prevalence of this disorder.

The prevalence rate for ASD has increased from a small range of 35 to 60 children per 10,000 children (i.e., .35%-6%; Odom, Horner, Snell, & Blacher, 2007) to a larger average of 110 children per 10,000 children (i.e., 1.1%; Kogan et al., 2009). According to Kogan and colleagues, increased awareness by parents, improved screening by schools and doctors, and early identification by care providers may explain this increase in prevalence rate. Given these figures, it appears that the number of children diagnosed with ASD has doubled during the last decade. Such demographics appear to have a number of implications for families with children diagnosed with ASD. Each of these is discussed in the following sections.

Implications of Increasing Prevalence of ASD on Families

The increasing number of children diagnosed with ASD implies that many families face daily challenges related to the management of problem behavior like non-compliance, aggression, self-injury, and property destruction. The quality of life of both parents and children can be severely impacted unless healthy and productive solutions for the problem behavior are implemented (Lucyshyn et al., 2007). The next section describes the literature on the severity of problem behavior of children with ASD and its impact on the quality of life of parents.

Severity of Problem Behavior in Children with ASD

According to Hagopian (2007), about “half of children diagnosed with autism will display some level of problem behavior, and a high percentage of those will require treatment by a professional” (p. 43). It has been noted that the most common problem behaviors of children with ASD include tantrums (76%), aggression (56%), stereotypy (14%), and self-injury (11%; Horner et
In 2001, Lord and McGee published a guide for parents, teachers, and administrators. In this document, the authors noted some of the assumptions surrounding the definition of problem behavior. Lord and McGee reported the following:

The definition of problem behaviors depends on whether the behaviors are considered from the perspective of a child with an autistic spectrum disorder or from the perspective of a parent or teacher. From a child’s perspective, problem behaviors include the inability to understand demands of a classroom or a parent and to communicate his or her needs and wants, severe difficulty in initiating and maintaining social interactions and relationships, confusion about the effects and consequences of many of his or her behaviors, and engagement in restrictive and repetitive behaviors, and interests that may limit the child’s ability to learn and to fit in with peers. From a teacher’s or parent’s perspective, problem behaviors include lack of compliance with or disruption of classroom routines, tantrums, destruction of property, and aggression against self or others. (p. 116)

The Committee on Educational Interventions for Children with Autism (2001) recommended that educators and caretakers will better understand the cause of problem behavior if they consider the child’s perspective of what the child might be trying to communicate through the use of problem, instead of appropriate, behavior. However, the cause of problem behavior is complex and effectively addressing problem behavior requires specific training, the lack of which could create further stress among parents.

**Parental Stress and Problem Behavior of Children with ASD**

According to Davis and Carter (2008), “parenting stress has been one of the most
frequently researched aspects of family life among families of children with ASD” (p. 1278). Parents of children with ASD do experience a considerable amount of stress due to their child’s socially inappropriate behaviors and their own impressions of parental competence (Baker-Ericzén, Brookman-Frazee, & Koegel, 2004; Herring et al., 2006; Tomanik, Harris, & Hawkins, 2004; Wolf, Noh, Fisman, & Speechley, 1989). It is well-documented that parents of children with ASD are far more likely to measure well above the norm on the Parenting Stress Index than parents with children not diagnosed with ASD (Abiden, 1995; Baker-Ericzén, Brookman-Frazee, & Stahmer, 2005). Notably, parents of children with ASD report higher levels of stress when compared with parents whose children have been diagnosed with Down syndrome (Holroyd & McArthur, 1976).

In seminal findings, Cummings, Bayley, and Rie (1966), Cummings (1976), and DeMyer (1979) concluded that while a child with ASD experiences considerable stress the parent experiences a greater amount of stress due to the function of their child’s diagnosis, heightened demands and the characteristic behaviors of ASD. However, what is particularly significant about DeMyer’s research is that it underscores not only the importance of looking at the family as a whole, instead of looking at one family member’s relationship with the child with ASD, but also the need to provide accurate measurement of the differences between the mother’s and the father’s responses to the child with ASD. DeMyer found that mothers tend to report greater feelings of guilt more than fathers. DeMyer’s results have remained consistent over time with those that emphasize mothers of children with ASD expressing feelings of being less competent than those parents of children without ASD (Fisman & Wolf, 1991; Rodriguez, Morgan, & Geffken, 1990). In addition, Holroyd and McArthur (1976) found parents of children with ASD were likely to be upset by and disappointed with their children, concerned about their children’s
long-term dependency on them, and ashamed of their children’s socially inappropriate behaviors around others.

Mothers of children with ASD experience an “elevated risk” for high stress when compared to mothers of children diagnosed with other intellectual disabilities, undifferentiated developmental delays, Down syndrome, and cerebral palsy, mostly due to differences in the children’s behavioral problems (Eisenhower, Baker, & Blacher, 2005). The adverse psychological effects of ASD on parents, particularly mothers, are clearly profound. Koegel et al. (1992) suggest that parental stress might be a function of a variety of factors including (a) geographical location of the family, (b) number of other children in the family besides the child with ASD, and (c) level of functioning of each of the children in the family. Baker-Ericzén et al. (2005) showed that when toddlers with ASD participated in inclusive education programs, their mothers reported lower levels of stress experienced by their children, but the mothers reported experiencing no similar reduction in their own stress levels.

Parental stress is compounded when children with ASD also have comorbid psychological problems (Wolf et al., 1989). Wolf et al. (1989) reported that caring for children with psychological disorders can have an adverse impact on parents’ mental health in general. In particular, the long periods during which these children are largely dependent on their parents, the disappointments parents feel when their children fail to meet long-term goals, their preoccupations over their children’s lack of self-sufficiency, the growing concern over who will take care of their children after they have passed away, the ongoing sacrifice of their own goals for the sake of the needs and desires of their children, and the sense that they are isolated from friends and family all contribute to parenting stress and mental fatigue.
Another contributing factor to parental stress appears to be the social environment which tends to proliferate stress due the problem behavior of the child with ASD (Benson, 2006). Benson noted that children’s symptom severity and stress proliferation increase the likelihood of depression in their parents. Because children’s problem behavior appears to be a causal factor in parental stress and mental fatigue, there is a need for empirical models to enable parents to effectively manage the problem behavior of their children with ASD.

The Need for Empirical Models for Parent Training

The previous section delineated the implications of problem behaviors displayed by children with ASD on parental stress and the children’s quality of life. Parent education and support needs to be an imperative component of any intervention for improving the family’s daily living situation (Briesmeister & Schaefer, 2007). The next section will describe the current literature related to strategies for effective problem behavior management including function-based, Behavior Intervention Plans (BIP), effective parent training practices, and strategies to facilitate generalization of learned skills.

The Use of Function-Based Behavior Intervention Plans

The research on reducing problem behavior in children with ASD has been centered on four components: functional behavior assessment (FBA), prevention, comprehensive intervention, and systems changes (Horner et al., 2002). The FBA is the foundation of recommended function-based BIPs and is used to identify the environmental variables influencing behavior, which then leads to an intervention often including prevention, comprehensive intervention, and systems change planning. Prevention is concerned with decreasing the probability and frequency of future episodes of problem behavior by addressing how the environment is set up prior to problem behavior. Prevention mainly focuses on
controlling the problem behavior by encouraging replacement behavior instead of managing problem behavior through consequences. Comprehensive intervention is a program that builds off FBA and is used for the implementation of behavior change procedures (McGee, Morrier, & Daly, 1999). Systems change then focuses on including interventions at an organizational level and is primarily used within school settings (Horner et al., 2002). As discussed above, FBA is the key element when attempting to address problem behavior and the first step to implementing effective function-based BIPs. As part of FBA procedures, professionals observe the most salient variables involved in behavior causes, effects, and consequences. These variables are: (a) the consequences of the action, (b) the antecedent events that tend to give rise to the problem behavior, and (c) the setting events. In FBA, professionals typically use four interrelated steps: (1) the identification of the problem behavior; (2) the generation of a reasonable hypothesis to explain the problem behavior; (3) the confirmation of the hypothesis by means of further testing; and (4) the development of an intervention that is in line with the results of step 3 (Carr et al., 1994).

The results of interventions based on FBA tend to involve reducing both the rate and severity of problem behavior (Horner et al., 2002; Odom et al., 2003; Wolery & Dunlap, 2001). Horner et al. (2002) finds the reduction in problem behavior based on FBA interventions to be over 90%, in their evaluation of studies conducted from 1996 to 2000. In addition, due to some problem behaviors being identified as a function of communication to gain preferable items, Goldstein (2002) suggests that FBA is efficacious with improving the communication and overall linguistic acquisition of children with ASD. Finally, Hume, Bellini, and Pratt (2005) find FBA to be beneficial, especially when parent training is an integral part of the intervention.
The Need for Effective Parent Training Practices

Parent training is critical to improving the quality of life of children with disabilities such as ASD (Briesmeister & Schaefer, 2007). Parental involvement in the intellectual, social, and emotional development of children with ASD is vitally important to their growth (Shriver & Allen, 2008). In addition, parents believe they can and should play an instrumental part in their child’s intellectual development (Lovaas, 1987; Sallows & Graupner, 2005). Parents report “that the training they received was the most effective service in contributing to their child[ren]’s growth” (Hume et al., 2005, p. 195). The use of intensive home-based parent training is an effective way to decrease the moderate to severe problem behavior of children with ASD (O’Reilly & Dillenburger, 2000).

In another study, Harris (1984) found that parent training did not proceed without difficulties. Specifically, often a number of “clinical problems” (p. 127) that need to be examined more fully emerge during and after parent training. Among other problems, when parents do not systematically implement behavioral interventions, the development of desirable behaviors in children with ASD may be impeded. When parents neglect to generalize or to implement the training for intervention over time, adverse effects on the children may follow (Harris). Parents who learn to generalize their training beyond the situations in which they were trained can facilitate their children’s abilities to produce desirable behaviors in appropriate situations (Ducharme & Drain, 2004). This proposed study was designed to investigate the extent to which the effective use of parent training procedures facilitate the ability of parents to generalize skills to natural settings with their children with ASD, because the natural setting is where the problem behavior occurs at high rates.
The Need to Focus on Generalization of Skills

One of the main drawbacks of the research reviewed in the above sections is the lack of focus on generalization training for parents. Generalization is defined as “the occurrence of relevant behavior under different non-training conditions” (Stokes & Baer, 1977, p. 350). Although a multitude of variables can greatly impact the behavior of children with ASD, the question of whether parents can be taught to implement effective instructional and behavioral skills with their children in natural settings still needs to be explored.

Cooper, Heron, and Howard (1987) noted that generalization of treatment effects is significant to the long term success of parent training. In addition, “treatment generalization is a particularly important issue in parent training because parents often report difficulty managing a range of problem behaviors in different settings and sometimes with more than one child” (O’Reilly & Dillenburger, 2000, p. 763). The skills learned by children with ASD in the clinic or school are not always easily applied to the home and vice versa. New behaviors learned in one setting may not easily or naturally transfer to another for either parents or children. In addition, problem behavior that may be diminished within the school environments may nonetheless continue to occur at home and vice versa (Reeve, Reeve, Townsend, & Poulson, 2007). Further, parent behavior may not generalize from the training setting to the natural setting (Miller & Sloane; 1976).

In their seminal parent training study, Koegel, Glahn, and Nieminen (1978) had expected that after a parent watched a brief demonstration, he or she would be able to teach the child with ASD a new behavior. However, Koegel et al. observed no generalization to new behaviors occurred and alluded to parents being unable to use the same teaching strategies observed during the demonstration to teach a new skill to their children at home. Koegel et al.’s finding may
explain why parents do not often analyze and address their own child with ASD’s problem behavior even after following observation or training of a behavioral intervention plan with a child other than their own child (Crockett, Fleming, Doepke, & Stevens, 2007; Horner et al., 2002).

Important to treatment generalization is the use of multiple exemplars, for example training parents in multiple settings (such as school, clinic, and home). Such training is most likely to help parents increase generalization of learned skills to non-trained settings and behaviors (Handleman & Harris, 1980). However, the likelihood of parent training occurring in one setting and influencing decreases in the child’s problem behavior in the natural setting still has not been presented in the existing literature.

Theoretical Foundations for the Present Study

Due to a lack of empirical models for parent training, there is a need to develop effective training practices based on technically sound theoretical foundations. Sound theoretical underpinnings lead to effective scientific practices. When function-based practices are found to be efficacious in the field, opportunities for parents to generalize their training and society to be affected abounds. This section describes the theoretical foundations that serve as the basis for the current study including the role of ABA in ASD intervention, function-based behavioral intervention, and the importance of generalization of training.

*The Role of Applied Behavior Analysis for ASD Intervention*

ABA requires that interventions be evaluated by documenting observable, measurable behavior and the environmental variables responsible for the occurrence, or non-occurrence, of behavior. ABA interventions demonstrate specific behavior changes which can reproducible (Baer, Wolf & Risley, 1987). In one recent study that compared the eclectic-developmental
(mixed methods) intervention with ABA for two groups of very young children with ASD, the ABA intervention was shown to be more effective than the eclectic developmental intervention approach for improving core symptom behaviors of ASD (Zachor, Ben-Itzchak, Reinovich, & Lahat, 2007). In another study, Howard, Sparkman, Cohen, Green, and Stanislaw (2005) compared intensive behavior analytic interventions and eclectic treatments and concluded the behavior analytic interventions to be more effective.

Healy, O’Conner, Leader, and Kenny (2008) noted ABA has been empirically supported and demonstrated as effective over several decades. Practitioners of ABA assume that behavior is what needs to be analyzed: behavior should be accurately measured and careful considerations must be made to observe the effects of the immediate environment as well as for the intended or unintended consequences of the particular behavior (or set of behaviors) being examined (Carr, 1977; Day, Horner, & O’Neill, 1994). For example, Lovaas (1987) has used the Young Autism Project at the University of California, Los Angeles to train ABA therapists who work one-on-one with children and individuals with ASD where the therapy was supervised by trained professionals. Additionally, the goal of the work was in large measure to teach skill generalization. Lovaas’ landmark study with children with ASD receiving intensive training (i.e., training of 40 or more hours per week) showed the children made dramatic improvements in their educational and intellectual functioning after 2 to 6 years of treatment. Eikeseth (2001) commended the long term benefits of the Lovaas intervention model on the grounds that it has been an effective ASD intervention program. It is now well documented that early diagnosis and treatment increases the probability of improving the overall cognitive and behavioral capacities of children with ASD (Howard et al., 2005; Sallows, & Graupner, 2005; Smith, Groen, & Wynn, 2000). In addition, intervention at an early age for children with ASD has demonstrated greater
gains than those entering into the programs at older ages (Harris & Handleman, 2000; Sheinkopf & Siegel, 1998).

Function-based Behavioral Interventions

Skinner (1953) laid the foundation for applying ABA to the current understanding that surrounding environmental variables influence behavior. Since the 1960s, Carr (1977) and Day et al. (1994) have argued, much in the spirit of Skinner, that problem behavior serves multiple functions (i.e., a certain stimulus may produce the same behavior in different children but may serve the achievement of different ends). For instance, a child may throw a tantrum in order to escape from activities he or she prefers not to do or to gain access to items that he or she would like to possess. Because problem behavior can have multiple functions, identifying the purpose for the child’s behavior without a prior understanding of all the variables at work in the context of the environment can be extremely difficult.

Day et al. (1994) sought to establish the ways that multiple functions are connected to problem behaviors by measuring the responses of a young girl with ASD, a 34-year-old woman with intellectual disabilities, and an 18-year-old man with intellectual disabilities. During in-home trials that lasted approximately 15 minutes each and were conducted 3 to 5 times per week, these three individuals were tested on (a) how often they performed the task correctly, (b) how often a problem behavior occurred, and (c) how often an alternative response was given. Day et al.’s results were consistent with their original hypothesis. They found that the individuals tended to resort to problem behavior (such as aggression) to avoid performing difficult tasks or to gain access to particular items. Day et al. make two notable conclusions. First, problem behavior arises in a particular context. Consequently, in order to understand that behavior’s context, those working with children with ASD need to be attuned to the various environmental variables
influencing behavior. Second, the same problem behavior can be performed for different reasons, such as for achieving more than one functional behavioral outcome. These observations confirm the view of behavior advanced by researchers committed to ABA.

Studies by Day et al. (1994) and others have implications for understanding the nature of problem behavior in children with ASD. Rather than being simply a form of noncompliance (though, of course, problem behavior is this too), problem behavior represents a child’s best attempt at communicating what he or she desires. The child tries to satisfy his or her needs by using problem behaviors; acknowledgment of this likelihood can increase sensitivity by parents and professionals to the needs or desires the child seeks to fulfill. Being sensitive to the multiple functions of behavior, however, is not inconsistent with the following conclusion—namely, that the “message from this literature is that problem behaviors are pervasive and young children with autism are particularly at risk for developing problem behaviors” (Horner et al., 2002, p. 423). Further, being sensitive to the multiple functions of behavior is not inconsistent with the message that “once problem behaviors become an established part of a child’s behavioral repertoire, the problem behaviors are not likely to decrease in the absence of intervention” (Horner et al., 2002, p. 423).

In their meta-analysis of the literature on ASD, Horner et al. (2002) concluded that (a) children with ASD are likely to engage in problem behavior, (b) intervention is necessary for reducing problem behavior, and (c) the effects of problem behaviors on educational and social activities are adverse. In short, past efforts to validate ABA’s efficacy are integral to present and future investigations into ASD and associated problem behaviors.

The Importance of Generalization Training

The science of ABA has been recognized since the 1980s for decreasing problem
behavior and facilitating skill acquisition for children with ASD (Lovaas, 1987). With the increasing demand for evidence-based services for children with ASD especially because of the increasing prevalence rate, effective training in home, school, and clinical settings has received an inordinate amount of interest (Lerman, Tetreault, Hovanetz, Strobel, & Garro, 2008). In addition, Lovaas and Koegel (1973) and Bruder and Bricker (1985) had long since established that parents were active participants in implementing interventions with children with ASD. However, generalization of training has not been equally addressed by researchers (Bolton & Mayer, 2008), for examining the relationship between parent training and their ability to generalize the learned skills to the natural settings or routines associated with the child’s problem behavior.

In 1976, Miller and Sloane questioned the usefulness of expecting parents to be able to generalize skills from one setting to another; their concerns were based on the evaluation of five parents that had received training. Miller and Sloane concluded that parents were able to generalize their newly learned behaviors in the home setting only minimally, even though the home setting was similar to the training environment. Not surprisingly, significant changes in parent behavior had been observed in the training setting.

More recently, Crockett et al. (2007) evaluated parents’ abilities to generalize skills learned during effective training techniques beyond the clinical setting where the training occurred. Crockett et al. included two parents as participants and found that following parent training, the two parents were able to teach their children new skills by using discrete trial training. Discrete trial training has been characterized by Anderson, Taras, and Cannon (1996) as containing the several sequential components including a interventionist’s presentation, a child’s [or an adult’s] response, the consequence, and the short pause between the consequence and the
next instruction. Thus, Crockett et al. recommended initiating further research to determine if similar effects would be present when training occurs in naturalistic environments.

To summarize the theoretical foundations for the present study, the use of ABA techniques, including function-based behavioral interventions when utilized with parents to teach them instructional skills, will most likely enable parents to better manage the problem behavior of their children with ASD in natural settings.

Rationale for the Study

Because the available literature has been unable to answer questions regarding whether or not the training environment, or setting, influences parent training, experimental research was needed. Little documentation for parent generalization of training to the natural setting exists in the literature. When implementing BIPs with their children with ASD to help their children behave more appropriately in natural settings, parents need to be able to generalize their new skills to natural settings. Therefore, the rationale and significance for this study are discussed in this section as evidence-based practices in training procedures, current practices regarding parent training for children with ASD, and the contribution of the present study to the existing literature.

Evidence-Based Practices for Training Adults

The use of ABA to create function-based interventions has been found to be most effective for reducing problem behavior displayed by children with ASD (Eikeseth, 2001; Harris & Handleman, 2000; Healy et al., 2008; Sheinkopf & Siegel, 1998). Biddy, Eikeseth, Martin, Mudford, and Reeves (2002) stated that the quality of training needed to implement ABA interventions effectively with those working with children with ASD in general is not addressed
adequately in the literature. However, Lerman et al. (2008) provided a detailed account of a
teacher training model.

Lerman et al. (2008) used an intensive teacher-training model with 18 certified special
education teachers who worked with students diagnosed with ASD. The intensive training
focused on facilitating teachers’ competence in implementing both preference assessments and
direct teaching procedures. The training occurred in the summer and consisted of 4 days of
lectures, discussion, and role playing. The topics covered focused on basic learning principles
and managing problem behavior. Training continued into a classroom with students during the
summer. The real-time, in-class training consisted of behavior modeling and direct practice with
feedback. Following the training period, the teachers received follow-up observations at the end
of 3 months. The follow-up observations were used to evaluate the teachers’ generalization of
the trained skills into their regular classrooms. Lerman et al. concluded that the teachers
maintained almost 100% accuracy (i.e., 17 out of 18 teachers participating) at the follow up
observation.

Sarokoff and Sturmey (2004) produced comparable results from providing instructions,
modeling, rehearsal, and feedback to with the teachers participating in their training program.
Sarokoff and Sturmey taught the teachers effective skills for providing instructions, modeling,
rehearsal, and feedback in order to implement discrete-trial teaching. Unfortunately, many of
these training procedures have not been applied to parent-training programs until recently
(Lafasakis & Sturmey; 2007), and the efficacy of parents generalizing parent-training models
into their natural setting needs to be established.
Current Practices Regarding Parent Training for Children with ASD

The results concerning the improvements in communication, social interaction, and behavior patterns have been much more encouraging in the case of parent training. A good deal of research supports the conclusion that parental involvement in the intellectual, social, and emotional development of children with ASD is of vital importance (Briesmeister & Schaefer, 2007; Shriver & Allen, 2008). The parents “indicated that parent training was the most effective service in contributing to their child’s growth” (Hume et al., 2005, p. 195). This report is consistent with reports by Lovaas (1987), Sallows and Graupner (2005), and Grindle, Kovshoff, Hastings, and Remington (2009b), who have suggested the importance of parent training in effective intervention.

Recent research addressing parent training focuses primarily on child behavior instead of the parent’s behavior, and the training facilitates the skill acquisition of children with ASD rather than decreases in problem behavior incidents. This focus has been demonstrated in research regarding training parents to use errorless academic compliance training (Ducharme & Drain, 2004). Ducharme and Drain (2004) found parents made a number of academic and nonacademic requests of their children with ASD. When the children complied with requests, they received positive reinforcement from the parents. The tasks were then ranked according to the likelihood of compliance, with 1 indicating high compliance behavior and 4 indicating low compliance behaviors. For as long as 6 months after treatment, study participants maintained a consistent level of academic compliance behavior for multiple areas of behavior (Ducharme & Drain, 2004). Ducharme, Sanjuan, and Drain (2007) reported equivalent results for mothers of children with Asperger syndrome (a disorder found within ASD) who successfully engaged their children in compliance training.
In 2007, Lafasakis and Sturmey implemented intervention involving the use of specific instructions, modeling, rehearsal, and feedback with three parent-child dyads in a room at a special education preschool to investigate the effectiveness of these procedures in teaching children with ASD new skills. They demonstrated the effectiveness of teaching discrete-trial skills to parents and which subsequently resulted in the generalization of skills with untrained stimuli. However, Lafasakis and Sturmey did not evaluate generalization of skills to a natural setting or focus on the decrease of CPB.

Lucyshyn et al. (2007) conducted a 10-year longitudinal, multiple baseline study to evaluate the effects of a function-based BIP across four settings with one child with ASD and severe problem behavior. Generalization of the intervention was promoted to parents through activities which included (a) implementation checklist to self monitor, (b) guided practice, and (c) encouragement to use strategies in non-trained environments. However, the reduction of child’s problem behavior was the only dependent variable, and parental behavior and generalization of training were not directly evaluated. Lucyshyn et al. also measured the social validity of the intervention which was verified by parents as being at a high level.

*Contribution of the Present Study to the Existing Literature*

To date, not enough documentation on the relationship between parent training for decreasing CPB and generalization of parent skills from one setting to another has been published. Nonetheless, researchers believe teaching individuals with ASD in multiple settings (such as school and home) can help to increase child’s generalization (Handleman & Harris, 1980). Bolton and Mayer (2008) confirm that the problems associated with the transfer, or generalization, of training by parents to the natural, or non-trained, setting has not been addressed. While this issue of training transfer (a.k.a., generalization of training) was identified
in the 1970s, it continues to remain a critical issue requiring further study in the 21st century. Crockett et al. (2007), McConnell (2002), and Wolery and Garfinkle (2002) recommended that more research be conducted to assess the methods used in training parents for intervening with their children with ASD. Thus, the purpose of the present study will be to fill in the gap in the current research by evaluating what procedures and what type of training setting will be most effective for parent training and for generalization of training skills to the natural setting. Specifically, the study will compare the effectiveness of parent generalization of training skills to decrease CPB when training is provided in a home-based setting versus a clinic-based setting.

Research Questions

1. Is home-based training more effective than clinic-based training for teaching parents to implement a function-based behavior intervention plan for a child with autism?

2. To what extent will parent training on the home- or clinic-based setting facilitate the generalization of skills to the natural environment associated with child problem behavior?

3. Will the problem behavior of the child with autism decrease in the natural environment as a function of parent training?
APPENDIX E

EXTENDED METHODOLOGY
EXTENDED METHODOLOGY

This section describes the research methodology utilized for both the pilot study and the replication study. Due to limited research documented in the current literature, a pilot study was first conducted to evaluate the effectiveness of parent training on decreases in the problem behavior of children with autism in natural environments. The specific purpose of the pilot study was to test efficacy of the measurement variables, the research design, the intervention, and the data analysis procedures. Following documentation of the effect of intervention for the participants in the pilot study, a replication study was implemented to validate the findings for additional participants. The methodology, including measurement variables, research design and intervention procedures were the same for both the pilot and replication studies and are described in the sections below.

Participants and Setting

Participant Selection

A total of four parent-child dyads were selected to participate in this study. Parents volunteered to participate in response to a flyer circulated in local school districts, clinics, resource agencies, and online postings on Parent Support Group chat rooms. A total of four out of nine dyads met the inclusion criteria. The inclusion criteria were: (1) the parent participant(s) must have a child already diagnosed with ASD and qualify for receiving autism services in the local public school; (2) the child with ASD must display problem behavior during at least one activity routine (e.g., bed-time, bath-time, meal-time, transition-time) in the home environment; (3) the parent participant(s) must commit to parent training sessions either at home or in the clinic and be willing to implement the intervention in either of these settings as demonstrated; and (4) the child with ASD must be between 2 to 15 years of age and reside at home with the
participating parent(s). No exclusion criteria were established regarding any demographic variables including gender, race, or ethnicity as long as the inclusion criteria were met.

Of the four parent-child dyads selected to participate in this research, two dyads participated in the pilot study and the other two participated in the replication study. Care was taken to ensure that the parent-child dyads were comparable on variables that could influence the outcomes of the study, including socio-economic factors, severity of the child’s disability, and the family composition (e.g., single-parent versus two-parent family).

**Institutional Review Board (IRB) Approval**

The procedures for protecting the rights and welfare of all participants in this research study were approved by the IRB committee at the University of North Texas. The committee approved the content of the informed consent letter, the procedures for data collection and intervention, and the anticipated benefits of the intervention for participants.

**Setting**

Two parent-child dyads were selected to receive parent training within the home setting, and the other two dyads received training in a clinical environment. The participants were assigned to receive training at home or the clinic based upon who returned the informed consent letter first. For both studies, the participants that returned the informed consent letter first were selected to receive parent training at home whereas the participants who returned the informed consent letters second received training at the clinic. This was necessary to ensure that the settings were selected randomly.

The parent training sessions in the home setting were implemented within a simulated (i.e., artificial) routine to allow for testing for generalization of effective strategies to the natural routine. For example, meal time may have been practiced at a different dining table and a room
than the typical location for this routine. Parent training sessions implemented in the clinical setting were completed in a room measuring 210 square feet with a one-way mirror for observation. For example, when meal time was practiced in the clinic, a simulated setting with a table, chairs, and food was provided. The effects of both home-based and clinic-based training were assessed during the natural routine in the home environment.

Participants

Two parent-child dyads participated in the pilot study. Dyad A included Christian (8 years) and his mother (35 years) and Dyad B included Matt (6 years) and his mother (39 years). Two additional parent-child dyads participated in the replication study. Dyad C included Ryan (8 years) and his mother (37 years) and Dyad D included Kenny (6 years) and his mother (41 years).

Prior to this study, all child participants emitted problem behavior during meal time as indicated by parent report and FBA procedures. All of the children demonstrated delayed expressive language and used approximately five sign language approximations and had limited receptive language skills. Additional information regarding participant characteristics is provided in Table 1.

<Insert Table 1 here>

Measurement

Parent Behavior

The parent behaviors measured included very specific actions and the discrete behavior analytic strategies identified as essential for decreasing CPB regardless of the setting. These strategies have been documented in the literature on ABA (and were described in the previous section) as evidence-based practices for intervening with parents or teachers of students with
problem behavior. The strategies were antecedents (i.e., events that occur before the child’s behavior) or consequences (events that occur after the child’s behavior) designed to prevent problem behavior and maintain appropriate behavior. The effective strategies were incorporated into the Behavior Intervention Plan (BIP) that was developed for each child. Examples of effective antecedent strategies included parents providing specific and clear instructions, making the materials and cues needed for the routine accessible, and completing a preference assessment prior to starting the mealtime routine. Examples of effective consequent strategies included contingent reinforcement for appropriate behavior, redirection for the child’s problem behavior, and physical blocking for problem behavior. Examples of ineffective antecedent strategies included reinforcers not visible to the child at the start of the routine or necessary materials not present on the table prior to routine. Examples of ineffective consequent strategies included reinforcement such as praise only without adding a tangible preferred item, allowing the child to disengage from the routine, or repeating verbal redirections used primarily as prompts. An operational definition, with examples of Parent Effective Strategies (PES) and non-examples or Parent Ineffective Strategies (PIS), is noted on the Parent Strategies Checklist shown in Table 2.

<Insert Table 2 here>

Parent behaviors were recorded using the Parent Strategies Checklist designed to document the occurrence or non-occurrence of discrete parent responses (see Table 2). This checklist with PES and PIS was completed by the primary and secondary data coders using video recordings made during the training and probe sessions in the natural setting. Based on the ABA literature, parents using PES were more likely to elicit appropriate child behavior whereas parents using PIS were more likely to elicit CPB. The notation of a plus symbol (“+”) was recorded to indicate occurrence of PES or PIS whereas a minus symbol (“−”) was recorded to
indicate non-occurrence of these responses. For example, during any given interval of time, a parent could display (“+”) both PES and PIS or not display (“−”) either response. At the end of each observation period, the total number of occurrences and non-occurrences of PES and PIS were added to generate a percentage for target behavior per observational session.

*Child Problem Behavior (CPB)*

CPBs were individually identified based on the responses that interrupted the daily mealtime routine for each child. These behaviors were identified from the information generated by conducting FBA procedures (Cooper et al., 1987). These responses were measured (probed) during Baseline and Intervention in the natural setting. Examples and non-examples of problem behavior for each child participant are provided in Table 3.

*Child Behaviors for Christian, Dyad A*

The topography of problem behaviors for Christian were identified as getting up from table, flopping to the floor, shirt off, turning off lights, opening and closing doors, and sitting in another chair (i.e., interrupting the routine). The total rate of these behaviors occurring per minute was calculated during the routine by documenting the frequency of each behavior and dividing by the duration of the routine.

*Child Behaviors for Matt, Dyad B*

The topography of behavior for Matt was classified as off-task behavior. Examples included standing up, keeping head below table, eloping from table, grabbing mom, hugging mom, hitting or rubbing head with hand, climbing on table or other surfaces, throwing food on floor, and using self-stimulatory behaviors (e.g., hand in front of face). However, self stimulatory behaviors were not recorded as off-task if Matt was simultaneously performing a response
considered to be an integral part of meal time (e.g., cutting or chewing food, having a drink, sitting in the chair, following parent instruction). A 30-second partial interval recording system was used to document the occurrences of off-task behavior. The symbol “+” was recorded if off-task behavior was observed at anytime during the 30-second interval and a “0” was recorded if the behavior was not observed during the same interval. The percentage of intervals documenting the occurrences of problem behavior was then calculated by dividing the total number of intervals by the total number of intervals documenting the target behavior.

*Child Behavior for Ryan, Dyad C*

The topography of problem behavior for Ryan was the time elapsed between the delivery of his parent instructing him to “go sit down” for the meal and his behavior of coming to the table and sitting down for the meal after his parent’s request. For example, after Ryan’s parent made a request to come to the table, Ryan’s CPB involved him continuing to engage in his preferred activity, such as using the computer, running away from his mother, or shutting the door to delay going to the dining table to start the meal. To document this behavior, a timer was used to record the time starting his mother’s words, “Come to Dinner,” or “Go Sit down,” or “Ryan…,” and the actual time it took Ryan to sit appropriately on the chair at the table. The unit of measurement for this target response was latency.

*Child Behavior for Kenny, Dyad D*

The topography of problem behaviors during meal time was identified as being out of seat, for example, standing in front of the seat, walking away from the table, jumping, or putting one knee in the seat. To document behavior, stop and start times for each incidence of behavior were totaled for each routine to record the duration of problem behavior during the routine. The
rate of problem behavior was then calculated by dividing the amount of time by the total duration of problem behavior (R = F/D).

Measurement Procedures

*Equipment and Materials*

Parent training and observations in the home and clinic settings were recorded using a digital video camcorder. A video camcorder and compatible SD cards were provided to each dyad. The SD cards recorded data for 2 to 4 hours at a time.

*Direct Observations*

Direct observations of target responses were conducted in the home and clinic environments with each parent-child dyad, respectively, during the meal-time routine during both baseline and intervention conditions. Direct observations to measure response generalization were conducted by video recording parent and child responses during training in the simulated setting as well as during the natural routine in the home setting. Because meal-time was a routine that occurred daily at home, families were asked to video-record any three events during the week instead of three recordings on the same day. This recording provided a sample (probe) of events that occurred during a specific routine. By using probe data, the demands on the time and effort of participants were reasonable and allowed for flexibility within their family schedules. Probe data were collected throughout the baseline and intervention phases at home during meal-time and following parent training sessions which occurred either in the clinic or in the simulated setting at home.

*Interobserver Agreement*

Procedures for training data collectors and measuring interobserver agreement (IOA) were established to ensure reliability of data across all the experimental conditions of the study.
These procedures are described below.

Observer Training

Two graduate students (one primary and one secondary data coder) assisted with the collection and coding of data and assessment of agreement between two data coders (i.e., IOA). Both data coders were certified Behavior Analysts with extensive coursework and practical training in data collection prior to being hired for this study. Also, each data coder received an average of 5 hours of direct training in data collection procedures specific to measurement of target responses for the participants in this study. In addition, the primary data coder was also trained to record data on the fidelity of treatment. Data collection for baseline was not initiated until the primary and secondary observers achieved an IOA score of least 90% for three consecutive training sessions.

Interobserver Agreement Measurement

IOA was measured for 25% of all observations distributed throughout the experimental phases of the study. The IOA was calculated by dividing agreements by the sum of agreements plus disagreements with the resulting value multiplied by 100 to obtain a percent (%) value. Special consideration was given for comparing the measurement of CPB in the replication study (Dyad C & D) due to behavior recorded as latency and duration. The coders’ IOA was recorded as “agreed” if no more than a 3-second discrepancy occurred. The outcomes of IOA for each dyad are as follows: dyad A, \( m = 95.9\% \); range 92-100\% dyad B, \( m = 93.83\% \); range 93.5-94.2\% dyad C \( m=100\% \), dyad D, \( m= 98.6\% \); range 96-100\%.

Research Design

A Multiple Probe Design across Participants (Barlow & Hersen, 1984; Tawney & Gast, 1984) was utilized to demonstrate a functional relationship between the independent variable
(parent training) and dependent variables (parent implementation of the BIP in the natural setting leading to a reduction in CPB). The design included the two phases of baseline and intervention, both which are described in detail in the experimental procedures below. The data for both parent and child responses were visually displayed on an individual scale to allow for a comparison between the baseline and intervention conditions. The results of the effect of intervention are illustrated separately for the pilot study (i.e., Dyads A and B) and the replication study (i.e., Dyads C and D). Decisions regarding the phase change from baseline to intervention were based on the stability of parent behavior.

Experimental Procedures

*Functional Behavior Assessment (FBA)*

The Functional Assessment Screening Tool (FAST; Iwata, 2002), a specific FBA tool, was completed with each parent-child dyad. The FAST offered a structured interview protocol designed to identify an individual’s function(s) of problem behavior (see Appendix A). This interview was administered to each parent with focus being on identifying the function(s) of the child’s problem behavior. For example, if the problem behavior of running from the dinner table was a concern, then the outcomes of the interview might have indicated that this behavior might be maintained by escaping the demand of staying seated during the dinner routine. Following this assessment behavioral objectives were identified for each dyad.

*Baseline*

Baseline probe data were collected for each participant prior to implementing parent training in the natural routine in the home environment using the measurement system described above. During this experimental condition, no attempts were made to alter or manipulate child or parent behavior.
**Intervention**

The parent training (intervention) was implemented in a staggered manner across the two dyads (one at home and another in the clinic). In other words, after a baseline demonstrated a stable pattern for the first dyad, the intervention was implemented while the baseline for the second dyad was held constant. When the interventions with the first dyad were observed to be effective based on an ongoing visual analysis of data, intervention with the next dyad was initiated.

The implementation of the intervention involved two stages. First, a behavior intervention plan (BIP) based on the function of the child’s problem behavior was developed. Second, parent training sessions were conducted to teach parents how to implement the BIP to address their child’s problem behavior during the specific routine associated with problem behavior. PES were incorporated in the BIP as critical responses for decreasing CPB as were PIS that needed to be eliminated.

**Development of Behavior Intervention Plan (BIP)**

Following collection of baseline data and generating information regarding the functions of CPB based on the FBA procedures, a BIP was developed in collaboration with the parents (see Appendix A). The BIP included (1) problem behaviors identified by function (social mediated, negatively or positively reinforced behavior, or automatic, negatively or positively reinforced behavior); (2) operationally defined topographies of problem behavior; and (3) explanations of antecedent and consequence strategies that needed to be displayed for decreasing CPB.

**Implementation of Parent Training**

Following the development of a BIP for each child, parent training procedures were
implemented with each dyad in a staggered manner in a simulated routine as noted above. For example, because meal time was the targeted routine, the training sessions were simulated at a different time of day, such as snack time instead of dinner time. When training was conducted in the clinic, a mock setting with a table, chairs, and food was provided. When training was provided in the home environment, a mock setting was created by using a different table in a different room than the equipment used in the natural routine.

Dyads A (pilot study) and C (replication study) received parent training in the home environment. Dyads B (pilot study) and D (replication study) received parent training in the clinical setting. The effectiveness of parent training was then evaluated within the natural home environment for each dyad using the same protocol as applied to evaluate target responses during baseline.

The first training session for each dyad included several components. It started with reviewing the BIP with the parent and differentiating between effective and ineffective strategies for addressing CPBs. In addition, some common ABA terminology noted on the BIP (e.g., antecedents, behavior, consequence, and reinforcement) were also reviewed with specific and individualized examples and non-examples. Each parent was also provided a checklist of strategies to use and not use during the meal-time routine. The parents were encouraged to use this checklist throughout the mealtime routine to enable them to monitor the strategies they were implementing with their children.

Following the discussion on the use of the parent checklist (see Appendix D), the interventionist first modeled the use of effective strategies with the child during the simulated meal-time routine. After the demonstration, the parent was asked to practice the use of effective strategies with the child during the session. The interventionist gave the parent immediate
feedback to confirm the correct usage of PES or to correct the use of PIS being implemented by the parent. This training session lasted for approximately 60 minutes. To ensure consistent implementation of intervention across all four dyads, the interventionist reviewed the Fidelity Checklist before and during the training to ensure all components of training were delivered accurately. These components are further described in the next section.

The second training for each dyad was utilized to provide the parents with direct feedback regarding video-records of observed responses during the probes in the natural setting following initial training and to address any questions or concerns. For example, two of the four parents inquired if they could fade out the reinforcement being used during meal-time after CPB decreased. In response to this question, the interventionist reviewed the benefits and risks with each parent to determine the importance of reinforcement for maintaining the individual child’s appropriate behavior during meal time. In both cases, the parent agreed that the reinforcement was an effective strategy that was still needed within their routine to maintain the child’s appropriate behavior.

**Implementation of PES by Parents**

Following each training session, the parent was provided with a camcorder and SD memory card to record three meal-time sessions. The three natural setting routines were selected by the parents based on their convenience within 10 days of parent training. Parents were given opportunities to practice using the camcorder with the interventionist and were provided with the user’s manual. In addition, parents were given permission to and encouraged to call the interventionist on the phone at anytime regarding the operation of the camcorder.

During the pilot study, the interventionist drove to the participant’s home and picked up the camcorder and then transported it to the data coder. Toward the end of the pilot study this
process was altered by having the parents mail the camcorder directly to the data coder. This process modification allowed for the data to be coded faster, and parent training to be scheduled in a time-efficient manner. The modification was instituted for the replication study because it was preferred by participants as well. Of note, the parents were not asked to pay for any of the mailing expenses and were instead issued a FEDEX account number.

Measurement of the Fidelity of Implementation of Intervention

In order to ensure the fidelity of implementation of intervention procedures, the primary observer recorded data on the interventionist’s behaviors for all eight training sessions (two per dyad) on the use of specific responses implemented by the interventionist with the parent during training sessions. These responses included: (1) interventionist demonstrates routine with child, (2) interventionist prompts and confirms parent behavior with child, (3) parent demonstrations of the procedures identified in the Parent Behavior Checklist while the interventionist provided parent with critical feedback necessary to maintain acquired skills or practice newly learned skills, (4) interventionist allowing parent to demonstrate working hands-on with child during the training routine, (5) training setting being different than targeted natural environment, and (6) interventionist being present to provide any assistance or guidance to the parent in case of occurrence of CPB. The fidelity of implementation of intervention was calculated to be 100% across all eight training sessions and was evaluated with a fidelity checklist indicating the five training components as shown in Table 4.

<Insert Table 4 here>
APPENDIX F

EXTENDED RESULTS
EXTENDED RESULTS

This study investigated the effectiveness of home-based versus clinic-based parent training and enabled parents to implement a function-based BIP during a specific daily routine associated with high rates of CPB. Evaluating the effect of the location of parent training (i.e., home or clinic) and generalization of skills by parents into the natural environments in which they were not trained to decrease their child’s problem behavior were key variables of interest in the study. Data were collected for three dependent variables for each dyad, including the percentage of the PES and PIS demonstrated by parents and the amount of CPB as a function of parents’ use of strategies. This section provides a description of the findings derived from the pilot and replication study. Specifically, a visual analysis of data is presented followed by the presentation of the effect size. An interpretation of results in relation to the research questions are presented in the discussion section.

Visual Analysis of Data

Visual analysis has been defined as the systematic examination of graphic data to identify meaningful change in behavior and to determine the extent to which behavior change can be attributed to the manipulation of the independent variable or intervention (Cooper et al., 1987). Data were evaluated to assess changes in the behavioral patterns of the three dependent variables in this study (e.g., PES, PIS, and CPB) by evaluating the trend, level, immediacy of effect, overlap, and variability.

Trend referred to the overall direction (i.e., increasing or decreasing) of the data. For the intervention to be deemed effective, data needed to indicate an increasing trend for PES and a decreasing trend for both PIS and CPB. Level referred to the mean (m), or average, change in target responses across experimental conditions. To identify level, the average was calculated...
across phases to evaluate the effectiveness of the intervention. For the intervention to be deemed effective, data needed to indicate lower levels during the intervention phase when compared to baseline for PIS and CPB. In addition, the higher levels of PES during the intervention phase when compared to baseline were needed. Immediacy of effect was used to evaluate how quickly behavior was impacted following the intervention. Immediate effects demonstrated the effectiveness of the intervention. Overlap referred to the number of data points across two adjacent phases within the same range. The greater the overlap was, less was the demonstration of experimental effect on target behavior; with no or less overlap, the demonstration of effect was more likely. Variability referred to the stability of the data pattern. These five properties of visual analysis explicated above were utilized to make on-going data-based decisions regarding the manipulation of the intervention throughout the data analysis.

*Visual Analysis Results for the Pilot Study (Dyads A and B)*

The intervention (parent training) appeared to have been highly effective as illustrated in the pilot study graph for increasing PES, decreasing PIS and CPB for Dyads A and B as evaluated using the five properties of visual analysis. Through visual analysis, the dependent variables were observed to significantly change following intervention from baseline.

Dyad A’s data indicated an increase in trend for PES and a decreasing trend for both PIS and CPB. Lower levels of PIS (m=13.75) and CPB (m= 23.56) were observed during the intervention phase when compared to baseline (PIS, m=77.0; CPB, m= 82.33). A higher level of PES (m=94.13) during the intervention phase was evident compared to baseline PES (m=33.0). Data showed immediacy of effect of intervention when compared to baseline. The last data point of PIS (77%) and CPB (1.18 rate per minute) in baseline to the first data point in the intervention phase of PIS (11%) and CPB (.09 rate per minute) appear to demonstrate the effectiveness of
intervention. Additionally, an increase of the first data point in the intervention phase of PES (100%) from the last baseline data point PES (11%) was also observed. The absence of overlap across the phase also indicated the effectiveness and strength of the intervention. No variability in the intervention data was demonstrated for this dyad which illustrated stability in the pattern of PES, PIS, and CPB.

Dyad B’s data indicated an increasing trend for PES and a decreasing trend for both PIS and CPB. Lower levels of PIS ($m=17$) and CPB ($m=1.18$) were documented for the intervention phase when compared to baseline (PIS, $m=83.3$; CPB, $m=1.3$). A higher level of PES ($m=100$) during the intervention phase was evident when compared to baseline PES ($m=33.3$). Data showed immediate effect of the intervention when compared to baseline. The last data point of PIS (87.5%) and CPB (74.07%) in baseline to the first data point in the intervention phase of PIS (0%) and CPB (28.26%) demonstrated the effectiveness of parent training. In addition, an increase of the first data point in intervention phase of PES (100%) from the last baseline data point PES (25%) was observed. The absence of overlap across the phase indicated the effectiveness and strength of the intervention. No variability in the data for this dyad was demonstrated which illustrated stability for PES, PIS, and CPB.

Visual Analysis of Replication Study (Dyads C and D)

The intervention (parent training) was deemed to be highly effective as illustrated in the replication study’s graph presenting the data of Dyad C and D and as evaluated using the five properties of visual analysis. Through visual analysis, the dependent variables PES, PIS, and CPB were observed to significantly change following intervention from baseline.

Dyad C’s data showed an increasing trend for PES and a decreasing trend for both PIS and CPB. Lower levels of PIS ($m=0$) and CPB ($m=18.87$) during the intervention phase when
compared to baseline (PIS, $m=91.66$; CPB, $m=105.3$) were observed. A higher level of PES ($m=100$) during the intervention phase was evident compared to baseline PES ($m=12.5$).

Immediacy of effect was illustrated in the immediate drop from the last data point of PIS (87.5%) and CPB (82 seconds) in baseline to the first data point in the intervention phase of PIS (0%) and CPB (30 seconds). The increase of the first data point in intervention phase of PES (100%) from the last baseline data point PES (12.5%) was observed. The absence of overlap across the phase indicated the effectiveness and strength of the intervention. The variability the data for this dyad illustrated stability for PES, PIS, and CPB.

Dyad D’s data indicated an increasing trend for PES and a decreasing trend for both PIS and CPB. Lower levels of PIS ($m=6.25$) and CPB ($m=.47$) during the intervention phase when compared to baseline (PIS, $m=87.5$; CPB, $m=37.42$) were observed. A higher level of PES ($m=95.31$) during the intervention phase was evident compared to baseline PES ($m=35.0$).

Immediacy of effect was illustrated in the immediate drop from the last data point of PIS (87.5%) and CPB (50%) in baseline to the first data point in the intervention phase of PIS (0%) and CPB (1.5%). Additionally, an increase of the first data point in the intervention phase of PES (100%) from the last baseline data point PES (25%) was observed. The absence of overlap across the phase indicated the effectiveness and strength of the intervention. The variability of the data for this dyad illustrated stability for PES, PIS, and CPB.

Measurement of Effect Size

In addition to conducting a visual analysis of data, the Effect Size was utilized to evaluate the magnitude of the effect of intervention on the dependent variables when compared to baseline levels. Measurement of effect size is a standardized measure and has been recommended to exemplify evidence-based practice in single-subject research (Horner et al.,
2005). For the purpose of this study, effect size ($d$) were calculated to determine the effect of parent training on the three dependent variables PES, PIS and CPB. The effect size was measured by using Cohen’s $d$ (standardized mean difference), which has been recommended for evaluating non-overlap data across experimental conditions (Parker & Hagan-Burke, 2007). The formula used for obtaining the $d$-index Effect Size was: $d = \frac{\text{Mean of intervention} - \text{Mean of baseline}}{\text{Standard Deviation pooled}}$. The formula used to calculate Effect Size was:

$$d_{pooled} = \sqrt{\frac{M_{(\text{INT})} - M_{(\text{BL})}}{[(n_b - 1) (Sd_b)^2] + [(n_a - 1) (Sd_a)^2]}}$$

$$n_b + n_a - 2$$

The criteria for evaluating the magnitude at which dependent variables may have changed due to the effect of intervention and not any extraneous variable is: Small ($d = .25$); medium ($d = .50$); large ($d = 1.0$ or greater).

*Effect Size of Intervention on Parent Behavior*

To evaluate the magnitude of parent training on the dependent variables, the effect size ($d$) was calculated for PES and PIS for the three categories of home-based training, clinic-based training, and overall (total) effect size for all parent participants for both settings. The effect size for PES for home-based training ($d = 5.48$), clinic-based training ($d = 6.50$), and overall ($d = 5.25$) demonstrated a large magnitude implying the effectiveness of intervention procedures in producing behavior change of participants. The effect sizes for PIS for home-based training ($d = 5.80$), clinic-based training ($d = 4.45$), and overall ($d = 4.65$) showed significant decreases in undesired practices used by participants. These calculations provide confirmation that the intervention significantly impacted parent behavior and the effect was large in magnitude (see Table 5).
Effect Size of Intervention on Child Behavior

To evaluate the magnitude of parent training on child problem behavior, the effect size (d) of CPB for each individual child was calculated. The individual effect size for CPB for Christian (d = 2.40), Matt (d = 3.99), Ryan (d = 2.40), and Kenny (d = 5.07) confirmed that the intervention with their parents produced a significant change in [decreases in] child problem behavior with a large magnitude (see Table 5).

<Insert Table 5 here>
APPENDIX G

EXTENDED DISCUSSION
EXTENDED DISCUSSION

Results of this study (both the pilot and replication stages) illustrated the effectiveness of parent training as an important variable for decreasing the problem behaviors of children with ASD. This section discusses the interpretations of the findings in relation to the specific research questions: (1) Is home-based training more effective than clinic-based training for teaching parents to implement a function-based behavior intervention plan for a child with autism; (2) To what extent will parent training on the home- or clinic-based setting facilitate the generalization of skills to the natural environment associated with CPB; and (3) Will the problem behavior of the child with autism decrease in the natural environment as a function of parent training? This section addresses the extent to which the findings can impact current practices in parent training and includes recommendations for future research.

Contributions of the Study to the Current Literature

Previous studies addressing parents of children with ASD focused primarily on the reasons that parent training needs to be an integral part of treatment programs (Briesmeister & Schaefer, 2007). Researchers also investigated the effects of having a child with ASD on levels of parental stress (Baker-Ericzén et al., 2004; Herring et al., 2006; Tomanik et al., 2004; Wolf et al., 1989). While the literature has supported the need to teach parents effective skills for working with their children with ASD (Briesmeister & Schaefer, 2007; Harris, 1984; Hume et al., 2005; O’Reilly & Dillenburger, 2000; Shriver & Allen, 2008), much of the literature has been limited by two aspects: (1) dependent variables being designed to assess changes only in child behavior instead of including evaluations of change in parent behavior; (2) measurement of child behavior being focused on skill acquisition, not CPB, as a function of parent training. This study has been conducted to fill these gaps in the existing literature by focusing on both the
measurement of parent behavior and on the evaluation of the effect of parent training for reducing CPB. Additionally, the results have demonstrated the effectiveness of the parent training procedures regardless of the training location. The following discussion addresses the impact of parent training in the home versus the clinical setting.

**Home-based Versus Clinic Based Training**

The first objective of this study was to investigate if the location of training played a significant role in skill acquisition by parent participants. This question allowed for isolating this variable and evaluating the influence it had on providing quality parent training for decreasing problem behaviors within a natural routine. Results of the study showed that both home-based and clinic-based parent training were equally effective in decreasing CPB; as depicted in Figures 1 and 2. This finding contributes to the parent training literature in that it appears to be the first study to demonstrate the significant effects of parent training on decreasing CPB regardless of training location.

In this study, a reduction of CPB was observed for all four child participants as a function of parent training. The location of the training did not significantly impact either parent behavior or CPB. The components and process of the training significantly, and with large effect, impacted both parent behavior and the reduction of CPB. The parent training strategies used within this study were drawn from previous research (Ducharme & Drain, 2004; Lafasakis & Sturmey, 2007; Lerman et al., 2008; Lucyshyn et al., 2007; Sarokoff & Sturmey, 2004). The six selected components that were utilized during the parent training intervention in this study included: (1) very clear and specific instructions to parents; (2) a parent checklist designed to prompt parent behavior; (3) modeling the specific effective practices for parents; (4) providing guided practice in a simulated setting; (5) providing direct feedback to the parents after
observing parent behavior; and (6) providing opportunities to parents to generalize learned skills
to the natural environment. These six components are detailed below with consideration to their
notable contributions to the success of the study.

Delivery of Clear and Specific Instructions

As detailed in the methods section, a BIP was constructed for each child to identify the
individual topography, function, and plan for addressing problem behavior during the selected
daily routine. During the initial parent training session the BIP was reviewed and specific
instructions were delineated to the parent regarding how to address CPB. The instructions
presented to the parent were not general solutions or recommendations but instead were an
outline of what (action or observable behavior) the parent needed to perform to prevent or
manage CPB. These instructions defined not just the behaviors (PES) the parent needed to use
but also those (PIS) that parents needed to refrain from using during the routine. In addition,
these instructions clearly told parents at what point, during the routine they needed to implement
PES. To guide parents, PES were classified into the two categories of antecedent-based and
consequent-based strategies. The antecedent PES were implemented prior to the occurrence of
CPB, and the consequent PES were implemented following the occurrence of either CPB or
appropriate child behavior.

Parent Checklist

Once specific instructions were given, the parent was provided with a Parent Checklist to
reference at any time before, during, or after the meal time routine to monitor their own
behavior. This checklist clearly labeled the behaviors to display (examples) and the ones not to
display (non-examples). This checklist served as a prompt to enable parents to implement the
effective antecedent and consequent strategies with accuracy and forgo the use of ineffective
strategies.

*Modeling Specific Effective Practices for Parents*

The interventionist first modeled with the child and for the parent, both PES and PIS, prior to the parent implementing the strategies. Behavior modeling allowed the parents to see the demonstration of the strategies and to understand how to execute these as listed on the Parent Checklist. Additionally, the interventionist reported that parents actively asked questions while referring to the Parent Checklist for clarification during the modeling portion of the training. Anecdotal notes also showed that parents were surprised at how well the child responded to the implementation of the PES by the interventionist, which most likely increased their confidence in implementing the strategies with their own children.

*Guided Practice in a Simulated Setting*

Each parent participant directly engaged with their child in a simulated setting to practice PES, both modeled by the interventionist and listed on the Parent Checklist. During the simulation, the interventionist was present and provided verbal and physical prompts, as needed, to guide parents’ implementation of PES. For example, if the child engaged in appropriate behavior and the parent did not present positive reinforcement, the interventionist pointed to the reinforcement to prompt the parent. In another example, if the child engaged in CPB, such as throwing food, and the parent did not address the child’s CPB, the interventionist verbally prompted the parent to remove the reinforcement item and have the child pick up the food that had been thrown on the floor or the table.

*Direct Feedback from Interventionist*

In addition to prompts being provided during training, the interventionist provided immediate parent feedback about the strategies being implemented. This feedback included
positive praise such as “good job, Mom” and corrective feedback such as “make sure to reinforce him with ____ once he takes a bite.” Anecdotally, the parents noted their appreciation for receiving direct feedback during the prime moment because the immediate feedback helped them remember what to do when the interventionist was not present during the natural routines where generalization was expected.

Opportunities to Generalize Learned Skills to the Natural Environment

Following each training session, the parent was given the assignment to video record themselves in the natural routine implementing PES as practiced in the simulated routine. Because the parent knew there was a need to demonstrate PES in the natural routine without the interventionist present, it is possible that this task may have contributed to their diligence due to accountability to the overall quality of the training sessions in the simulated settings. The interventionist observed that the parents expressed a sense of accomplishment and empowerment once they successfully implemented PES during the natural routine. Parents expressed that they used PES in other situations or routines with success. Further, parents reported their surprise and excitement at how well their child generalized their behavior from the simulated setting to the natural setting.

Each of these components of training with feedback and reflection contributed to the success of parents’ changing their behavior, as supported by the results illustrating the decrease of PIS and increase of PES following the intervention. The six components as a unit were found to be effective and deserve consideration for inclusion in parent training models.

Generalization of Skills to the Natural Environment

The second objective of this investigation was to determine if parents could generalize skills learned in the simulated setting to the natural setting. This question was warranted due to
the multiple studies surmising barriers associated with generalizing skills of both parents and children with ASD (Bolton & Mayer, 2008; Handleman & Harris, 1980). In addition, while this topic has been recommended for research in the literature, it has not been adequately studied to date (Crockett et al., 2007; McConnell, 2002; Wolery & Garfinkle, 2002). The results of this study, as illustrated in Figures 1 and 2, showed successful generalization of desired parent behavior to the natural setting following intervention, which in turn led to decreases in CPB. One possible explanation for successful generalization of parent behaviors from the training environment to the natural environment involved the selection of relevant physical and contextual stimuli (Handleman & Harris, 1980). The physical stimulus materials (e.g., table, chairs, utensils, food items, and preferred reinforcers) remained consistent across the two environments for both the parents and children as did the actions of parents associated with these stimuli. Both types of environmental cues were necessary for emitting the desired responses.

**Parent Generalization**

It was evident from the results of this study that all four parents generalized newly learned skills from the training to the natural meal-time environment. Contextual stimuli introduced during the training sessions that allowed parents to be successful in the natural environment included the parent checklist, having the necessary materials present before starting the routine, the sequential and predictable nature of the routine, and opportunities for practicing learned skills on a daily basis. These factors have been suggested in existing research as critical for producing generalization effects (Koegel et al., 1987; Robbins, Dunlap, & Pleinis, 1991; Singer & Irvin, 1991).

**Relation Between Parent and Child Behavior**

The third and final objective of this research study was to determine if problem behavior
displayed by a child with autism would decrease in the natural environment as a function of parent training. Many previous studies have confirmed the importance of a function-based intervention for decreasing problem behavior for children with ASD (Baer et al., 1987; Carr, 1977; Day et al., 1994; Eikeseth, 2001; Howard et al., 2005; Lovaas, 1987; Sallows, & Graupner, 2005; Smith et al., 2000; Zachor et al., 2007). However, as mentioned previously, it appears that the relationship between parent and CPBs have not been directly and concurrently measured when evaluating the effects of parent training as an independent variable and instead have focused on the child’s skill acquisition (Moes & Frea, 2000; Ducharme & Drain, 2004).

Whereas previous studies (Lucyshyn et al., 2007) have measured only child behavior to evaluate the effectiveness of behavioral parent training, this study incorporated measurement of both child and parent behavior with the recognition that the parent training could not be identified as effective without documenting a functional relationship between parent and child behavior.

As illustrated in the results, parent training directly impacted decreases in CPB across all four child participants. CPB was reduced as a function of systematic changes in the parent’s use of PES which generalized from training to the natural environment. During baseline, all four parents demonstrated PIS at higher levels and PES at lower levels than during the intervention phase. In addition, all four children demonstrated higher occurrences of CPB during baseline than during the intervention phases. In other words, when PIS decreased and PES increased, decreases were observed in the occurrence of CPB as well.

Implications for Practice

Due to the increasing number of children with ASD being identified and the problem behaviors often associated with this diagnosis, many families will continue to face challenges with CPB in the home environment. The findings of this study can be utilized to support several
initiatives regarding both professionals and parents. First, the use of function-based BIPs offer parents the successful tools necessary for reducing CPB in the home environment (Griest & Forehand, 1982; Lucyshyn & Albin, 1993; O’Reilly & Dillenburger; Hieneman & Dunlap, 2001). Professionals working within the home need to be aware of the benefits for training a parent to acknowledge that the child’s behavior can be explained through understanding the motivation (function) of the behavior rather than operating under the assumption that CPB is a function of the child’s disability (Hieneman & Dunlap, 1999; Horner et al., 2002; Odom et al., 2003; Wolery & Dunlap, 2001). This awareness is fundamental to the development of appropriate interventions. Similarly, parents should advocate for their children’s BIP to be founded on the function of problem behavior with the addition of distinct plans for teaching functionally equivalent replacement behaviors. BIPs should also include modifications in the environment (e.g., antecedent and consequent events) without which CPB may not decrease (Carr et al., 1994; McGee et al., 1999).

Second, due to the lack of effective parent training models currently available in the literature (Crockett et al., 2007; Dunlap, Hieneman, Knoster, Fox, Anderson & Albin, 2000; Grindle et al., 2009a; Lafasakis & Sturmey; 2007; McConnell, 2002; Wolery & Garfinkle, 2002), the six components described in this study may be considered for facilitating successful parent training. Today, many professionals are asked to conduct parent training but are provided with little guidance regarding procedures that need to be utilized for sustained effects (Day et al., 1994; Horner et al., 2002). Professionals need to recognize that training parents to intervene with children involves a different set of skills than implementing interventions with children. By utilizing the six parent training components, professionals could create guidelines or models for the delivery of parent training in a systematic and structured manner. Setting these expectations
with parents seems to be critical to the likely successfulness of parent training. In addition, when parents seek parent training, they need to ask questions pertaining to what the structure of training looks like, what their role as the parent will be, and what will be the expected results of the training that will impact their daily lives. If professionals cannot describe a plan detailing how the training will be conducted, then it may be better to find an alternative for training to ensure expectations are clearly communicated between the two parties. Parents should be affirmed that they are vitally important to any intervention’s success; therefore, their perspectives and concerns must be addressed as part of the training plan.

Third, professionals developing home intervention plans must seek to understand CPB by evaluating parent behavior as a maintaining variable. Interventions should then be implemented while keeping in mind the limitations of the environment (Albin, Lucyshyn, Horner & Flannery, 1996; Dunlap & Fox, 1996). For example, if a family lives in an apartment versus a house, or the parent is single versus married, the intervention itself may differ even if the functions of behavior are the same. The question should not be “what will work to address behavior” but “how will the behavior be addressed within the context of the family”? Parents need to be able to evaluate their own behavior and identify what things in the environment can be set up to help them implement effective strategies within their current context.

**Recommendations for Future Research**

- The study might be systematically replicated with additional participants to determine the effectiveness of the research design and intervention procedures in producing a similar clinical effect as this study for both parents (primary recipients of intervention) and their children (secondary recipients of intervention).
- The findings of this study may be extended by evaluating the effects of parent training
and generalization of the use of effective strategies by parents across multiple routines within the home environment, for example, bath-time, bed-time, and transition times.

- Further evaluation of the effectiveness of each of the six components included in the parent training intervention might be conducted to evaluate the relative effect of individual versus combined components on behavior change outcomes.

- As suggested in the literature and supported by the findings of this study, there is a need to further evaluate the implementation of a function-based BIP by parents in the home environment where both parent and child behavior are measured to evaluate the effect of intervention.

- Future research might focus on developing a model for intervention to facilitate the procedures for implementing parent training to effectively address the problem behaviors of children with Autism.
APPENDIX H

COMPREHENSIVE REFERENCE LIST


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