An evaluation of changes in parent interaction quality as an indirect effect of functional communication training

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AN EVALUATION OF CHANGES IN PARENT INTERACTION QUALITY AS AN INDIRECT EFFECT OF FUNCTIONAL COMMUNICATION TRAINING

by

Anna Day Ryan

A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Psychological and Quantitative Foundations in the Graduate College of The University of Iowa

August 2017

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Nevertheless, she persisted.
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ABSTRACT

Previous research has suggested that increases caregiver interaction quality may lead to subsequent reductions in child problem behavior. However, there is currently little research that evaluates whether successful reductions in problem behavior through behavioral treatment may have a measurable positive impact the caregiver-child relationship. The purpose of the current study was to determine whether successful implementation of an empirically validated, reinforcement based-treatment for children who display challenging behaviors (functional communication training, or FCT) leads to changes in caregiver interaction quality. A retrospective data analysis was conducted using assessment and treatment sessions conducted for a federally funded research project (Lindgren & Wacker, 2011). Five caregiver-child dyads were included in the current study, and caregivers conducted all sessions while being coached on behavioral procedures by a trained behavior specialist via telehealth. No caregiver received any direct training intended to improve or modify caregiver-child interactions during playtime. Appropriate and inappropriate interactive caregiver behaviors were recorded throughout all playtime intervals during assessment and treatment. Results indicated that child problem behaviors were significantly negatively correlated with caregiver interaction quality for 3 out of 5 caregiver-child dyads; however, for 1 caregiver-child dyad, child problem behavior and caregiver interaction quality were significantly positively correlated. Additionally, the results showed that positive increases in caregiver interaction quality rarely maintained throughout treatment. In conclusion, the results show that improvements in child problem behavior can favorably impact caregiver
interaction quality. However, additional supports may be necessary to maintain these effects over time.
PUBLIC ABSTRACT

Children who exhibit problem behavior on a regular basis are at risk for impairment in many areas of functioning, such as poor academic outcomes, greater risk of physical injury, and poor social relationships with peers and families. Functional communication training (FCT) is an empirically validated behavioral treatment that reduces child problem behavior by replacing it with a more socially acceptable alternative, such as a recognizable form of communication. The literature suggests that FCT has a number of favorable indirect effects, such as decreasing non-targeted inappropriate behaviors, increasing related appropriate behaviors, and the emergence of pro-social behaviors. However, despite the extensive amount of research available on FCT, very few studies have evaluated whether caregiver interactions are impacted by reductions in problem behavior. Other treatment procedures, such as Parent-Child Interaction Therapy, hypothesize that as caregiver interaction quality is improved, reductions in child problem behavior will occur. The current study sought to evaluate whether reductions in child problem behavior will naturally lead to improvements in caregiver interaction quality.

Five caregiver-child pairs experienced assessment and treatment (FCT) for child problem behavior maintained by escape from nonpreferred activities. All children were diagnosed with autism, and all sessions were conducted in the participants’ homes with behavioral coaching delivered via telehealth. Caregiver behaviors were coded during all free play intervals that occurred throughout the entire evaluation. The results suggested that changes in child problem behavior were significantly correlated with changes in caregiver interaction quality for 4 out of 5 participants. However, for most caregivers, many of these positive benefits (e.g., reductions in child problem behavior leading to
improvements in interaction quality) did not maintain throughout treatment, suggesting that further training may be necessary to sustain these beneficial effects.
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CHAPTER I

INTRODUCTION

Negatively reinforced problem behavior, such as noncompliance, aggression or disruptive behavior maintained by escape from demands, is a prevalent issue for many families with young children. High levels of noncompliance characterized as problematic in intensity, frequency or duration are often associated with higher levels of tantrums, child and caregiver stress, and impairment of social relationships (Burke, Loeber, & Birmaher, 2002; Kalb & Loeber, 2003). Functional communication training (FCT) is one of the most common empirically supported treatments used to increase compliance and decrease child problem behaviors (Tiger et al., 2008). Additionally, studies have shown that FCT treatments have been successful in not only decreasing targeted problem behaviors, but also decreasing non-targeted destructive behavior (Schieltz, Wacker, Harding, Berg, Lee, Padilla Dalmau, Mews, & Ibrahimovic, 2011) and increasing related adaptive social behaviors (Derby et al., 1997). Although reduction in child problem behavior is often associated with improved social interaction and decreased family stress, there are few FCT studies that directly focus on observing and documenting these correlated issues.

Child Problem Behavior

Disruptive child behavior is a common concern for parents and families, and children who exhibit significant problem behavior are often at risk for impairment in multiple areas of functioning. Disruptive behavior disorders in children, which can include tantrums, aggression, self-injurious behavior, and noncompliance, have been estimated to affect between 5% and 14% of the population (Merikangas, Nakamura, & Kessler, 2009). Children with disruptive behavior disorders are at higher risk for poor academic outcomes, as noncompliant and unruly behavior is
often incompatible with learning and academic settings (Taplin & Reid, 1997). Children with recurrent behavior problems can also be at greater risk of physical injury, ranging from accidental injury resulting from the child’s noncompliant or dangerous behavior, to reciprocal aggressive behavior from peers, and even a higher likelihood of physical abuse or maltreatment from caregivers (Kalb & Loeber, 2003; Thomas & Zimmer-Gembeck, 2012). Additionally, behavior problems that manifest in childhood often continue to persist into adolescence and early adulthood without appropriate intervention (Baker et al., 2003; Kalb & Loeber, 2003).

Children with autism spectrum disorders (ASD) are even more likely to have a comorbid disruptive behavior disorder, with prevalence rates between 25% (Kaat & Lecavalier, 2013) and 70% of children with autism (Lesack, Bearss, Celano, & Sharp, 2014). In a cross-sectional study by Vohra, Madhavan, Sambamoorthi, and St Peter (2014), parents of children with ASD reported more difficulties accessing services, receiving referrals, and overall poorer quality of care than parents of children with other developmental disabilities or mental health conditions. While taking into account family demographics and socioeconomic status, families with children with ASD reported greater financial burdens and limited insurance coverage, and were also more likely to have a caregiver or family worker stop working to help provide more in-home support for the child. In another study by Estes et al. (2009), they found that parents of children with ASD reported higher levels of parental stress compared to parents of children with other developmental delays, and the largest predictor of parent stress was child problem behavior.

One common treatment approach to child problem behavior is to directly concentrate on the variables that may be influencing the child’s behavior. Clinicians practicing from an operant theoretical orientation commonly use a two-stage model of assessment and treatment to address this issue. During the first phase, an assessment is conducted to identify situations that are
associated with problem behavior. In the field of applied behavior analysis, the most precise method of assessing problem behavior is the functional analysis (Hanley, Iwata, & McCord, 2003; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994), so called because it aims to identify the purpose that the behavior serves for the individual. In the functional analysis (FA), the child is systematically exposed to different situations which may evoke problem behavior and putative reinforcers are delivered contingent upon the occurrence of targeted problem behaviors. If data from the FA show elevated levels of problem behavior in specific test conditions relative to a control condition, it is inferred that a particular function has been identified. The FA commonly tests for three broad, socially-maintained functions of behavior – access to attention, access to tangibles, and escape from demands – as well as non-socially mediated functions. The FA is considered to be the gold standard of the field to identify the functional relationship between problem behavior and the reinforcer (for more information on the functional analysis, see the special issues on the FA in the Journal for Applied Behavior Analysis [JABA], 1994, Vol. 27, and 2013, Vol. 46).

After the function of the behavior has been identified, these results are used to inform an individualized treatment. Differential reinforcement of alternative behavior (DRA) is a behavioral treatment that focuses on replacing problem behaviors with socially acceptable behaviors by reinforcing an appropriate behavior that results in the same functional outcome as the problem behavior, as identified in the FA. Typically, this treatment is combined with extinction (i.e., withholding reinforcement following problem behavior) such that reinforcement is only delivered for the alternative, appropriate behavior. For example, if a child’s aggressive behavior is determined to be maintained by attention, a DRA treatment would provide attention
contingent on an appropriate behavior, such as clapping, while aggression would no longer result in attention.

A common DRA treatment is functional communication training (FCT), in which the replacement behavior is a recognizable form of communication (Tiger, Hanley, & Bruzek, 2008), such as verbal requests, manual signs, or picture exchange communication systems that function for the reinforcer. In the seminal FCT study by Carr and Durand (1985), they identified environmental variables that were associated with problem behavior for four participants, such as access to attention or removal of demands. All participants were then taught appropriate relevant and irrelevant communication responses based on their identified function. For example, a child with behavior maintained by access to attention was taught to request attention (a relevant response based on their functional reinforcer) and to ask for help (an appropriate, yet irrelevant response that would not result in their reinforcer). All participants demonstrated decreases in problem behavior and increases in appropriate behavior when using their relevant communication response compared to baseline and when using the irrelevant response.

This two-step approach to identifying and treating the environmental variables maintaining problem behavior has been shown to be effective in reducing multiple topographies of severe problem behavior such as aggression, destruction, self-injury, pica, and stereotypy (Kurtz, Boelter, Jarmolowicz, Chin, & Hagopian, 2011; Rispoli, Camargo, Machalicek, Lang, & Sigafoos, 2014) across different populations, such as children with ASD, intellectual disability, and other disabilities (Byiers, Dimian, & Symons, 2014; Carr & Durand, 1985; Radstaake et al., 2013), across settings such as inpatient clinics (Hagopian, Fisher, Sullivan, Acquisto, & LeBlanc, 1998), outpatient clinics (Love, Carr, & LeBlanc, 2009), schools (Casey & Merical, 2006), and homes (Wacker et al., 2013). Reductions in problem behavior have long been associated with
increases in targeted appropriate behaviors such as compliance (Russo, Cataldo, & Cushing, 1981), and there has been some additional research observing the emergence of nontargeted appropriate prosocial behaviors and other long-term collateral effects of FCT (Derby et al., 1997; Schieltz et al., 2011).

*The Impact of Child Problem Behavior on Families*

Despite the efficacy of FCT, there are often additional challenges that clinicians must face when treating children with problem behaviors. The negative effects of a child’s problem behavior extend beyond the impact to the child. Children with problem behavior frequently have poor social relationships with adults and peers, which is highly correlated with increased family stress and can contribute to social isolation for the both the child and the family (Lesack et al., 2014). Families who have children with disruptive behaviors are usually more restricted in their ability to participate in normative family activities, often avoiding going out into the community or limiting their child’s interactions with others to decrease the likelihood of problem behavior occurring (Lucyshyn et al., 2004). Parents of children with chronic problem behavior also consistently report higher levels of family stress than parents of typically developing children or children with other non-behavioral disorders (Baker et al., 2003; Lucyshyn et al., 2004; Rao & Beidel, 2009; Solomon, Ono, Timmer, & Goodlin-Jones, 2008).

Studies have indicated that both the child and the caregiver often mutually contribute toward inappropriate interactions (Lucyshyn et al., 2004). It is common for caregivers of children with problem behavior to exhibit counter-therapeutic parenting practices, such as punitive or inconsistent discipline, lack of supervision, ineffective modeling and problem-solving, lack of positive involvement, and even physical aggression toward the child (Blandon & Volling, 2008; Bosmans, Braet, Leeuwen, & Beyers, 2006; Schuiringa, van Nieuwenhuijzen, Orobio de Castro,
The use of these ineffective parenting practices can also inadvertently maintain inappropriate behaviors, and in some cases may lead to the parent using increasingly punitive measures to keep up with a child’s escalating problem behavior. Individuals who exhibit externalizing behavior disorders in childhood are also more likely to have a child of their own that exhibits problem behaviors, perpetuating the cycle of inappropriate behavior throughout generations (Brook, Lee, Finch, & Brown, 2012).

An example of a mutually maladaptive caregiver-child interaction may involve a child seeking attention from a busy caregiver. A preoccupied caregiver may ignore a child’s appropriate bids for attention, so the child may engage in destructive behavior which results in scolding from the caregiver. The child, having gained their preferred outcome (attention), may temporarily stop their problem behavior which in turn reinforces the caregiver’s scolding. Although the scolding may be effective momentarily, it also functions to reinforce the child’s problem behavior so it becomes more likely the child will repeat the problem behavior to gain access to attention in the future. Moreover, the caregiver may then feel frustrated and avoid interactions with the child, either due to feelings of irritation or in an attempt to avoid further problem behavior. This then deprives the child of their preferred reinforcer, and increases motivation to once again engage in inappropriate attention-seeking behavior. This cyclical dynamic can continue to maintain inappropriate behavior by both parties, as well as significantly damage the relationship and quality of interactions between the caregiver and child.

Although FCT has been shown to decrease problem behavior and increase appropriate behaviors such as communication and compliance, studies to date have not measured changes in caregiver-child interactions as a collateral effect of FCT. One explanation is that many clinics use trained therapists to conduct initial treatment sessions instead of caregivers (Cooper, Wacker,
Sasso, Reimers, & Donn, 1990), focusing on developing a stable treatment plan before generalizing the finalized treatment to caregivers. Although using trained staff ensures that assessment and treatment procedures will be conducted with high fidelity, this precludes further exploration on whether participation in FCT treatments may help address the caregiver’s contributions to these mutually inappropriate interactions.

**A Therapeutic Model for Improving Caregiver-Child Interactions**

Instead of only focusing on child behavior, a different way to approach this issue is to focus on modifying the caregiver’s interactions and observing the collateral effects on child behavior. One commonly used evidence-based program focused on promoting and improving caregiver-child relationships is Parent-Child Interaction Therapy (Epstein, Fonnesbeck, Potter, Rizzone, & McPheeters, 2015). PCIT is partially founded on social learning principles and a family systems perspective which theorizes that problem behaviors in children are an outward manifestation of dysfunctions in the caregiver-child relationship (Timmer, Urquiza, Zebell, & McGrath, 2005). Unlike FCT, PCIT attempts to address both family interactions and child problem behavior simultaneously. The underlying assumption for PCIT is that the modification of the caregivers’ interaction promotes positive parenting, therefore diminishing child problem behaviors. PCIT combines a behavioral modification approach of training caregivers to reward appropriate behaviors and punish problem behaviors, while also teaching more traditional child therapy techniques aimed at building a safe and warm therapeutic relationship between both parties (Eyberg, 1988).

PCIT aims to help caregivers shift their focus from using punishment procedures for child problem behavior to rewarding and attending to appropriate child behavior using a two-phase model. The first phase focuses on improving the caregiver-child relationship. Caregivers
are coached to use descriptive praise and to follow the child’s lead during play, showing interest in the child’s activity in a non-controlling manner. They are also taught to use selective attention to shape their child’s behavior, ignoring the child or withdrawing their attention when they engage in problem behavior and providing attention and praise when the child engages in appropriate behavior. During the second phase, parents are taught strategies to help improve child compliance, such as using reward-based contingencies, reducing ineffective commands, and using appropriate and safe disciplinary strategies when necessary (Timmer et al., 2005).

PCIT has been shown to improve caregiver-child interactions and increase compliance with typically developing children with externalizing problem behaviors (Eisenstadt, Eyberg, McNeil, Newcomb, & Funderburk, 1993), children diagnosed with disruptive behavior disorders (Burke, Loeber, & Birmaher, 2002; Nixon, Sweeney, Erickson, & Touyz, 2003), autism (Lesack et al., 2014; Solomon et al., 2008), intellectual disability (Bagner & Eyberg, 2007) and with parents who have physically abused or otherwise maltreated their children (Thomas & Zimmer-Gembeck, 2012; Timmer et al., 2005). However, PCIT does not test for behavioral function, often using attention as a presumed reinforcer for appropriate behavior and removal of attention or time out as an overall punisher for inappropriate behavior. For a child whose behavior is motivated by escape from aversive situations, time out can be a countertherapeutic measure as in some cases the child is allowed to avoid the aversive situation (e.g., a work task).

Additionally, although PCIT researchers collect data on child compliance with parent requests, the program does not emphasize collecting data on observed levels of problem behavior, such as aggression, disruptions, and self-injurious behavior. Many of the child problem behavior outcome measures are based on standardized pre- and post-test parent reports, such as the Child Behavior Checklist (CBCL) or the Eyberg Child Behavior Inventory (ECBI). However,
pre- and post-test measures require the participants to complete the training in order to be evaluated, and the caregiver-child dyads with the highest levels of problem behavior are at the greatest risk for attrition (Timmer et al., 2005). More importantly, caregiver report measures only reflect the caregivers’ perceptions of their child’s behaviors – they are not necessarily a clear measure of behavioral change. For example, in a PCIT study by Nixon et al. (2003), caregivers reported their child’s problem behavior as significantly less severe after treatment despite the fact that there were no significant changes in the observed levels of child problem behavior. Caregivers who are under higher levels of stress have been shown to be more likely to overreport child problem behaviors (Stokes, Pogge, Wecksell, & Zaccario, 2011), and those who are actively seeking treatment for their child’s behavior are often in crisis and may overreport child problem behavior to ensure access to services, either deliberately or unintentionally (Epstein et al., 2015). As one of the goals of PCIT is to shift caregiver attention and focus from inappropriate to appropriate behaviors, it is possible that throughout treatment the parents may gain better perspective on the frequency or intensity of their child’s inappropriate behaviors. Therefore, the reports may more accurately reflect a change in caregiver attitudes toward their child’s behavior, and not child behavior itself (Timmer et al., 2005).

Due to the overlap in target population (children with externalizing problem behaviors), procedures (behavioral modification), and outcome goals (improved behavior), FCT and PCIT may share similar mechanisms of change and related outcomes. FCT has been shown to decrease problem behavior, but there have been very few direct studies, if any, that address how it can affect the quality of the caregiver-child relationship. PCIT has been shown to improve caregiver-child relationships, but the literature is somewhat lacking to fully support whether these procedures significantly decrease child problem behavior. Due to the possible interconnected
nature of these two outcomes, it is important that these variables are studied in tandem to help create more effective treatment packages for children with problem behaviors and their families.

Purpose of the Current Study

The purpose of the current study is to expand the literature on FCT by directly assessing whether the implementation of FCT by a caregiver has an impact on caregiver/child relationships, using standards for interaction quality as specified in the PCIT literature. The current study is a complementary experiment embedded within a larger federally funded project (Lindgren & Wacker, 2011) in which caregivers of young children with ASD and a history of challenging behavior are coached by trained behavior specialists via telehealth in functional analysis and functional communication training protocols.

This study hopes to address these broad questions as well as other more narrow questions:

1. Does caregiver interaction quality change as an indirect effect of FCT?
2. Are there specific positive caregiver behaviors that are more likely to be impacted by changes in child problem behavior?

This study focuses on the caregiver-child interactions for children with identified escape-maintained behavior. If FCT treatments are only effective in decreasing problem behavior in a demand context, it is unlikely to see caregiver behavior changes in a free play context. However, if reductions in child problem behavior are correlated with increases in interaction quality, this may be reflected in the caregiver’s behavior in free play.
CHAPTER II

LITERATURE REVIEW

Assessment of Problem Behavior

In the applied behavior analysis literature, the gold standard for assessing problem behavior is the functional analysis (FA) (Beavers, Iwata, & Lerman, 2013). The assumption behind the FA and reinforcement theory is that if a behavior is followed by a preferred outcome, it is more likely that the behavior will be repeated in the future to obtain that same outcome—that is, a response-reinforcer relationship exists. The FA is used to systematically identify the environmental variables that are influencing and maintaining the occurrence of the problem behavior using direct observation and measurement of behavior under test and control conditions.

The first demonstration of a functional analysis was published by Iwata and colleagues in 1982 (later republished in 1994). Nine participants with developmental delays were included in the study, and all displayed forms of self-injurious behavior, such as self-biting, head banging, eye gouging, and self-hitting. Each participant was exposed to four conditions in a multielement design: social disapproval, academic demands, unstructured play, and alone. All conditions were designed as an analog to everyday situations that may occasion problem behavior. The order of the conditions was randomized, and each session was 15 minutes in length. Sessions were conducted until 1) the levels of self-injury were stable, 2) levels of self-injury were unstable across all conditions for 5 days, or 3) sessions lasted for 12 days.

During the social disapproval condition, the participant was told to play alone while the experimenter pretended to be busy with work. Attention in the form of statements of concern and disapproval (e.g., “stop that, don’t hurt yourself”) were provided contingent on self-injury, and
all other behaviors were ignored. This condition tested whether positive reinforcement in the form of social attention would maintain problem behavior. During the academic demands condition, an experimenter continuously presented difficult academic demands to the participant using a three-step least-to-most prompting procedure. The participant received praise for task completion regardless of the level of prompting needed to complete the task. If the child engaged in self-injury, the therapist removed the demand and attention for 30-seconds with a 30-second changeover delay for repeated instances of problem behavior. This condition tested whether problem behavior was maintained by negative reinforcement in the form of escape or avoidance of demands. In the unstructured play condition, the participant was given free access to toys throughout the session, and the therapist provided attention at least once every 30-sec contingent on appropriate behavior (the absence of problem behavior). No demands were given throughout the session, and there were no consequences in place for problem behavior. This was designed as an “enriched environment” where self-injury was expected to be low. During the alone condition, the participant was alone in a room without toys or other stimulating materials. No consequences were delivered contingent on problem behavior or appropriate behavior. This was to determine whether the participant’s self-injury may be maintained by self-produced (e.g., automatic) sensory reinforcement.

They observed multiple patterns of behavior in the nine subjects that suggested that self-injury was sensitive to different sources of reinforcement. For all participants who were exposed to the unstructured play condition, they observed levels of problem behavior that were at or below their overall mean, and four participants engaged in less self-injury in the unstructured play conditions compared to all other conditions. For seven of the nine participants, one condition was associated with higher mean levels of self-injury compared to the other three
conditions – four participants showed higher levels in the alone condition, two were highest in the academic demand condition, and one participant showed highest levels in the social disapproval condition. For the remaining two participants, they observed undifferentiated levels of problem behavior across two or more conditions.

This study demonstrated that although problem behavior varied between and within individuals, it was lawful and responsive to the environment. Until Iwata and colleagues standardized this methodology, environmental variables were often ignored, especially when working with children or adults with significant communication problems and disabilities. Many procedures instead attempted to override these influences using powerful but arbitrary reinforcement or punishment contingencies, usually with limited success. The implications for treatment were immediate, calling for clinicians to stop basing treatment decisions on guesswork and instead empirically identifying and targeting variables maintaining problem behavior.

**Functional Communication Training and Extensions**

Differential reinforcement of alternative behaviors (DRA) is a type of behavioral treatment that focuses on replacing problem behaviors with socially acceptable behaviors. In DRA treatments, the problem behavior is placed on extinction while the participant is taught to emit an appropriate behavior that results in the same functional outcome as the problem behavior. One of the most common DRA treatments is functional communication training (FCT), in which the replacement behavior is a recognizable form of communication (Tiger et al., 2008). In their seminal FCT article, Carr and Durand (1985) identified four children whose problem behavior was maintained either by access to attention or escape from demands, and taught them all a functionally appropriate communicative response and an irrelevant communicative response. For example, a functionally appropriate response for the children whose problem
behavior was maintained by escape was to say “I don’t understand” during difficult work. The therapist then responded by assisting the child with the demand, thereby decreasing the effort and aversiveness of the task. For the children whose problem behavior was maintained through access to attention, they were taught to say “Am I doing good work?” to obtain praise and tickles from the therapist. The children were also taught to emit a functionally irrelevant response – that is, the escape-maintained children were taught to ask for attention, and the attention-maintained children were taught to ask for help with the task. They observed decreases in problem behavior for all four children during the relevant functional response phase, and problem behavior remained high during the irrelevant communication phase. This confirmed their hypothesis that simply emitting a communicative response would not be effective in decreasing problem behavior; the response and reinforcer must be relevant to the child’s behavioral function. For individuals with escape-maintained behavior, FCT often focuses on teaching the child an appropriate way to request for termination of the activity (e.g., asking for a break) or requesting ways to decrease the aversiveness of the task (e.g., asking for help).

Since this seminal article, FCT and its applications have been researched extensively. Durand and Carr (1991) continued to study the applications and long-term maintenance of FCT by assessing its effects across settings for 18 to 24 months. The study included 3 participants with developmental disabilities who displayed severe challenging behavior that was resistant to other interventions (e.g., punishment, differential reinforcement of other or incompatible behavior, medication). Behavioral assessments were conducted to identify the function of the participants’ challenging behavior and suggested that two participants’ behavior was maintained by escape from nonpreferred tasks, and one participant’s behavior was maintained by social attention. Observations were conducted in the participants’ classrooms to determine baseline
levels of challenging behavior and their teachers’ natural responses to behavior. Each participant was then taught an appropriate communicative phrase to elicit the same reinforcer that was maintaining behavior – for example, saying “Help me” for children with escape-maintained behavior, and “Am I doing good work?” for the participant with attention-maintained behavior. All challenging behavior was ignored during training, and multiple trainers were used across different tasks and all prompts for the communicative responses were faded to promote the transfer of effects to novel settings. After training, the participants were introduced back into their classrooms. The classroom teachers were not trained on the procedures and instead instructed to respond to the participants as they typically would. The researchers then followed the participants over a period of up to 2 years to conduct observations in their classrooms as they changed throughout the years. This was to determine whether the participants would generalize the appropriate communicative phrases to novel settings, whether the responses would be met with appropriate reinforcement by untrained teachers, and whether the reinforcement would maintain the response over time.

For all participants, they observed steady levels of unprompted appropriate requests across years, classrooms, and teachers, as well as suppression of challenging behavior for up to 2 years. One participant demonstrated an increase in challenging behavior in his first year; however, further investigation determined that the participant’s articulation of the appropriate response had deteriorated, resulting in the response inadvertently being put on extinction by teachers. After implementing booster sessions to improve the request quality, the participant’s challenging behavior decreased and remained at low levels. The authors attribute the natural maintaining contingencies as the reason for the generalization of the functional communication
response across settings, as they were able to teach the participants to utilize responses that could be easily understood and efficiently reinforced by untrained caregivers.

In similar follow-up study by Durand and Carr (1992), they evaluated the long term effects of FCT compared to another common behavioral intervention (time out). They hypothesized that one of the benefits of FCT was the ability for others unfamiliar with the child’s history to recognize the functional communication response as a request for appropriate reinforcement and respond accordingly without prior training. However, time-out procedures and other similar behavioral interventions often must be explicitly trained before an unfamiliar adult would be expected to implement them. Twelve participants with developmental disabilities who displayed challenging behavior maintained by access to adult attention (as determined by previous behavioral assessments) were selected to receive either FCT or time-out procedures contingent on challenging behavior. The group receiving FCT treatment was taught to say “Am I doing good work?” to elicit attention during an easy work task. The group receiving time-out had all work materials removed and the trainer briefly turned away from the participant contingent on challenging behavior. Both treatments were successful in reducing challenging behavior, but participants in the time-out group reverted to baseline levels of challenging behavior when exposed to naïve trainers who were not informed about the time-out procedures. However, the participants who received FCT maintained low levels of challenging behavior and generalized their coached responses to the naïve trainers, which were then appropriately reinforced by the trainers.

Numerous studies have also looked at different treatment components that can help enhance the effects of FCT and promote generalization to multiple clients. Fisher and colleagues (1993) noted that previous studies had often used other operant procedures, such as extinction,
prompting, and punishment when evaluating the use of FCT, potentially obfuscating which components were critical for the desired behavioral change. The authors then evaluated the use of FCT, extinction, and punishment alone and in conjunction to determine the most effective applications of the different components in reducing challenging behavior for four participants. They observed acceptable reductions in problem behavior for one of their four participants with FCT alone, and these gains did not maintain outside of the analogue session. FCT with extinction (teaching an appropriate communicative response to obtain the functional reinforcer while ignoring challenging behavior) was effective in increasing appropriate communication for one participant, but did not sufficiently reduce challenging behavior. FCT plus punishment (appropriate responses were met with reinforcement, and challenging behavior resulted in contingent demands or a baskethold time out) resulted in decreases in challenging behavior for three of the four participants. Additionally, they found that the punishment component was able to be faded or withdrawn for two of the participants while maintaining high levels of appropriate communication and low levels of destructive behavior.

These results were replicated by Hagopian and colleagues in 1998, and researched again in 2013 by Rooker and colleagues. Hagopian and colleagues first expanded these results by replicating them with a larger sample of 21 inpatient cases. They found that FCT with extinction was initially effective in decreasing challenging behavior, but when demands increased or reinforcements were delayed, the efficacy decreased for roughly half of the participants. FCT with punishment was observed to be the most effective overall method of reducing problem behavior even with fading procedures in place. In the Rooker et. al. study, the authors examined data from 58 inpatient cases who had been trained in FCT procedures. As well as studying the effects of FCT with extinction and FCT with punishment, the authors also evaluated the use of
FCT with alternative reinforcement schedules, such as additional differential reinforcement of alternative or other behaviors, and noncontingent or fixed time reinforcement. They found that FCT with extinction was slightly more effective and FCT with punishment was slightly less effective in their sample than reported in the previous Hagopian et. al. article, but still resulted in substantial reductions in problem behavior in over half of the applications. They observed greater positive treatment gains for participants that experienced FCT with some form of alternative reinforcement compared to FCT with extinction or punishment, and the best results with FCT combined with alternative reinforcement plus punishment. Another notable result was that FCT alone was more effective for outpatient cases compared to inpatient cases, suggesting that patients with less severe behaviors may be more likely to respond to the basic FCT procedures without needing additional operant components.

FCT has also been used to help parents enhance communication skills in young children by targeting prelinguistic behaviors instead of challenging behaviors. Tait and colleagues (2004) identified prelinguistic behaviors of six young children with developmental and physical disabilities, such as looking at preferred items, whining-like vocalizations, or moving toward items, and developed intervention goals that would replace these behaviors with more desired communication, such as approximating the name of preferred items, signing “help,” “more,” or vocalizing “no,” or “yes”. The mothers of the participants were trained to set up the environment to create communication opportunities for their children, teach the relevant replacement behaviors, and reinforce the appropriate responses. Across all six participants, they observed successful increases in the appropriate communicative responses and decreases in the prelinguistic behaviors.
This study also contributed to the growing literature demonstrating that parents can be successfully trained to implement FCT procedures in the natural home setting. Despite some initial concerns of the ability of caregivers to accurately conduct sessions, such as time constraints and unpredictable environmental variables, the research has continued to demonstrate acceptable procedural fidelity with caregivers as therapists. Training parents as therapists also has demonstrated the added benefit of allowing the parents to be directly involved in the assessment, potentially increasing the likelihood that they will follow through with treatment recommendations, as well as giving them the opportunity to observe firsthand how their behaviors can directly influence and improve their child’s behavior (Cooper, Wacker, Sasso, Reimers, & Donn, 1990).

Wacker and colleagues (1998) successfully trained parents of 28 children with developmental disabilities who displayed aberrant behavior to conduct behavioral assessment and treatment within the home. The parents were coached in the FA procedures and individualized FCT treatments were created for each participant, which involved reinforcement for appropriate behaviors and extinction or mild punishment for challenging behaviors. The parents were not provided with a specific training program, but instead were provided with coaching throughout the weekly treatment probes. They were encouraged to use the procedures initially for roughly 10 minutes daily, and then to incorporate them into their daily routine. Throughout the treatment, parents were also asked to rate the acceptability of the treatment.

Of the 28 participants, social functions were identified for all but four children. The FCT treatment reduced aberrant behavior for all participants that received treatment, and these positive gains maintained during follow-up sessions over the course of 3 to 12 months. Overall acceptability of the treatment was also high across participants, including high scores on
measures regarding the willingness of parents to implement treatment, their confidence in the treatment, and their belief in the efficacy of the treatment. Wacker and colleagues continued to demonstrate the efficacy of training parents in the home using on-site coaching in numerous studies following this 1998 study (Wacker et. al., 2005; Wacker et. al., 2011).

Wacker and colleagues (2013) continued along this line of research, demonstrating that these behavioral procedures could be taught and implemented with fidelity by parents without a behavioral therapist entering the household. The advent of telehealth consultation has extended the reach of many health services, including behavioral assessment and treatment, to families who otherwise may be unable to access services due to location, financial constraints, or other barriers. In the 2013 study, behavioral consultants provided all coaching to parents remotely while parents conducted sessions in more accessible regional health clinics. All participants had diagnoses of an autism spectrum disorder and displayed challenging behavior. Social functions were identified for participants using FA procedures, and individualized FCT treatments were created based on these results. Parent assistants (family navigators) who were not formally trained in applied behavior analysis procedures were present to provide on-site support for parents. They observed an average 93.5% reduction in challenging behavior across participants, with an average duration of 21 sessions (range: 6-42). As with the previous studies, the treatment acceptability by parents continued to be high across participants.

Functional communication training continues to be an effective reinforcement-based treatment for children who display challenging behaviors. The research has demonstrated that the procedures are easily trained, and can be completed with fidelity by individuals without any formal training in applied behavior analysis. The trained responses and other positive collateral effects can be easily generalized across settings and maintained for long periods of time, and can
allow children to more naturally come into contact with functional reinforcers without requiring additional instruction to their communication partners. Kurtz and colleagues (2011) examined the existing literature on FCT from January 1985 to October 2009 to determine whether it met the criteria for empirically supported treatments as described by Divisions 12 and 16 of the APA. The criteria considered were the number of studies available that demonstrated statistically significant results compared to an already established treatment, placebo, or pill; proper descriptions of procedures and characteristics of the sample; and replication of the results by at least two separate research groups. Despite the individualized nature of FCT and the wide variety of behaviors, communication modalities, participants, and training procedures used, the basic treatment algorithm for FCT remains unchanged: identify the environmental reinforcers maintaining the target behavior, select and teach a communication response, use differential reinforcement to encourage communication and extinguish the target behavior, add other operant treatment components if necessary, and program for generalization. The results of the study determined that FCT can be categorized as a well established treatment for reducing problem behavior for persons with intellectual disability, particularly children and adolescents with intellectual disability and individuals with ASD.

Use of Positive Reinforcement for Escape-Maintained Behaviors

Escape from demands, called negative reinforcement, is a common function identified in the literature and in clinical cases. In a review by Beavers, Iwata, and Lerman (2013) of over 981 published FAs from the last thirty years, the largest proportion of the sample had an identified escape function (32.2%). An attention function was the second most common (21.7% of the sample), followed by multiply maintained, automatic, and access to tangibles (18.9%, 16.3%, and 11.0% of the sample, respectively). A typical form of escape-maintained problem behavior is
noncompliance, which is also one of the most frequent reasons for psychiatric referral of young children. In a study reported by Kalb and Loeber (2003), in their sample of nonclinical populations, between 10% and 57% of children were seen to have some form of persistent noncompliance; in clinical populations, this increased to 65% to 92%. Additionally, noncompliance is often closely tied with other maladaptive behaviors, as many children escalate to aggressive and destructive behaviors if noncompliance is not sufficient to escape the aversive stimulus (Lalli, Mace, Wohn, & Livezey, 1995).

Despite the importance of addressing function of behavior, when treating negatively reinforced behaviors it is often less desirable to simply provide the functional reinforcer – escape from demands and other aversive situations – contingent upon appropriate behavior. In many cases, such as in school settings, allowing the child to continuously avoid nonpreferred tasks would be counterproductive to their academic achievement. This was highlighted in a study by Marcus and Vollmer (1995), in which a participant with escape-maintained problem behavior was exposed to two different treatment conditions: differential negative reinforcement (DNR) for communication and DNR for compliance. In the DNR for communication treatment, the participant was issued demands and if they engaged in appropriate communication (e.g., saying “finished”), they were provided with a brief break – that is, the participant could contact negative reinforcement without ever engaging in the work tasks. In the DNR for compliance treatment, demands were issued in the same manner and a brief break was provided contingent on task completion. Throughout both treatments, if the participant engaged in problem behavior, she was physically guided to complete the task – that is, she did not escape the task if she engaged in problem behavior. Both treatments were highly effective in decreasing problem behavior relative to baseline FA conditions, but increases in compliance were only observed in the DNR for
compliance treatment. This suggests that decreases in problem behavior may not always coincide with increases in compliance if task completion is not addressed directly.

A study by Lalli and colleagues (1995) expanded on this study, also using functional communication training and extinction, but adding a response chaining component to increase compliance and decrease the availability of escape. Three children with negatively reinforced behavior identified via a FA were taught a communicative response (e.g., saying “no” or handing over a break card) that resulted in escape from the demand. Initially, the participants were able to emit the functional response immediately upon presentation of the demand and escape the task completely. The response requirement was then gradually increased as the participants were required to complete a specific number of steps of the task before their functional communication response was reinforced. They demonstrated both decreases in problem behavior and corresponding increases in appropriate communication, as well as gradual increases in task compliance as the response requirement was increased. However, this study still utilized escape as a reinforcer for appropriate behavior.

Instead of continuing to use escape as a reinforcer for appropriate behavior, many studies began addressing the use of positive reinforcement to encourage compliance and bias participants away from negative reinforcement. A study by DeLeon, Neidert, Anders, and Rodriguez-Catter (2001) evaluated the use of both positive and negative reinforcement to increase task completion. The participant showed high and steady levels of problem behavior during the escape condition throughout the FA, and comparable levels of problem behavior emerged in the tangible session near the end of the assessment. They chose to address problem behavior in a demand setting, and the participant was taught to request either positive reinforcement (a high preferred edible) or negative reinforcement (a 30 second break) by
handed the experimenter a corresponding picture card. Instructional demands were delivered continuously, and during every session one of the two picture cards was made available contingent on task completion. A brief 30 second break was also delivered contingent upon problem behavior during both positive and negative reinforcement conditions. This was to determine the relative efficacy of the positive and negative reinforcement for compliance on a concurrent schedule with problem behavior. They observed increases in compliance and decreases in problem behavior only during the positive reinforcement sessions. This suggested that positive reinforcement was more effective in increasing compliance.

Next, an extinction component was paired with a choice of reinforcer – that is, problem behavior no longer resulted in escape from the task, and each reinforcer (positive and negative) was available concurrently for the participant to choose contingent on compliance. The task requirements to gain access to reinforcement were gradually increased as well. As problem behavior was placed on extinction and the participant was given a choice of positive or negative reinforcers, she reliably chose positive reinforcement when fewer tasks were required and problem behavior stayed at low levels. As the response requirement increased, she allocated more toward negative reinforcement and her preferences and problem behavior became more unstable. The authors suggested that the increase in response effort may have influenced the motivating operation by increasing the value of escape over positive reinforcement, which increased the probability of her choosing behaviors associated with negative reinforcement - both choosing the break card and engaging in destructive behavior.

This posed a question of whether these results were due to a) the motivation for positive reinforcement overcoming the motivation for escape (e.g., the relative value of escape is unchanged), or b) the presence of the positive reinforcer altered or abolished the value of escape,
thereby decreasing the effectiveness of the negative reinforcer. Call, Wacker, Ringdahl, Cooper-Brown, and Boelter (2004) attempted to address this question by observing different antecedent variables and their effects on compliance. During Experiment 1, two typically developing participants experienced three conditions: free play, demand plus escape, and demand plus attention plus escape. The free play condition was used as a control, and the participants had access to preferred toys and adult attention, and problem behavior was ignored. In the demand plus escape condition, the participants were given difficult instructional tasks with minimal attention. If the participant engaged in passive noncompliance (e.g., off-task behavior), they were provided with attention in the form of verbal prompting to do work. If they engaged in problem behavior, the task was briefly removed. The demand plus attention plus escape condition was identical to the previous condition, except the participant was provided with continuous attention in the form of verbal praise. They observed larger decreases in noncompliance for both participants in the demand plus attention plus escape condition. This suggests that the addition of attention may have altered the value of escape on an antecedent basis for both participants, as the consequences for noncompliance were constant across conditions.

The effects of positive reinforcement on the value of escape were also addressed by Fisher and colleagues (2005). The authors argued that it was important to know whether positive reinforcement degrades the value of escape or simply overrides it, as the motivation for positive reinforcement could potentially wane over time, thus once more increasing the child’s motivation for escape and decreasing the long-term maintenance of the treatment. In this study, two participants were taught to exchange a communication card for 30 seconds of positive or negative reinforcement during a work task, similar to DeLeon et al. (2001). Both participants experienced 3 conditions: baseline, restricted choice, and unrestricted choice. During baseline,
the participants were given continuous demands and a 30 s break was delivered contingent on problem behavior. During the restricted choice conditions, both communication cards were present and the participants were given continuous demands in the same manner as baseline. Handing over a communication card resulted in the corresponding outcome (30 seconds of attention and/or edibles for the positive reinforcement card, or a 30 second break from the task for the negative reinforcement card), and both cards were removed during the reinforcement interval. Problem behavior was placed on extinction. During the unrestricted choice condition, the procedures were identical except only the card selected by the participant would be removed from the table during the 30 second reinforcement interval. That is, the schedules of reinforcement were independent from each other, and the participant could choose both reinforcers concurrently, at different times, or partially overlapping.

One participant reliably chose positive reinforcement over negative reinforcement in both conditions, and selection of negative reinforcement in the unrestricted condition decreased throughout the analysis. This suggested that the presence of the positive reinforcer decreased the motivation to escape for this participant. The second participant initially also showed a preference for positive reinforcement over negative reinforcement in both restricted and unrestricted choice conditions, but her responding became more variable as the analysis progressed. She also began choosing both positive and negative reinforcement concurrently in the unrestricted choice phase near the end of the analysis. This suggested that her motivation to escape demands was not lessened in the same manner as the first participant, and that the positive reinforcement temporarily overrode the motivation for escape.

Harding, Wacker, Berg, Winborn-Kemmerer, and Lee (2009) also studied the preferences between positive and negative reinforcement for children with escape-maintained behavior. Both
participants experienced two conditions: FCT and FCT plus a choice component (FCT + choice). In the FCT condition, the participants were given demands and attention in the form of praise and encouragement, and problem behavior was ignored. If the participant completed their required work without problem behavior, they could request a break. The work requirement was increased slowly throughout the analysis. In the FCT + choice condition, the room was divided into two areas. On one side, the contingencies were exactly the same as the FCT condition. On the other side, the participant was allowed to escape the work but did not receive any attention or leisure items. The participant could freely move between sides at any point in the session. They found that FCT was effective in increasing appropriate mands and task completion, and decreasing problem behavior. Also, when given a choice between work with positive reinforcement and escaping work, both participants reliably allocated their time to the work side, showing a clear preference for positive reinforcement over negative reinforcement.

Another hypothesis for why individuals with negatively reinforced problem behavior may choose positive reinforcement is due to the overall quality of reinforcement. In a study by Gardner, Wacker, and Boelter (2009), the authors evaluated the impact of attention quality on the choice allocations of two participants with escape-maintained problem behavior. For the purpose of this study, high quality attention (HQA) was defined as frequent eye contact, close physical proximity, physical orientation toward the participant, and enthusiastic praise. Low quality attention (LQA) was defined as infrequent eye contact, far proximity, negative verbal statements, and flat or monotone vocal affect.

The study consisted of two phases: a brief experimental analysis and a concurrent operants assessment. The experimental analysis phase consisted of three conditions: free play, demand, and attention. During free play sessions, the participants had access to LQA and leisure
items, and no demands were placed on them. There were no programmed consequences for problem behavior. During the attention condition, the participants were told to play alone. If they engaged in problem behavior, they were provided with 15 seconds of LQA. During the demand condition, the participants were instructed to complete an academic task, and a therapist provided either LQA or HQA on a VT 15 second schedule throughout the session. If the participant engaged in problem behavior, the task was removed for 15 seconds and no attention was provided. During the concurrent operants assessment, the room was divided into two halves, and each side of the room was associated with either demands or free play, and alternating qualities of attention (either HQA, LQA, or no attention). Participants could freely move between sides throughout the sessions. In the experimental analysis, they observed highest levels of problem behavior during demand sessions with LQA. However, problem behavior decreased if demands were presented with HQA, indicating that HQA may compete with negative reinforcement. In the concurrent operants assessment, both participants also consistently chose to allocate their time to the side with HQA – regardless of whether it was during free play or demands, and regardless of whether the other side had demands or free play. This suggested that the quality of attention was a substantial factor in biasing responding to positive reinforcement over negative reinforcement, even when escape was concurrently available.

**Collateral Effects of Behavior Treatments**

Numerous studies have shown that treatment of one behavior can have indirect effects on related, but nontargeted behaviors. Russo and colleagues (1981) posited that topographically dissimilar behaviors that are consistently emitted in close temporal proximity are likely to receive similar consequences, and therefore may become functionally related. As the contingencies surrounding one of these behaviors are changed, the other related behaviors may
also change accordingly. In their study, three participants with a history of noncompliant behavior experienced a compliance treatment package, and both compliance and problem behavior (crying, aggression, and self-injurious behavior) were recorded. In the baseline phase, roughly every 30 seconds each participant was given easy commands (e.g., “come here,” “stand up,” “go there,” etc.) that historically were not met with low levels of compliance. There were no programmed consequences for compliance or problem behavior, and the therapist did not engage in any other interactions with the participant. In the compliance treatment phase, procedures were identical to baseline except the therapist provided reinforcement for compliance in the form of small edibles, praise, and physical contact (e.g., hugs, pats on the back, and saying “good boy” or “good girl”). For all three participants, they observed increases in compliance in the reinforcement condition, as well as decreases in all problem behaviors, even though no direct contingencies were placed on these corollary behaviors. The authors suggested that problem behavior and compliance may have formed an inverse response class; however, the preliminary nature of the experiment warranted further study on the covariation of these two behaviors.

Parrish, Cataldo, Kolko, Neef, and Egel (1986) expanded on this study, specifically testing for response covariation between problem behavior and compliance. Four participants took part in the study, and experienced four conditions: extinction, social disapproval, reinforcement for compliance and differential reinforcement of other behavior (DRO). During all conditions, every 20 seconds the therapist issued easy commands that often were met with noncompliance (e.g., “sit down,” “open/close the door,” “give me ___”, etc.). In the extinction condition, no programmed consequences were delivered for compliance or problem behaviors. In the social disapproval condition, the therapist provided attention in the form of statements of concern (e.g., “You’re going to break that”) contingent on problem behavior. During the
reinforcement of compliance condition, the therapist provided praise, edibles, and/or physical attention contingent upon independent compliance. No programmed consequences were delivered for problem behaviors, even if they occurred at the same time as compliance. During the DRO phase, the therapist provided praise, edibles, and/or physical attention if no targeted problem behaviors occurred for 5 seconds. A reversal design was used to evaluate behavior, and the order of conditions varied across participant. They observed the predicted inverse relationships between compliance and problem behavior; as one decreased, the other increased and vice versa.

Derby and colleagues (1997) continued to explore the collateral effects of FCT on other social behaviors. They conducted a study with 4 children with mild ID and/or developmental delays who displayed problem behavior, data was collected on levels of problem behavior, appropriate communication, and collateral social behaviors related to ongoing interactions with their caregivers. The participants experienced four phases conducted by their caregivers: descriptive assessment, experimental analysis, FCT treatment and follow-up. During the descriptive assessment phase, a daily behavior log and caregiver interviews were conducted to obtain behavioral descriptions, identify antecedent events that were associated with problem behavior, difficulty levels for various tasks, preferred activities, and activities that required different levels of social interaction. During the experimental analysis phase, antecedent and consequence (functional) analyses were conducted. The conditions consisted of control (free play), positive reinforcement (social attention and tangibles), and negative reinforcement (escape), which were conducted similarly to Iwata et al. (1982/1994). During the FCT treatment phase, caregivers were trained in one of two treatment packages depending on whether their child’s problem behavior was maintained by positive or negative reinforcement. The caregiver
training consisted of written reports, a 1 hour training session, feedback, and home visits. The two treatment packages were positive reinforcement plus time out (for children with positively reinforced problem behavior), and negative and positive reinforcement plus guided compliance (for children with negatively reinforced problem behavior). In the positive reinforcement plus time out package, the child was prompted to request for attention every 30 to 60 seconds. Appropriate communication was reinforced with praise and enthusiastic social attention. If the child engaged in problem behavior, the parent restricted their attention for 20 to 30 seconds. For the combination negative and positive reinforcement plus guided compliance treatment package, the parent provided similar demands as in the FA, and provide social praise contingent on compliance. After presenting the task for 30 to 60 seconds, the child was prompted to ask for a break. A 15 to 30 second break was delivered contingent upon appropriate requests. If the child engaged in problem behavior, they were immediately issued another task. The follow-up phase occurred after 2 to 6 months of treatment and consisted of a contingency reversal analysis. During these conditions, the reinforcer that maintained inappropriate behavior during the FA was provided contingent upon appropriate requests.

The results indicated that FCT was effective not only in decreasing inappropriate behavior and increasing compliance as expected, but over time they observed the emergence of positive social behaviors, such as talking, social expressions, and interactive toy engagement, even though these behaviors had no programmed consequences and were not being targeted for intervention. They also observed that parents reinforced the child’s positive social behavior at high levels after treatment. However, as there was no initial data reported on these behaviors, it is unclear whether this is a change from baseline. The authors suggested that the appropriate communication taught during FCT may be associated with other positive social interactions, and
therefore the reinforcement contingencies in FCT were maintaining both the appropriate communication and these social behaviors as well. Additionally, they speculated that the high quality of parent interactions may help maintain the effectiveness of FCT over time by maintaining the potency of the reinforcement. However, they cautioned that the relationship between the FCT treatment and the increase in social responding was purely correlational. These effects were also seen more cleanly in the children with identified attention functions, as the participants with escape-maintained problem behavior demonstrated less suppression of problem behavior and poorer treatment maintenance.

Berg and colleagues (2007) also studied the impact of FCT on problem behavior, task completion, manding, and social interactions across antecedent stimuli and responses for four participants with problem behavior maintained by both negative and positive reinforcement. Four children with problem behavior maintained, in part, by negative reinforcement as determined by an FA experienced FCT sessions in their homes which trained them to request a break from work tasks. Probes conducted across different tasks, settings, and persons were conducted before and after FCT treatment to determine changes in the dependent variables. They generally observed increases in positive social interactions in post treatment compared to their baseline levels for all participants, ranging from a 55% to 71% increase across the different generalization sets. The authors selected their dependent variables (problem behavior, task completion, manding, and social interactions) because they hypothesized that they all could be used as alternative methods of obtaining reinforcers; for example, by drawing a caregiver into a conversation or argument a child may delay or avoid a nonpreferred task. This suggests that social interactions may be in the same response class as problem behavior and appropriate manding if they are reinforced by the same consequence.
Schieltz and colleagues (2011) continued to explore this phenomenon further, evaluating the effects of FCT on non-targeted disruptive behavior. The study evaluated ten participants who engaged in destructive (property destruction, aggression, and self-injury) as well as disruptive (hand flapping, screaming, crying, spinning) behaviors. For both phases of the study, only destructive behavior was targeted for intervention – all disruptive behavior was ignored. All sessions were conducted by the participant’s caregiver at their home, with coaching provided by the experimenters. Phase 1 was a functional analysis, which consisted of free play, escape, attention, and tangible conditions. Phase 2 consisted of FCT with demand fading, as well as repeated extinction baselines within a reversal design. During the extinction baseline, the caregiver issued demands every 30 seconds without breaks. Brief praise was provided contingent on task completion. During FCT, the room was divided into a work area and play area. At the beginning of each session, the child was prompted to go to their work area and complete a task. Contingent upon independent task completion, the caregiver provided praise and prompted the child to request to play. After the child appropriately requested to play, they were provided with a 1 minute break from the task with access to toys and attention. If the child engaged in destructive behavior, they were immediately directed back to the work area and given a demand. Throughout the analysis, the number of demands was slowly increased from 1 task to 8 tasks.

The FCT treatment not only demonstrated decreases in the targeted destructive behavior and increases in compliance, but also similar decreases in nontargeted disruptive behavior. The authors provided three explanations for this result. The destructive and disruptive behaviors may have been part of the same response class or response chain as the destructive behavior, and the decrease in one behavior in the response class resulted in decreases of the entire behavioral class. Alternatively, perhaps the disruptive behaviors decreased because they were placed on extinction
throughout the study. The third explanation was that specific stimuli associated with the
treatment (such as the microswitch used for communication) may have signaled the availability
of reinforcement, and therefore exerted stimulus control over both the destructive and disruptive
behaviors.

_Evaluating Caregiver Interactions_

Another popular approach to managing children who exhibit inappropriate behaviors is
the use of parent training models (Burke, Loeber, & Birmaher, 2002). Instead of only focusing
on the direct contingencies that are maintaining the child’s problem behavior, many parent
training programs emphasize changing the overall pattern of interactions between the child and
caregiver. One of the most common and successful parent training programs used is parent-child
interaction therapy (Epstein et al., 2015). Parent-child interaction therapy (PCIT) was first
described by Eyberg (1988) as a behavioral family therapy approach for preschool children and
their caregivers that utilized operant behavior change as well as general principles of change
used by traditional play therapists. These traditional principles, as described by Eyberg, were 1)
the therapist follows the child’s lead during play, creating a safe atmosphere without fear of
censure, 2) therapist responses should convey empathy, accepting, warmth, and understanding,
3) the therapist should describe the child’s play to provide clarification and encourage
elaboration, and 4) the therapist reassures the child that their productions are important.

Eyberg describes a two-stage model broken into assessment and treatment. The
assessment stage consists of psychological assessment to identify problem behaviors, guide
treatment, and evaluate outcomes. This can include developmental assessments, behavior
interviews, behavioral rating scales, and direct observations. During post-treatment, many of
these measures are repeated to evaluate treatment success as well as social validity. The
treatment stage is broken into two phases: Child-Directed Interaction (CDI) and Parent-Directed Interaction (PDI). Caregivers attend didactic training sessions using direct instruction, role-play, handouts, and feedback before each phase. Many therapists also utilize a bug-in-ear device during sessions to provide unobtrusive feedback and coaching throughout sessions. Caregivers are directed to play with the child while the therapist observes and codes the first five minutes of interactions, then uses the data to determine which areas to focus for the duration of the session. At the end of the appointment, caregivers are provided with feedback of their performance and progression, and homework is assigned. The program is designed to be completed in 9 to 12 weekly sessions.

During the CDI phase, the main focus is on enhancing the quality of the caregiver-child relationship by teaching the caregiver to follow the child’s lead in play. Caregivers are coached in three “don’t” rules: 1) don’t give commands, 2) don’t ask questions, and 3) don’t criticize. These are intended to help parents relinquish control of the play activity, minimize attention for inappropriate behaviors, and avoid making statements that diminish or attack the child’s self-esteem. Caregivers are also taught four “do” skills: 1) describe what the child is doing, 2) imitate their actions, 3) reflect on their child’s verbalizations, and 4) praise. By describing the child’s activities, they retain their involvement while not being directive, encourage the child’s attention in the activity, inspire elaboration and clarification about the activity, and indirectly teach concepts to the child. Imitation of the child’s play helps the caregiver physically follow the child’s lead, as well as appropriately participate and teach the child how to play with toys. By reflecting on the child’s verbalizations, caregivers learn how to listen to their child, convey understanding and acceptance, and allow elaboration on both sides to increase communication. Praise helps increase a child’s self-worth, teaches the child what behaviors are acceptable, and
serves as reinforcement of behaviors. Lastly, caregivers are encouraged to ignore problem behavior during this phase to avoid inadvertently reinforcing inappropriate behavior with attention or other consequences, and to focus on their “do” skills.

Once the caregivers have achieved mastery of the skills taught in the CDI phase, the PDI phase is initiated. During the PDI phase, caregivers are still encouraged to use their skills from the CDI training. However, they are now trained to lead the activity using direct verbal directions and consequences for appropriate and inappropriate behavior. The first step of PDI is giving direct commands, which clearly state the behavior that the parent wishes the child to exhibit, such as “please come here,” or “put the red block in the basket.” Examples of indirect commands to be avoided are ones that are phrased as a question (e.g., “can you tie your shoe?”), or have vague expectations for child behavior (e.g., “behave yourself,” “let’s clean up”). Eyberg also describes three rules for effective commands: the command is stated positively, something the child is able to complete independently, and requires only one behavior at a time. The second step of PDI is to provide labeled praise for compliance to encourage task completion with positive reinforcement. The third step is the use of time-out from attention for noncompliance as a punishment. Once the child is consistently compliant with caregiver instructions, caregivers are taught how to teach specific skills relevant to the presenting problem by breaking them down into simpler components and building up mastery of the new skill using practice and praise.

In PCIT, researchers traditionally uses the Dyadic Parent-Child Interaction Coding System (DPICS), a behavioral observation coding system that measures the quality of caregiver-child interactions (Robinson & Eyberg, 1981). The codes encompass both appropriate and inappropriate parent and child behaviors, and focus on two sequences of interactions: the caregiver’s response following the child’s inappropriate behavior, and the child’s response to a
caregiver’s command. The parent behaviors include direct and indirect commands, labeled and unlabeled praise, positive and negative physical interactions, critical statements, descriptive questions, verbal acknowledgement. Child behaviors include compliance and inappropriate behaviors such as noncompliance, whining, yelling, smart talk, physical negative behavior, and destructive behavior. Opportunities to for children to comply with caregiver commands are also recorded. These codes can be used to evaluate total parent praise (labeled + unlabeled praise), total child deviant behavior (all inappropriate behavior), total commands (direct + indirect commands), command ratio (direct commands/total commands), opportunity ratio (no opportunity/total commands), compliance ratio (complies/total commands) and noncompliance ratio (noncomplies/total commands).
CHAPTER III

METHODOLOGY

Participants

Caregivers

Five caregiver participants whose children were enrolled in a federally funded research project, *Behavioral Treatment through In-Home Telehealth for Young Children with Autism* (Lindgren & Wacker, 2011), were selected for a retrospective data analysis. All caregivers were informed about potential privacy issues and completed informed consent to all treatment procedures through the IRB for the research project prior to being enrolled. Caregiver education ranged from some college to a doctorate degree. Caregivers received formal didactic training from their behavior specialist twice during the course of the project, focusing on basic behavioral principles (e.g., antecedents, consequences, and positive and negative reinforcement), structuring sessions, and the purpose of the assessment and treatment procedures. Although all caregivers were instructed to generally ignore problem behavior and attend to appropriate behavior during reinforcement intervals, no caregiver received direct training from the behavioral specialist focused on improving interactions or modifying caregiver or child behavior during playtime. Caregivers were excluded from the current study if at any point during the federally funded project they reported that they were concurrently receiving any other training focusing on improving their interactions (e.g., PCIT), or if multiple caregivers conducted sessions at the same time (e.g., if the child’s attention would be divided among caregivers during sessions). Caregivers were not excluded if they each conducted separate sessions throughout the study.
Children

All child participants in the federally funded project were between the ages of 18 months and 6 years, 11 months upon enrollment, had an autism spectrum disorder diagnosis (e.g., autistic disorder, Asperger’s syndrome, or a pervasive developmental disorder, not otherwise specified), and exhibited destructive or disruptive challenging behavior. To be included in the current study, child participants’ problem behavior had to be maintained, at least in part, by negative reinforcement as identified in the functional analysis, and their treatment was focused on increasing compliance with demands. Children were excluded from the current study if their behavior was maintained at least in part by positive reinforcement in the form of caregiver attention. This was to decrease the likelihood that caregiver attention quality would be a focus of the intervention. The children’s intellectual functioning ranged from an estimated developmental delay to average intelligence.

Four child participants were included in this study. Tim was a 2-year 3-month-old male diagnosed with autistic disorder. His caregiver was named Karen (mother). Lane was a 2-year 11-month-old male diagnosed with PDD-NOS, whose caregiver was named Wilma (mother). Jace was a 2-year 7-month-old male diagnosed with PDD-NOS and intellectual disability. His caregiver’s name was Renee (mother). Tera was a 6-year 8-month-old female diagnosed with autistic disorder. Her caregivers were Terry (father) and Ruby (mother).

Setting and Materials

Participant Homes

All sessions were conducted in a room that the families selected within their own homes. Upon enrollment in the federally funded project, the families received the materials needed to conduct the telehealth procedures (e.g., a Windows-based laptop with Skype installed, webcam,
Ethernet cable, Bluetooth headset). The room had leisure items and task materials available. For Tim, Lane, and Jace, sessions were conducted in a living room. For Tera, all sessions were conducted in her bedroom. Leisure items were selected by the caregivers based on the child’s preferences, and work tasks were selected based on a history of the task being correlated with problem behavior. Leisure items for Tim were balls, toy food, play instruments, trucks, and a tablet. His initial work task was placing blocks in a bucket, and the generalization task was tolerating the presence of hair clippers and cutting his hair. Lane’s leisure items were a tablet, videos, and blankets. His task was touching pictures in a book. Jace’s leisure item was a tablet. His initial task was putting blocks in a bucket, and his generalization task was pointing to pictures in a book. Leisure items for Tera were stuffed animals, games (e.g., Hungry Hungry Hippos, a butterfly catcher), and toys (e.g., plastic dinosaurs). Her work task was academic work, such as math problems and writing Chinese characters.

**Telehealth Center**

All behavioral specialists were housed in the telehealth center located at UIHC, which was equipped with a Windows-based desktop computer, monitor, webcam, and headset. The behavioral specialists observed and coached each caregiver through Skype, and recorded the audio and video of each visit using Debut, a screen capture software. All video recordings had an embedded 6-second audio track to assist with data coding.

*Response Definitions, Observation System, and Interobserver Agreement*

The dependent variables were appropriate caregiver behaviors, inappropriate caregiver behaviors and child problem behavior.
**Caregiver Behaviors**

Appropriate caregiver interactions were separated into four behaviors. These behaviors were selected based on the definition of high quality attention outlined in Gardner, Wacker, and Boelter (2009) and the Dyadic Parent-Child Interaction Coding System (DPICS). Positive verbal statements were defined as statements of praise or excitement, active descriptions of child activity, and repeating the child’s words in an enthusiastic tone of voice. Orientation toward child was defined as the caregiver’s body, head, and/or eyes physically oriented toward the child or child’s activity. Caregiver engagement was defined as the caregiver actively participating in the child’s activity or conversation, including the caregiver/child dyad touching the same object within 5 seconds of each other, caregiver imitation of child’s actions, and reciprocal positive verbalizations. Physical proximity was defined as any time the caregiver was within arm’s length of the child. Inappropriate caregiver behaviors were defined as negative verbal statements, such as reprimands, demands to change current activities (unless giving the prompt to complete the targeted task), and criticism of child behavior.

Caregiver behaviors were recorded using a 6-second partial interval system. An audio track signaling the end of each interval was embedded into each video to assist with scoring. If any behaviors occurred at any point during the interval, the behavior was scored. A sample data collection form is displayed in Figure 1. The percentage for each behavior was calculated by summing the total number of intervals in which the behavior occurred, then dividing this number by the total number of available intervals and multiplying by 100. Although all sessions were 5 minutes in length, only intervals including uninterrupted playtime were recorded. That is, intervals were removed from the total number of intervals if a) the demand was present during the interval, b) the behavior therapist initiated coaching or conversation with the caregiver during
the entirety of the interval, c) the parent was engaged in other activities necessary for the research procedures to be implemented correctly (e.g., setting up the next task, adjusting the camera for the data coders). This was to prevent caregivers being “penalized” for lack of interactions while they were conducting essential treatment procedures. The total percentages of the appropriate caregiver behaviors were then summed together, and the total percentage of inappropriate caregiver behavior was subtracted from that total to create an overall caregiver interaction score. Each caregiver interaction score was then plotted on a line graph to observe any changes in caregiver interaction quality over time.

**Child Problem Behaviors**

Child problem behavior was identified and defined for each individual child. Tim engaged in self-injury (self-hitting), aggression (hitting, scratching, pinching), and destructive behavior (kicking and throwing objects). Lane’s target behaviors were self-injury (falling to the ground), aggression (hitting, kicking), and destructive behaviors (throwing, hitting, or kicking items, knocking or pulling items out of his mother’s hands). Jace engaged in self-injury (headbanging, headbutting), aggression (hair pulling), and destructive behaviors (throwing items). Tera’s problem behaviors were aggression (hitting, kicking, scratching, pushing or pulling her parents), destructive behaviors (kicking furniture, throwing items, destroying task materials), and self-injury (headbanging). The percentage of intervals with problem behavior was calculated by dividing the number of intervals with problem behavior by the total number of session intervals and multiplying by 100.

**Experimental Design**

Each participant experienced three phases within the procedures of the federally funded project: a) FA, b) extinction baseline in the treatment context (e.g., demand), and c) FCT
treatment in the demand context. During Phase 1, an FA (Iwata et al., 1982/1994) was conducted within a multielement design to identify social reinforcers that were maintaining the child’s problem behavior. During Phase 2, an extinction baseline was conducted in which problem behavior and mands were placed on extinction (e.g., not met with reinforcement) during demand conditions. These sessions were alternated with free play sessions. During Phase 3, FCT treatment trials were conducted to decrease problem behavior and increase the child’s compliance with tasks and appropriate manding. Generalization probes in the form of 5-minute uncoached free play and treatment sessions were also conducted during Phase 3 for two participants (Lane and Jace).

Interobserver Agreement

Sessions were recorded and subsequently scored by a trained data coder who recorded the occurrence of each dependent variable. A second data coder independently recorded at least 30% of all sessions for each participant, with at least 80% agreement with the primary data coder. An agreement was defined as both data collectors recording the occurrence of the same behavior in the same 6-second interval. A disagreement was defined as a discrepancy between the data coders in recording a dependent variable in the same interval. Interobserver agreement (IOA) was calculated by dividing the number of agreements by the total number of agreements and disagreements and multiplying by 100.

Procedures

The FA and FCT procedures were conducted as part of the federally funded project, and the current data analyses were conducted retrospectively. Each caregiver/child dyad met with the behavioral specialist via telehealth for 1 hour every week for the duration of the project. The
project duration lasted an average of 26.5 weeks (range: 20 to 38 weeks) with an average number of 92 sessions (range: 67 to 130 sessions) for the current participants.

**Phase 1: Functional Analysis**

Each caregiver was coached via telehealth by the behavioral specialist to conduct an FA based on procedures described by Iwata and colleagues (1982/1994) to demonstrate that each child’s problem behavior was maintained, at least in part, by negative reinforcement. All sessions were 5 minutes in length and conducted in the participants’ home. All FAs consisted of escape, tangible, and attention test conditions, as well as a free play condition to establish baseline levels of behavior.

During the escape condition, the caregiver instructed the child to complete a targeted task, such as picking up a toy or tracing a circle. The caregiver presented the task roughly every 30s, and provided a verbal, model or physical prompt to the child if the child did not complete the task independently. If the child completed the task, the caregiver provided brief praise and presented another task. Contingent on target problem behavior, the caregiver removed the task for 30s and allowed the child to take a break. The child was not allowed access to leisure items or attention during the reinforcement period. After the 30s reinforcement period, the caregiver re-presented the task. This was to determine whether the child’s problem behavior would be maintained by negative reinforcement – that is, whether the child would repeatedly engage in problem behavior when provided with escape from a low-preferred task.

During the tangible condition, the caregiver restricted the child’s access to a high preferred tangible item. If the child engaged in problem behavior, they were given access to the tangible item for 30s. After the 30s reinforcement period, the item was once again restricted.
This condition was to determine whether the child would engage in problem behavior to gain access to positive reinforcement in the form of a high preferred tangible item.

During the attention condition, the caregiver instructed the child to play alone while they restricted their attention. Contingent upon problem behavior, the caregiver provided 30s of attention. After the reinforcement period, the caregiver once again restricted their attention. This was to determine whether the child would engage in problem behavior to gain access to positive reinforcement in the form of caregiver attention.

During the free play conditions, the child had access to leisure items and caregiver attention, and there were no demands placed on the child. Parents were coached to ignore or otherwise not respond to problem behavior. For the current study, parent behaviors were coded only during the free play sessions to establish an initial baseline for uncoached caregiver-child interactions.

**Phase 2: Extinction**

During Phase 2, only free play and escape extinction sessions were conducted. All sessions were 5 minutes in duration, and had no programmed consequences for inappropriate or appropriate behavior. The free play conditions were conducted in the same manner as in Phase 1. During the escape extinction condition, the caregiver instructed the child to complete the same task as in the escape condition in Phase 1. If the child completed the task, they were provided with brief praise and given another task. If the child engaged in problem behavior or noncompliance, the caregiver was instructed to ignore this and continue presenting tasks for the duration of the 5 minute session. For the purposes of the current study, caregiver behaviors were only coded during the free play sessions, as there were no reinforcement intervals during the
demand extinction conditions. This was to observe the pattern of caregiver behaviors prior to treatment being implemented.

Participants were randomly assigned to either an immediate treatment group or a delay treatment group within the telehealth project. Participants in the immediate treatment group conducted at least one visit in Phase 2 before immediately moving to Phase 3. Participants in the delay group met with the behavioral consultant once a month for at least 3 months to conduct Phase 2 sessions before moving to Phase 3.

**Phase 3: Treatment - Functional Communication Training**

During Phase 3, caregivers implemented FCT to increase compliance and decrease problem behavior. The same task that was used in Phases 1 and 2 was also used during FCT sessions. Noncompliant and inappropriate behavior were still placed on extinction, and caregivers continued to present the task until it was completed independently. Contingent upon task completion, the child was provided praise and prompted to ask for a break. Once the child appropriately requested a break, they were given 2-min reinforcement interval in which they had access to leisure items and parent attention. If a child engaged in problem behavior during the reinforcement interval, the reinforcement interval was ended and they were instructed to complete another task. Caregivers also conducted weekly uncoached free play and treatment sessions. For this study, parent behavior was coded only during the uncoached free play sessions and the reinforcement intervals of the FCT treatment sessions.
Figure 1. Sample Data collection form.

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<td>Or Orientation</td>
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**Parent Behavior**

- **V+** = Positive verbal statement. Includes praise, active descriptions of child activity, repeating child’s words, enthusiastic tone of voice. Do not code questions.
- **V-** = Negative verbal statement. Includes reprimands, demands to change current activities, criticism. Do not code questions.
- **Eng** = Parent engagement. Parent is actively engaged in child’s activity. Includes adult and child looking/touching same object within 5s of each other, parent imitation of child’s actions.
- **Phys** = Physical contact. Parent is within arm’s length of child. Includes appropriate parent- and child-initiated physical contact.

Exclude any intervals where therapist is coaching through whole interval or EO is present through whole interval.

**NOTES:**
CHAPTER IV

RESULTS

Mean Caregiver Interaction across All Sessions

The means of each participant’s caregiver interaction scores are displayed in Table 1. Terry displayed the highest mean caregiver interaction score across all sessions, with an average score of 322.47 (N = 15; SD = 47.58; range: 224.49 to 383.33). Ruby’s mean caregiver interaction score was slightly less, at 306.84 (N = 25; SD = 65.74; range: 138 to 400). Karen and Renee had similar mean scores, at 238.69 (N = 104; SD = 63.18; range: 12 to 375) and 237.07 (N = 55; SD = 26; range: 178 to 285), respectively. Wilma scored the lowest in mean caregiver interaction, with a score of 163.13 (N = 70) and the greatest variability (SD = 98.39; range: 13.89 to 345.83).

The group means of each caregiver behavior are displayed in Table 2. Orientation was the most common positive caregiver behavior exhibited by all five participants (M = 84.74, SD = 25.85) throughout the entire assessment, followed by physical proximity (M = 75.08, SD = 30.57). Positive verbalizations occurred at lower levels (M = 40.13, SD = 26.65). Engagement was the lowest appropriate caregiver behavior that occurred (M = 32.37) but had the largest standard deviation (SD = 31.29). Negative verbalizations occurred at the lowest levels of all caregiver behaviors across all participants (M = 2.62, SD = 7.82).

Overall results displaying total caregiver interaction scores and child problem behavior for Karen, Wilma, Renee, Terry, and Ruby are presented in Figures 1, 3, 5, 7 and 9, respectively. Individual caregiver behaviors across sessions for Karen, Wilma, Renee, Terry, and Ruby are presented in Figures 2, 4, 6, 8, and 10, respectively.
Functional Analysis – Free Play

General findings

During the FA free play sessions (first phase), one participant (Renee – Figure 5, first phase) demonstrated a decreasing trend in overall parent behaviors and one participant (Ruby – Figure 9, first phase) demonstrated an increasing trend in behavior. The other three participants (Karen, Wilma, and Terry – Figures 1, 3, and 7, respectively; first phases) demonstrated variable trends. Terry demonstrated the highest overall caregiver behaviors across the FA (M = 310.40, SD = 43.86, range: 224.49 to 358), whereas Wilma demonstrated the lowest (M = 220.42, SD = 56.58, range: 107.5 to 286.96). Ruby demonstrated the second highest overall caregiver behaviors (M = 278.22) with the greatest variability (SD = 100.28, range: 224.49 to 358). Karen had an average score of 238.29 (SD = 78.01; range = 12 to 332) and Renee had an average score of 226.13 with the smallest degree of variability (SD = 25.10; range: 178 to 267.65).

For three of the five caregiver participants (Renee, Terry, and Ruby), caregiver interaction scores during the FA free play sessions fell below their overall mean interaction scores reported above (Table 1). One participant (Wilma) had a caregiver interaction score during the FA that exceeded her overall mean across all sessions. The last participant (Karen) showed relatively little difference between her mean caregiver interaction score in the FA and her overall mean score.

Individual Caregiver Behaviors

The individual means for all caregiver behaviors across conditions are displayed in Table 3. For all five participants, orientation was their highest average behavior during the FA. In fact, all participants except Ruby (M = 79.33) demonstrated orientation behaviors at or above 90% of intervals on average. Physical proximity was the second highest behavior shown by three
participants (Karen, Wilma, and Renee). For Terry and Ruby, engagement was their second highest behavior. The lowest behavior demonstrated for all caregivers during FA free play sessions was negative verbalizations (all below 8% of intervals).

Karen (Figure 2, first phase) showed relatively stable elevated trends in orientation and physical proximity, and low and stable negative verbalizations during the FA. However, positive verbalizations and engagement occurred at more variable levels. Wilma (Figure 4, first phase) demonstrated increasing trends in positive verbalizations, and variable trends for all other behaviors. Wilma also demonstrated the highest levels of negative verbalizations than the other caregivers (M = 7.51% of intervals), which may have contributed to her overall lower caregiver interaction score compared to the other participants. Renee (Figure 6, first phase) demonstrated decreasing trends in positive verbalizations and engagement, which were also the lowest average levels of these behaviors demonstrated by any participant in the FA free play sessions (M = 13.95% and M = 19.58%, respectively). However, Renee also demonstrated higher levels of orientation and physical proximity than any other caregiver (M = 96.84% and M = 95.75%, respectively), and she was the only caregiver that did not engage in any negative verbalizations through the FA. Terry (Figure 8, first phase) demonstrated a decreasing trend in positive verbalizations, but his average was still higher than any other participant (M = 70.19%). He also demonstrated the highest levels of engagement of all participants (M = 86.19%), but the lowest average physical proximity (M = 63.96%). Ruby (Figure 10, first phase) demonstrated increasing trends for all five caregiver behaviors during the FA, including negative verbalizations. Her orientation was the lowest of all caregivers (M = 79.33%).
**Extinction**

**General findings**

Four caregivers (Karen, Wilma, Renee, and Terry) conducted free play sessions in Phase 2 (Extinction). Two caregivers (Karen and Wilma – Figures 1 & 3, respectively, second phases) demonstrated decreasing overall trends in total caregiver interaction scores during this phase, and one participant (Terry – Figure 7, second phase) showed a variable trend. The last participant, Renee (Figure 5, second phase), conducted only one extinction session, thus did not have a trend. Terry continued to demonstrate the highest overall caregiver interaction score across participants (M = 318.97, SD = 53.80, N = 5; range: 252 to 383.33). Karen demonstrated the second highest score (M = 216.23, SD = 51.57, N = 6; range: 147.91 to 294). Renee’s extinction session had a score of 195.45. Wilma continued to demonstrate the lowest average caregiver interaction scores during the extinction phase as well (M = 134.07, SD = 88.18, N = 4; range: 17.65 to 266). All four child participants demonstrated an increase in problem behavior during extinction sessions (Figures 1, 3, 5, 7, & 9; second phase).

Three out of these four participants (Karen, Wilma, and Renee) demonstrated decreases in caregiver interaction scores during the extinction sessions when compared to their FA sessions (Table 1). One of these participants (Renee) demonstrated average caregiver interaction scores during her extinction session that was more than one standard deviation below her average functional analysis scores (FA mean = 226.13; Extinction mean: 195.45; Overall SD = 25.10). The fourth participant (Terry) had minimal differences between his average functional analysis and average extinction interaction score.
Individual Caregiver Behaviors

All four caregiver participants that conducted extinction sessions demonstrated average decreases in at least two positive caregiver behaviors in the extinction sessions when compared to the functional analysis sessions. Wilma (Figure 4, second phase) demonstrated average decreases in all four positive caregiver behaviors - orientation, physical proximity, positive verbal statements, and engagement – and decreasing trends for all behaviors except physical proximity. Karen (Figure 2, second phase) demonstrated slight decreases in engagement and physical proximity on average, and decreasing trends throughout the extinction phase for all four positive caregiver behaviors. Karen also demonstrated an increase in negative verbal statements. Renee (Figure 6, second phase) demonstrated decreases in positive verbal statements and engagement, as well as a slight increase in physical proximity. Terry (Figure 8, second phase) demonstrated very slight decreases in orientation and engagement, and an average increase in physical proximity and negative verbal statements. Terry’s positive verbalizations and engagement showed slight increasing trends, and physical proximity showed a downward trend.

Treatment

General findings

Two of the five participants (Terry and Ruby) demonstrated their highest average interaction scores during the treatment sessions. Two participants (Karen and Renee) had interaction scores during treatment that were similar to their initial functional analysis scores. One participant (Wilma) had scores during the treatment sessions that were lower than her functional analysis scores. However, all four participants who conducted extinction sessions (Karen, Wilma, Renee, and Terry) demonstrated higher average caregiver interaction scores during the treatment compared to the extinction sessions. Although only one child participant
(Jace) showed an overall decrease in average problem behavior for the entire FCT treatment, all four child participants had a decreasing trend in problem behavior throughout treatment and demonstrated lower problem behavior during the last 5 treatment sessions compared to the baseline functional analysis and treatment sessions (see Figures 1, 3, 5, & 7 for levels of problem behavior demonstrated by Tim, Lane, Jace, and Tara, respectively).

Terry demonstrated the highest overall average caregiver behavior score across participants during the treatment phase (M = 344.94; SD = 35.32, N = 4, range: 288 to 375). Ruby had the second highest, with an average score of 314.60 (SD = 58.42, N = 22; range: 168.42 to 385.42). Karen and Renee demonstrated similar average scores during treatment (M = 236.93, SD = 61.48, N = 87, range: 78.38 to 375, and M = 232.46, SD = 25.06, N = 45, range: 180.85 to 285, respectively). Wilma had the lowest overall average caregiver scores during the treatment sessions (M = 164.98), and the largest standard deviation (SD = 100.29, N = 60, range: 13.89 to 345.83).

All caregivers demonstrated variable overall trends across treatment sessions. Karen initially (Figure 1) demonstrated an overall increasing trend in caregiver quality throughout FCT when reinforcement was delivered on an FR1 schedule; however, as the task requirement was increased and generalized to a novel task, Karen’s caregiver behaviors decreased to below baseline levels. Wilma’s caregiver behaviors were highly variable (Figure 3) throughout treatment, showing an initial increase in caregiver behaviors compared to the extinction phase but a quick decreasing trend. However, behaviors once again increased and then continued to decrease throughout treatment. Renee (Figure 5) demonstrated an initial increase in caregiver behaviors during FCT sessions which showed a slow decreasing trend throughout the treatment. Terry (Figure 7) exhibited slightly higher caregiver behaviors during the first half of the
treatment, which decreased slightly to comparable levels as his baseline. Ruby (Figure 9) also demonstrated highly variable levels of behavior throughout the FCT phase.

**Individual Caregiver Behaviors**

Orientation continued to be the highest overall behavior exhibited by all participants during treatment (Table 2), followed by physical proximity for Karen, Wilma, Renee, and Terry. Negative verbalizations continued to be the lowest across all participants. Positive verbalizations was the most likely behavior to increase from the initial functional analysis and extinction to the treatment sessions, as all participants but Terry showed overall average increases. Three of the four participants that conducted extinction sessions (Karen, Wilma, and Terry) showed decreases in negative verbalizations from extinction to treatment. The fourth participant (Renee) showed minimal change in negative verbalizations.

Throughout the assessment, Karen (Figure 2) showed the most favorable change in positive verbalizations compared to other behaviors. She had comparable levels of positive verbalizations in the FA free play and extinction, which increased overall during treatment. She showed minimal changes in behavior for physical proximity, negative verbalizations, and orientation. For physical proximity, she displayed a decrease from FA to extinction, which returned to similar levels as the FA during treatment. Her engagement behaviors decreased during extinction, and remained at lower levels throughout treatment. Her negative verbalizations increased during extinction but returned to baseline FA levels during treatment. Karen’s levels of orientation remained high and consistent across all phases.

Wilma (Figure 4) demonstrated a favorable change for negative verbalizations, which remained stable throughout the FA free play and extinction free play sessions, but decreased in treatment. Positive verbalizations decreased during extinction and returned to overall baseline
levels during treatment. However, orientation and physical proximity decreased substantially from baseline to extinction, and either increased minimally (orientation) or stayed relatively low (physical proximity). Engagement also decreased slightly and remained at lower levels during treatment.

Renee (Figure 6), like Karen, also demonstrated positive verbalizations as her largest increase from baseline and extinction to treatment. However, her orientation, physical proximity, and negative verbalizations remained relatively constant across all phases. Her engagement decreased from baseline to extinction and increased once again during treatment, but only at about half of the level it was previously.

Terry (Figure 8) demonstrated increases in orientation, engagement, and physical proximity across the entire assessment. For orientation and engagement, he showed decreases in the extinction phase and increases in the treatment phase that was higher than his baseline scores. Negative verbalizations increased during extinction and decreased to zero levels during treatment. Physical proximity increased steadily throughout the assessment. Positive verbalizations, however, decreased on average throughout the assessment.

Ruby (Figure 10) demonstrated increases in all positive caregiver behaviors from baseline to treatment, with the largest increases in positive verbalizations. However, her negative verbalizations also increased from the FA to treatment.

Functional Communication Training – Coached and Independent Sessions

During the FCT treatment, four of the caregiver participants (Karen, Wilma, Renee, and Ruby) conducted independent, uncoached practice sessions as well as coached sessions (Table 1). Two of the four participants (Wilma and Ruby) had higher caregiver interaction scores during the
coached sessions than the uncoached sessions. One of the participants (Karen) had higher interaction scores during the uncoached sessions compared to the coached sessions. The last caregiver (Renee) had similar interaction scores across both coached and uncoached sessions.

Wilma demonstrated higher percentages of all four positive caregiver behaviors in the coached sessions compared to the uncoached sessions. Ruby showed higher levels of engagement and physical proximity and slightly higher levels of positive verbal statements during the coached sessions, but higher levels of orientation in the uncoached sessions. Karen showed higher levels of positive verbal statements and engagement in the uncoached sessions.

*Functional Communication Training – Free Play*

Caregivers also conducted uncoached free play sessions during FCT treatment in which no demands or demand materials were presented prior to the reinforcement interval (e.g., playtime). These sessions were identical to those conducted during the previous two phases. All participants that conducted extinction sessions showed increases in the FCT free play sessions compared to extinction free play sessions. Three participants (Wilma, Terry, and Ruby) also demonstrated higher average caregiver scores during the FCT free play sessions compared to the initial FA free play sessions. Two participants (Wilma and Ruby) also had higher interaction scores during the FCT free play sessions compared to the FCT treatment sessions. However, three of the five participants (Karen, Renee, and Terry) had higher caregiver interaction scores during the FCT treatment sessions compared to the FCT free play sessions.

Terry demonstrated higher individual caregiver behaviors across all categories in the FCT treatment session compared to the FCT free play sessions. Karen demonstrated higher positive verbal statements and engagement in the FCT treatment sessions compared to the FCT free play sessions, but slightly higher physical proximity in the free play sessions. Renee demonstrated
higher average verbal praise in the FCT treatment sessions compared to the FCT free play, as well as higher engagement. Ruby engaged in higher verbal praise, engagement, physical proximity, and negative verbalizations in the free play sessions. However, she had higher levels of orientation during the FCT treatment sessions. Wilma demonstrated higher caregiver behaviors across all categories in the FCT free play sessions compared to the FCT treatment sessions.

**Correlations**

Correlational analyses were conducted to determine whether individual caregiver behaviors would be correlated with child problem behavior. Caregiver behaviors and child problem behaviors were averaged across all sessions conducted in a single visit and a Pearson product-moment correlation coefficient was computed for each pair. Table 4 depicts the results of all correlational analyses. Four of the five participants showed significant correlations between caregiver behaviors and child problem behavior at the 0.05 level. For Karen, there was a significant negative correlation between child problem behavior and total positive caregiver behavior ($r = -0.43, p < 0.01$) as well as a significant negative correlation between caregiver engagement and child problem behavior ($r = -0.047, p < 0.01$). For Renee, child problem behavior and total positive caregiver behaviors were also negatively correlated ($r = -0.57, p < 0.01$), as well as positive verbalizations and child problem behavior ($r = -0.49, p < 0.05$). For Ruby, child problem behavior and negative verbal statements were positively correlated ($r = 0.64, p < 0.05$). For Wilma, child problem behavior was positively correlated with total positive caregiver behavior ($r = 0.54, p < 0.01$), orientation ($r = 0.48, p < 0.01$), engagement ($r = 0.69, p < 0.01$), and physical proximity ($r = 0.42, p < 0.05$).
Table 1. Mean caregiver interaction scores and standard deviations for overall assessment and treatment, and individual phases.

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>FA Free Play</th>
<th>Extinction Free Play</th>
<th>Total Treatment</th>
<th>Coached FCT</th>
<th>Uncoached FCT</th>
<th>FCT Free Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karen</td>
<td>Average</td>
<td>238.69</td>
<td>238.29</td>
<td>216.23</td>
<td>240.30</td>
<td>237.55</td>
<td>255.31</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>63.18</td>
<td>78.01</td>
<td>51.57</td>
<td>61.48</td>
<td>61.51</td>
<td>58.43</td>
</tr>
<tr>
<td>Wilma</td>
<td>Average</td>
<td>163.13</td>
<td>220.42</td>
<td>134.073</td>
<td>159.34</td>
<td>170.47</td>
<td>237.78</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>98.39</td>
<td>56.58</td>
<td>88.18</td>
<td>100.29</td>
<td>81.76</td>
<td>83.58</td>
</tr>
<tr>
<td>Renee</td>
<td>Average</td>
<td>237.07</td>
<td>226.13</td>
<td>195.45</td>
<td>240.18</td>
<td>250.93</td>
<td>201.62</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>26</td>
<td>25.10</td>
<td>---</td>
<td>25.06</td>
<td>20.05</td>
<td>21.19</td>
</tr>
<tr>
<td>Terry</td>
<td>Average</td>
<td>322.47</td>
<td>310.40</td>
<td>318.97</td>
<td>344.94</td>
<td>358.93</td>
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</tr>
<tr>
<td></td>
<td>SD</td>
<td>47.58</td>
<td>43.86</td>
<td>53.80</td>
<td>35.32</td>
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<tr>
<td>Ruby</td>
<td>Average</td>
<td>306.84</td>
<td>278.22</td>
<td>---</td>
<td>310.75</td>
<td>314.60</td>
<td>320.41</td>
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<tr>
<td></td>
<td>SD</td>
<td>65.74</td>
<td>100.28</td>
<td>---</td>
<td>58.42</td>
<td>60.75</td>
<td>43.90</td>
</tr>
</tbody>
</table>

Table 2. Group means and standard deviations for caregiver behaviors across overall assessment and treatment phases.

<table>
<thead>
<tr>
<th></th>
<th>Positive Verbalizations</th>
<th>Orientation</th>
<th>Engagement</th>
<th>Physical Proximity</th>
<th>Negative Verbalizations</th>
<th>Total Caregiver Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Mean</td>
<td>40.13</td>
<td>84.74</td>
<td>32.37</td>
<td>75.08</td>
<td>2.62</td>
<td>229.71</td>
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<td>Group StDev</td>
<td>26.65</td>
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<td>30.57</td>
<td>7.82</td>
<td>83.41</td>
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Table 3. Mean individual caregiver interaction scores for each participant.

<table>
<thead>
<tr>
<th>Positive Verbalizations</th>
<th>Overall</th>
<th>FA Free Play</th>
<th>Extinction Free Play</th>
<th>Total Treatment</th>
<th>Coached FCT</th>
<th>Uncoached FCT</th>
<th>FCT Free Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karen</td>
<td>46.06</td>
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<td>35.79</td>
<td>48.26</td>
<td>46.86</td>
<td>56.92</td>
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<td>18.88</td>
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<td>43.94</td>
<td>43.83</td>
<td>2.67</td>
</tr>
<tr>
<td>Ruby</td>
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<td>60.58</td>
<td>---</td>
<td>77.70</td>
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<td>69.77</td>
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<td>---</td>
<td>53.30</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Karen</td>
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<td>90.68</td>
<td>91.94</td>
<td>90.45</td>
<td>91.01</td>
<td>89.13</td>
<td>88.54</td>
</tr>
<tr>
<td>Wilma</td>
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<td>96.97</td>
<td>97.22</td>
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<td></td>
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<td></td>
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<tr>
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<td>86.11</td>
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<td>93.37</td>
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<td>82.66</td>
<td>94.61</td>
<td>98.21</td>
<td>---</td>
<td>91</td>
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<td></td>
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<td></td>
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<td>50.51</td>
<td>55.90</td>
<td>23.90</td>
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</tr>
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<td>100</td>
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<td>93.93</td>
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<td>---</td>
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<td>68.70</td>
<td>46.03</td>
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<td>84.93</td>
<td>95.33</td>
<td>100</td>
<td>---</td>
<td>90.65</td>
</tr>
<tr>
<td>Negative Verbalizations</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karen</td>
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<td>4.65</td>
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<tr>
<td>Wilma</td>
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</tr>
<tr>
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<tr>
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<td>5.30</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>
Table 4. Correlations between parent behaviors and child problem behavior.

<table>
<thead>
<tr>
<th></th>
<th>Positive Verbalizations</th>
<th>Orientation</th>
<th>Engagement</th>
<th>Physical Proximity</th>
<th>Negative Verbalizations</th>
<th>Total Positive Caregiver Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karen</td>
<td>-0.34</td>
<td>-0.27</td>
<td>-0.47**</td>
<td>-0.23</td>
<td>0.29</td>
<td>-0.43*</td>
</tr>
<tr>
<td>Wilma</td>
<td>0.31</td>
<td>0.48*</td>
<td>0.70**</td>
<td>0.43*</td>
<td>0.33</td>
<td>0.54**</td>
</tr>
<tr>
<td>Renee</td>
<td>-0.49*</td>
<td>0.16</td>
<td>-0.23</td>
<td>-0.33</td>
<td>-0.23</td>
<td>-0.57**</td>
</tr>
<tr>
<td>Ruby</td>
<td>-0.25</td>
<td>-0.39</td>
<td>-0.15</td>
<td>0.41</td>
<td>0.64*</td>
<td>-0.23</td>
</tr>
<tr>
<td>Terry</td>
<td>0.12</td>
<td>0.26</td>
<td>0.19</td>
<td>0.33</td>
<td>0.16</td>
<td>0.39</td>
</tr>
</tbody>
</table>

* = < 0.05        ** = < 0.01
Figure 2. Total caregiver interaction scores and percentage of intervals with child problem behavior across all sessions for Karen.
Figure 3. Total percentage of intervals with positive verbalizations (top panel), percentage of intervals with orientation (second panel), percentage of intervals with engagement (middle panel), percentage of intervals with physical proximity (fourth panel), and percentage of intervals with negative verbalizations (bottom panel) across all sessions for Karen.
Figure 4. Total caregiver interaction scores and percentage of intervals with child problem behavior across all sessions for Wilma.
Figure 5. Total percentage of intervals with positive verbalizations (top panel), percentage of intervals with orientation (second panel), percentage of intervals with engagement (middle panel), percentage of intervals with physical proximity (fourth panel), and percentage of intervals with negative verbalizations (bottom panel) across all sessions for Wilma.
Figure 6. Total caregiver interaction scores and percentage of intervals with child problem behavior across all sessions for Renee.
Figure 7. Total percentage of intervals with positive verbalizations (top panel), percentage of intervals with orientation (second panel), percentage of intervals with engagement (middle panel), percentage of intervals with physical proximity (fourth panel), and percentage of intervals with negative verbalizations (bottom panel) across all sessions for Renee.
Figure 8. Total caregiver interaction scores and percentage of intervals with child problem behavior across all sessions for Terry.
Figure 9. Total percentage of intervals with positive verbalizations (top panel), percentage of intervals with orientation (second panel), percentage of intervals with engagement (middle panel), percentage of intervals with physical proximity (fourth panel), and percentage of intervals with negative verbalizations (bottom panel) across all sessions for Terry.
Figure 10. Total caregiver interaction scores and percentage of intervals with child problem behavior across all sessions for Ruby.
Figure 11. Total percentage of intervals with positive verbalizations (top panel), percentage of intervals with orientation (second panel), percentage of intervals with engagement (middle panel), percentage of intervals with physical proximity (fourth panel), and percentage of intervals with negative verbalizations (bottom panel) across all sessions for Ruby.
CHAPTER V
GENERAL DISCUSSION

Research has shown that parent training models, such as PCIT, can be effective at increasing the quality of parent-child interactions (Epstein et al., 2015). Through relational improvements and the use of basic behavioral techniques such as time out and differential attention, these programs aim to also increase child compliance and decrease overall problem behavior as a complementary goal. However, research also suggests that these programs may be more effective at improving parent perception of problem behavior rather than creating significant behavioral change in the participating children (Timmer et al., 2005). A core strategy of PCIT is the use of time out as a punishment procedure for inappropriate or noncompliant behavior, which may inadvertently reinforce escape-maintained behavior. Behavioral treatments, such as functional communication training (FCT), have been shown to be effective in decreasing escape-maintained problem behaviors in children and increasing appropriate functional behaviors such as compliance and communication (Kurtz et al., 2011; Rispoli et al., 2014). However, little research explores whether improvements in child behavior can result in improvements in caregiver-child interactions.

The purpose of the current study was to examine whether improved caregiver-child relationships would be an indirect effect of completing functional communication training with children with escape-maintained problem behavior. Specifically, the goals of this study were to identify whether parent behaviors would change during FCT, and identify whether specific parent behaviors would be correlated with child problem behavior. This chapter will conclude with suggested explanations of the findings, limitations of the study, and future directions.
Changes in Parent Interaction Quality during FCT Treatment

The first goal of the current study was to evaluate whether parent interaction quality changes during behavioral assessment and treatment. The results from the current study show that caregiver interaction quality is not static throughout behavioral assessment and treatment, and there is some improvement in quality when behavioral treatments are initiated. Despite limited specific instruction on how to improve interaction quality during the course of the FCT treatment, all five participants showed improvement in interaction scores during intervention compared to their baseline FA scores. This supports and expands on the findings by Derby and colleagues (1997), who found that collateral social effects can be observed in children during FCT. The current study demonstrated that collateral social improvements may be observed in caregivers’ behaviors as well. Additionally, Derby and colleagues found collateral benefits with children who exhibited attention-maintained problem behaviors, but they observed higher levels of problem behavior and fewer generalized social behaviors with children that exhibited escape-maintained problem behaviors. This study contributes to this line of research by finding similar results with children with escape-maintained problem behaviors.

For four of the five participants (all but Terry), overall changes in child behavior were shown to be significantly correlated with caregiver interaction quality. For three participants (Karen, Renee, and Ruby), these correlations supported the initial hypothesis: child problem behavior was either negatively correlated with appropriate caregiver behaviors or positively correlated with inappropriate caregiver behaviors. This supports the results from other PCIT studies that demonstrate a correlation between parent interaction quality and child problem behavior (Burke, Loeber, & Birmaher, 2002; Nixon, Sweeney, Erickson, & Touyz, 2003; Epstein
et al., 2015). The current study also expands on these studies by demonstrating that these interactions are reciprocal and potentially bidirectional.

Two findings were counter to the hypotheses. One participant (Wilma) demonstrated overall decreases in engagement, physical proximity, and orientation as child problem behavior decreased during treatment. Additionally, gains in caregiver interaction quality were not always sustained throughout treatment; by the end of the FCT treatment only two participants (Ruby and Terry) continued to display positive caregiver behaviors that were above their average FA free play behaviors, despite all of the child participants continuing to show low levels of problem behavior. This suggests that improvements in child behavior alone may not be sufficient to sustain long-term improvements in caregiver interactions.

**Individual Caregiver Behaviors**

The second goal of this study was to determine whether any specific parent behaviors would be more likely to be influenced by completion of behavior treatment programs. However, there were few consistent patterns across participants, and therefore the results did not suggest that any one behavior was more likely to be impacted with behavioral training and subsequent changes in child behavior.

The results indicate that although all appropriate caregivers’ behaviors may naturally experience some increases throughout behavioral treatment, caregivers were more likely to already exhibit certain behaviors at high levels. This may have made it more difficult to demonstrate increases across caregiver behaviors. For example, all participants exhibited orientation behaviors, on average, for near or above 80% of sessions during baseline. Thus, this behavioral skill was already high when the assessment began. Three participants (Karen, Renee,
and Wilma) demonstrated high levels of physical proximity behaviors as well, also averaging over 80% during baseline sessions.

By contrast, Karen, Renee, and Wilma displayed levels of verbal praise and engagement below 50% across all sessions. This suggests that for some caregivers, verbal praise may require direct coaching for improvement to occur.

Terry and Ruby showed slightly different patterns of behavior from the other three caregiver participants. Like the other participants, they demonstrated higher levels of orientation and lower levels of verbal praise, providing further support that caregivers may benefit more from receiving instruction in how and when to provide appropriate verbal praise, but likely need less coaching on orientation. Unlike the other participants, both Terry and Ruby displayed high levels of engagement at baseline and during treatment, again suggesting that some parents may already display high levels of certain behaviors that may not need additional coaching. Additionally, they both showed slightly lower levels of physical proximity than other participants. However, this finding may be more reflective of the type of play of their child (Tara). During reinforcement (play) intervals, Tara often requested to play catch, which necessitated a larger physical distance between her and her caregivers.

Conceptual Explanation of Results

Inverse relationship between child problem behavior and appropriate caregiver interactions

A possible explanation for the inverse relationship between appropriate caregiver behaviors and child problem behavior is the cycle of maladaptive interactions described by Lucyshyn and colleagues (2004). This cycle begins when a child displays problem behavior upon the presentation of a demand by a caregiver, which serves to punish the caregiver’s interaction
attempts, resulting in removal of the demand and the interaction. After repeated exposure to the child’s problem behavior in demand contexts, the caregiver may then associate the child with aversive outcomes and the child may become a conditioned aversive stimulus, in some cases generalizing outside of the demand context. This may lead the caregivers to avoid interactions even when the child is behaving appropriately. In turn, the caregivers’ avoidance behavior decreases the opportunities for the child to associate the caregiver with positive outcomes, and the presentation of demands may cause the child to also simultaneously associate the caregiver with aversive outcomes during certain contexts. This may increase the child’s motivation to engage in problem behavior to escape not only the task but also the presence of the caregiver outside of demand contexts, further reinforcing the maladaptive cycle of avoidance behaviors and inappropriate interactions.

This explanation is supported by the interaction patterns displayed in the extinction free play sessions by Karen, Wilma, Renee, and their respective children. All three children demonstrated high levels of problem behavior during the extinction test sessions, but lower levels of target problem behavior during the extinction free play sessions in which the establishing operation was not present. Caregiver behaviors were only coded during the free play sessions – not the extinction test sessions – yet these caregivers still demonstrated decreasing levels of interaction quality despite the absence of the demand context and the child’s low levels of problem behavior during the free play sessions. This suggests that the detrimental impact of child problem behavior may continue to affect the caregivers’ behaviors well after the problem behavior has ceased.

When treatment was implemented, however, both the child and the caregiver may have begun to associate each other with positive outcomes. For example, as the child began to engage
in higher levels of compliance, the caregiver may be more likely to provide praise. If the child enjoys the praise they may be more likely to comply again in the future, which can in turn reinforce the caregivers’ praise. Also, when the child begins to complete the task more quickly, more session time can be allocated to the reinforcement interval which increases opportunities for more appropriate interactions to occur. The decreased latency to reinforcement leads to a denser schedule of reinforcement, further encouraging shorter latencies to task completion. Therefore, instead of a cycle of aversive and avoidant behaviors creating a rift between the caregiver and child, a pattern of mutually reinforcing appropriate behaviors can be quickly established.

**Differences in individual caregiver behaviors**

Although the results of this study did not identify any specific behaviors that may be more likely to correlate with child problem behavior, it did reveal that certain behaviors, such as orientation and physical proximity, were higher at baseline than other behaviors, such as engagement and verbal praise. One possible explanation for this could be that orientation and physical proximity can be conceptualized as “passive” behaviors that require either little effort to maintain once initiated, or require some other active behavior to occur in order for the behavior to be terminated. For example, once a caregiver moves within close physical proximity to the child, they will continue to be within close proximity unless the child or the caregiver actively moves away. This is similar for orientation; unless the child moves from their location or the caregiver actively diverts their gaze, the behavior will continue.

Another possible explanation is that orientation and physical proximity not only are important behaviors for improved caregiver-child interaction quality, but they are also necessary for basic supervision of young children. Many parents, especially parents of children who exhibit
problem behavior, learn quickly that they must keep an eye on their children at all times and be ready to physically intervene should the child begin to engage in problematic or dangerous behavior. For Karen, Renee, and Wilma in particular, these behaviors may have occurred at higher rates overall because their children are younger (between 2 years, 3 months and 2 years, 11 months upon enrollment) and likely require higher levels of supervision in their daily lives.

Verbal praise and engagement, on the other hand, may require more effort from the caregiver or necessitate participation from the child to sustain. Verbal praise is a discrete behavior that requires constant emissions to maintain high rates, which may be more effortful than other “passive” behaviors. Also, if the child does not have a history of frequently displaying appropriate or compliant behaviors, the caregiver may not have as many opportunities (i.e., practice) for using verbal praise and direct coaching may be necessary. This is supported by the number of interventions that include training caregivers in differential attention and praise as an important treatment component in reducing child problem behaviors (Murrihy, Kidman, & Ollendick, 2011).

Engagement showed the least improvement from baseline to treatment for Karen, Renee, and Wilma. This may be because engagement is also the only behavior that required active, reciprocal interaction between the caregiver and the child in order to be coded. For both Renee and Wilma, their children often chose to engage in activities during their reinforcement interval that did not require a second participant, such as watching videos on a tablet. This made it difficult for the caregivers to consistently interact with their children, and often resulted in the caregivers passively watching the video with their children or engaging in tablet maintenance (e.g., restoring the Wifi signal, changing the sound, finding the correct video, etc.). Karen’s child (Tim) demonstrated limited play skills and would quickly move from one activity to the next.
during the reinforcement interval. Karen would often appropriately follow his lead and allow him to initiate playing with a toy or activity, but he would often abandon the activity before she could join. This suggests that it was not necessarily a solitary skill deficit on the part of the caregiver, but likely required intervention and skill building on the part of the child. This theory is supported by Terry and Ruby, who demonstrated engagement consistently at high levels across phases. Compared to the other participants, their child was older (6 years, 8 months upon enrollment), had more sophisticated language skills, and a more expansive play repertoire. Tara would regularly direct her parents during the reinforcement interval to engage in social games, such as make-believe and catch. In her case, she showed a clear preference for interactive activities that required her caregivers’ engagement rather than solitary games. This suggests that engagement may be depend upon the play activities a child prefers and/or the child’s ability to participate in interactive play with others.

**Decreases in interaction quality over time**

Three of the five caregivers (Karen, Renee, and Wilma) demonstrated initial increases in caregiver quality during FCT treatment, but then subsequent decreases in interaction quality throughout the treatment. This decrease occurred despite child problem behavior staying low and stable. There are two potential explanations for this. The first explanation is that the appropriate caregiver behaviors were not sufficiently reinforced to maintain their elevated rate. Karen, Renee, and Wilma all experienced improvement in the child’s behavior when treatment was implemented and initially responded enthusiastically to this improvement with appropriate social behaviors (e.g., praise, physical affection, offers to participate in the child’s activities). However, anecdotally, the children did not always respond to these behaviors favorably, and occasionally would avoid the caregiver (e.g., push the caregiver away if they attempted to cuddle
them, protest and hold the tablet out of reach if the caregiver moved closer to them), suggesting that the caregivers’ approach behaviors may have signaled the interruption or termination of preferred activities, and/or presentation of demands to the child. As described earlier, the children did not always engage in activities that required a reciprocal partner during their reinforcement interval, often choosing to engage in solitary activities. It is possible that the children’s lack of response or active avoidance of these appropriate caregiver behaviors gradually placed these behaviors on extinction or actively punished the parent behaviors, decreasing their rate over time. In other parent training models, the caregivers may receive feedback and praise from the therapist for demonstrating these appropriate behaviors, maintaining these behaviors at high levels throughout the intervention. Since the focus of the original FCT treatment was to decrease child problem behavior, the behavioral coaches primarily focused on providing corrective feedback for parent behaviors that were germane to the FCT procedures in the demand context, and less emphasis was given to caregiver behaviors during the reinforcement intervals.

An alternate explanation for the decreasing quality of caregiver interactions throughout treatment is the presence of competing activities that diverted the caregivers’ attention away from their children, thus degrading their interaction quality or reducing the opportunities for interaction. In many instances, the competing stimulus was the therapist. Whether inadvertently or by necessity, the therapist diverted the caregivers’ attention away from their child multiple times during sessions across all participants. The majority of these situations involved the therapist providing immediate coaching and corrective feedback about the procedures. Occasionally, the therapist discussed plans for future sessions, answered caregiver questions, or explained behavioral principles in greater depth. At other times, therapists engaged in friendly
conversation with the caregivers during the child’s reinforcement period. These conversations were occasionally initiated by the therapist, but more commonly were initiated by the caregiver, suggesting that the caregiver was actively choosing to allocate their attention away from their child for other purposes.

It seems likely that the presence of the therapist led to lower caregiver scores for some caregivers. In order to avoid “penalizing” caregivers when a therapist diverted the caregiver’s attention (such as when therapists were following the grant protocols by providing feedback to the caregivers), intervals where a therapist initiated interactions with a caregiver were excluded from analysis. However, intervals where the caregiver initiated conversation with the therapist (regardless of relevance to the current assessment or treatment procedures) were included in the data collection. When caregivers initiated conversation with the therapist a decrease in the overall caregiver score would be expected. This paradigm is demonstrated most clearly with Karen. She was noted to initiate more conversations with the therapist near the end of treatment, and a subsequent decrease in positive caregiver behaviors is noticeable in her results during the generalization phase. However, during her 6-month follow-up probes conducted without a therapist present, positive caregiver behaviors increased once again. This suggests that the therapist was potentially a transient competing stimulus for her attention, and the removal of the stimulus resulted in full allocation of her attention back to her child.

**Positive relationship between child problem behavior and appropriate caregiver behaviors**

As previously mentioned, the results for one participant (Wilma) failed to support the hypothesis. For Wilma, child problem behavior was positively correlated with appropriate caregiver behaviors. There are a number of explanations for these results, some of which have already been briefly discussed.
All participants but Wilma generally showed an increase in behaviors from baseline to treatment. Wilma displayed overall decreases in appropriate caregiver behaviors from baseline to treatment. The largest decreases were observed in orientation and physical proximity behaviors, which were often the highest behaviors exhibited by other participants. It is possible that Wilma’s behavior was guided by the need for increased parental supervision when Lane was engaging in higher levels of problem behavior. As Lane’s problem behavior decreased during treatment, the need for this close supervision also decreased, which was reflected in her interaction patterns.

Another possible reason that Wilma’s caregiver behavior differed from the others is that Lane may have associated Wilma with the presentation of demands and other aversive outcomes, and subsequently engaged in problem behavior to avoid her presence. Over time, this may lead to a decrease in Wilma’s overall attempts to engage with him, which could have maintained even when overall problem behavior decreased. Lane also often selected activities during his reinforcement interval that did not encourage Wilma’s interactions. Like Jace, he often chose to play with a tablet, which provided limited interaction opportunities. Unlike Jace, he often actively moved away from Wilma, vocally protested if she came close, or held the tablet out of reach, which may have punished Wilma’s attempts to interact with him during the initial stages of the assessment.

Wilma, like Karen, also experienced competing stimuli that vied for her attention. Anecdotally, during the uncoached FCT practice sessions, after conducting the training trial she allowed Lane to access his preferred toy (a tablet) and then regularly left the treatment area. She often engaged in household tasks during this time, such as cleaning the treatment room or doing laundry, and periodically checked on Lane to ensure that he was safe and behaving appropriately.
When Wilma allocated her time to household chores it came at the cost of engagement with Lane. Although this resulted in decreases in caregiver interaction quality, it also demonstrates how reduction in child problem behavior may allow caregivers time to engage in other essential tasks. This may in turn lead to decreases in caregiver stress and can contribute to their overall quality of life.

One last possible explanation for Wilma’s behaviors is that the behaviors may have been influenced by a variable that was not accounted for in the data collection. In analyzing Wilma’s results in particular, she demonstrates a recurring pattern of behavior where she was more likely to engage in higher quality interactions during the first session conducted during weekly visits, regardless of the type of condition conducted. Across assessment and treatment, Wilma showed decreasing trends for 83% of visits where at least three sessions were conducted. No other participant demonstrated this same trend in behavior. Therefore, some of her behavioral variability could be due to fatigue near the end of visits and unrelated to Lane’s level of problem behavior.

**Limitations and Future Directions**

Several limitations are present in the current study. First, the small number of participants and the variability in the results limit the strength of the findings. Additional studies with a greater number of participants may help clarify the results obtained here and potentially identify other patterns of behavior.

Another limitation is the use of parent-child dyads where the child displayed escape-maintained behaviors while excluding those with primarily attention- or tangibly-maintained problem behavior. These findings limit the generalizability to all children with problem behaviors. Future studies may explore whether parent-child dyads where the child exhibits
problem behaviors maintained by positive reinforcement demonstrate similar patterns as the dyads in the current study.

Although this study identified some association between child behavior change and parent behavior change, correlational analyses do not provide any definitive answers into the directional causality between caregiver and child behaviors. In PCIT, it is assumed that increases in caregiver interaction quality will lead to decreases in child problem behavior, and that the foundation of this change begins with the enhanced relationship gained by the caregiver-child dyads. However, the results of this study may challenge this assertion. During the FCT treatment, child problem behavior is the variable of concern and caregiver interactions are not targeted. Therefore, this suggests that any increases in caregiver interaction quality during these procedures may be due to the improvement in child behavior. Future studies could aim to determine causality; however, it is likely that these results only provide evidence that these behaviors do not occur in isolation of each other, and are constantly interacting and impacting one another. This supports the results found by Eisenstadt, Eyberg, McNeil, Newcomb and Funderburk (1993), indicating no differences in relationships of mother-child dyads who completed parent-directed interactions (focusing on increasing compliance) compared to dyads that completed child-directed interactions (focusing on enhancing the caregiver-child relationship).

One unexpected variable that impacted the caregivers’ interaction quality was the presence of the therapist. As mentioned previously, for some participants the therapist occasionally became a competing stimulus for caregivers’ attention and detracted from their overall interaction quality. In these cases, it is important for the therapist to be cognizant of the impact of their presence when coaching sessions. Studies have shown that parents of children
with disabilities and children who exhibit problem behaviors experience higher levels of family stress and isolation (Baker et al., 2003; Lucyshyn et al., 2004; Rao & Beidel, 2009; Solomon et al., 2008), and therefore may be more motivated to talk with another adult who is understanding and sympathetic to their situation. Although it is important for the therapist to be sensitive to their needs and build rapport with the caregiver, therapists must be careful to not detract from times when the caregiver could be building rapport with their child. It may be beneficial for therapists to set aside scheduled time during visits to check in with caregivers, build rapport, discuss questions and concerns. Future studies may consider eliminating the option for the caregiver to talk with a therapist at will to determine whether this would lead to more positive caregiver behaviors.

For Wilma, the presence of the therapist demonstrated the opposite effect. FCT treatment sessions conducted with a therapist present boasted a 22% increase in positive caregiver behaviors on average compared to her uncoached caregiver FCT practice sessions. As mentioned previously, Wilma would often leave the treatment area during the uncoached caregiver practice sessions. However, during the FCT treatment sessions where the therapist was present, Wilma would often stay within the camera frame and focus on Lane. This is reflected in the increase in caregiver interaction scores across all behavior categories during these sessions. This likely demonstrates reactivity to the presence of the therapist. The focus of the FCT treatment for the telehealth grant was to decrease child problem behavior, so the purpose of the reinforcement intervals was to allow the child to appropriately escape the demand and engage in whichever activity the child chooses. Lane chose to engage in activities that required limited social interaction (e.g., watching or playing on a tablet). There were no expectations or explicit instructions for Wilma to interact with Lane during these times, only to provide supervision as
needed. Similar to Karen’s case, in these situations it may be beneficial for therapists to provide some explicit coaching or expectations that parents interact with their children in certain ways during reinforcement intervals to improve their relationship.

Future studies could focus on whether a parent-coaching strategy such as PCIT embedded into FCT treatments may assist in more efficient behavioral treatments, or determine if these additional components help maintain treatment gains for longer periods of time. Many PCIT programs require at least 12 weekly sessions to complete (Nixon et al., 2003) and the behavioral treatments used in this current study lasted between 5 to 9 months, so it may be difficult to effectively integrate both procedures without undermining the efficacy of either intervention or overloading the parents. However, the benefits of creating caregiver-child dyads with reciprocally reinforcing positive interactions may outweigh the initial effort required on the part of the caregivers.

**Conclusions**

Overall, these results indicate that reductions in child problem behavior may lead to increased caregiver interaction quality. Additional research in this area is warranted to determine the extent of its impact. Instead of using free play sessions only to determine baseline levels of child problem behavior, these conditions could easily be used to gauge the caregivers’ baseline interaction skills. Behavioral treatments like FCT often already encourage parents to use differential attention to reduce negative comments and increase positive attention during free play sessions, so it may be feasible to systematically teach other interactive skills as well, such as labeled praise, imitation of the child’s activities, or allowing the child to lead the play. By explicitly establishing a foundation of appropriate interaction skills during reinforcement intervals as well as teaching parents to appropriately manage problem behavior, clinicians can
equip parents with the tools to improve their relationships with their child, their family, and themselves.
REFERENCES


