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UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

EFFECTIVENESS OF A BRIEF PARENT TRAINING
IN PIVOTAL RESPONSE TREATMENT FOR
YOUNG CHILDREN WITH AUTISM
SPECTRUM DISORDER

A Dissertation Submitted in Partial Fulfillment
of the Requirements of the Degree of
Doctor of Philosophy

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College of Education and Behavioral Sciences
School of Special Education
Special Education

August 2021

This Dissertation by: Hesham F. Hassan Abda

Entitled: *Effectiveness of a Brief Parent Training in Pivotal Response Treatment for Young Children With Autism Spectrum Disorder*

has been approved as meeting the requirement for the Degree of Doctor of Philosophy in the College of Education and Behavioral Sciences in the School of Special Education, Program of Special Education.

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ABSTRACT

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This study used a single-case research design across subjects. The purpose of this research was to investigate the effectiveness of a brief 6-hour training program in Pivotal Response Treatment (PRT) for parents of young children with Autism Spectrum Disorder (ASD) on the increased use of social functional utterances (SFU) by their children during play sessions. Baseline data were collected before the parent training. Training commenced once baseline trends showed stability, at which point the parents – all of whom were three fathers – received instruction in PRT motivational techniques for use in the home setting during play sessions. During the training sessions, the fathers were educated regarding how PRT motivational techniques and strategies are used and how to apply them in playtime with their children. After receiving the training, the parents then applied the PRT techniques during interactive play sessions over 8 weeks to develop the language use and social communication skills of their children with ASD. In this study, culture and language were factors considered as the parents and children were from Libya and spoke Arabic. This study is the first time these techniques have been implemented with this population of individuals. The cultural parenting interactions played a part in examining the results. The present research study demonstrated that following the brief training, the fathers were able to consistently utilize the PRT motivational techniques with their children with ASD during the intervention phase and that, once the intervention began, each of the three subject

children with ASD showed an increase in mean frequency of social functional utterances. These exhibitions of increased SFU were a marked improvement, making the development of the brief training in PRT for parents worthwhile and cost-effective, in terms of personnel and time commitment. The significant increase in the mean frequencies of the PRT motivational techniques indicates that all the participating fathers successfully implemented the techniques with fidelity throughout the intervention phase of the research study. The visual inspection of the percentages of non-overlapping data values demonstrated that the intervention used in this research study was highly effective.

Keywords: autism spectrum disorder, pivotal response training, parent intervention, social functional utterances, Libya

DEDICATION

This dissertation is dedicated to my mother, Aliyah and her beautiful soul; to my wife, Amna; and to my daughters Zaynab and Alia.

My mother, you had always loved me unconditionally. You motivated me to successfully complete my doctoral program. Amna, you inspire me all the time. You have been a constant source of encouragement and support that made it possible for me to complete my dissertation. Zaynab and Alia, I hope that my getting a doctorate will inspire you to achieve your dreams in the future, no matter the challenges.

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CHAPTER I

INTRODUCTION

The current research study investigates the implementation fidelity of parent training in Pivotal Response Treatment (PRT) and the ensuing communication skills development in children with Autism Spectrum Disorder (ASD). This chapter includes an overview of autism spectrum disorder and background on how communication and speech development may impact children with ASD. This introductory chapter also presents the statement of the problem, the significance of the study, the research questions that were examined, the definitions of the relevant terms, and the limitations of the research.

Autism Spectrum Disorder

Autism spectrum disorder is an umbrella term applied to a range of neurodevelopmental conditions that may include developmental delay or impairment in the area of social, verbal, and/or nonverbal communication (Lai et al., 2014). The federal definition found in the Individuals with Disabilities Education Act ([IDEA], 2004) defines autism as “a developmental disability significantly affecting verbal and nonverbal communication and social interaction, usually evident before age 3 that adversely affects a child’s education performance” (34 C.F.R. 300.8c1). Ruble (2001) noted that the degree of social interaction is a notable factor when comparing individuals with ASD and their neurotypical peers. Autism spectrum disorder is a lifelong condition that may be characterized by persistent inflexible thinking, impairment in social interactions, and communication deficits (Esan et al., 2015).

During the 1960s and 1990s, researchers focused mainly on what would today be considered more severe presentations of ASD, thus boosting the belief that ASD was an uncommon disorder affecting roughly 1 in every 2,000 children (Fombonne, 2009). However, in the first decades of the 21st century, the rate of ASD diagnoses has exponentially increased. For example, the 2007 rate of ASD in the United States was 1:150 births; by 2008, this rate was 1:110; and then in 2012, 1:88 (Monteiro et al., 2015). Subsequently, in just the last few years, according to Baio et al. (2018), the diagnosis rate was 1:59, and then in 2020, Maenner et al. identified the rate as 1:54. Such an increase in a 30-year span would be viewed in other mental health or medical identification arenas as a public health crisis. When children cannot communicate, it interferes with their ability to learn, impedes their social development, and may stifle their ability to achieve independence (Harr & Brown, 2018). Because communication affects many aspects of development, the need to identify effective interventions that can address communication deficits is essential. The increase in individuals with significant communication deficits and social interaction impairments in educational and community settings requires attention from educators and those who initiate early intervention programs. Evidence-based practices and supports must be identified for efficient and straightforward implementation.

Moreover, the increase in diagnoses is not without financial burden. In the United States, the lifetime cost of caring for an individual with ASD is estimated to be between \$1.4 and \$2.4 million, which translates to a national cost of \$61-\$66 billion per year for young children and \$175-\$196 billion per year for adults with the disorder (Buescher et al., 2014). These costs do not account for the loss of quality of life for these individuals and the addition to tax bases that could result if they were employable. It is essential that parents and educators have evidence-

based practices to employ that can be both preventative and proactive in the treatment and intervention of the more severe characteristics of autism spectrum disorder.

Similarly, the number of children with ASD has increased dramatically worldwide, and regardless of where they live, these children face challenges in developing communication and social skills; may exhibit repetitive restricted behaviors, a lack of interest in certain types of activities, or an almost obsessive interest in certain activities; and possess other stereotypical patterns of behaviors. One of the main characteristics of ASD is impairment in communication skills development, severely impacting these children's overall growth and progress (Bruyneel et al., 2019). Unfortunately for such children, communication has a large influence on behavioral and social functioning. Researchers have found that early intensive treatment and behavioral interventions have shown positive results for addressing a substantial diversity of the challenges these children may experience (Eikeseth, 2009; Rogers & Vismara, 2008). For this reason, there is a need for early intensive social and behavioral interventions to teach children with ASD essential skills.

One intervention program found effective in the improvement of communication and language skills for children with ASD is Pivotal Response Treatment (PRT; L. M. Turner et al., 2006). This approach is an evidence-based practice that employs specific strategies to support children with ASD in developing necessary communication skills (Bradshaw et al., 2017). Numerous studies have demonstrated the effectiveness of PRT in the improvement of language ability in children with ASD (Delprato, 2001; Gengoux et al., 2015; L. K. Koegel et al., 1997; R. L. Koegel & Koegel, 2006). One of the distinguishing factors of PRT is that it can be implemented in an environment that is natural to the child. Thus, the approach can incorporate the family in the delivery of the intervention. Training parents of children with ASD in evidence-

based therapeutic techniques has been found to be a useful tool to enhance children's treatment plans (Bearss et al., 2015). Parental engagement in behavioral training for children with ASD can be more effective when professionals facilitate interventions while considering the family's needs and ensuring that methods are easily accessible for parental implementation (Raulston et al., 2019).

Communication and Speech Impairments in Autism

Individuals with autism spectrum disorder may experience challenges with communication issues related to social interactions. Communication involves more than merely speaking a thought. Once the statement is made, the meaning of it must be interpreted, which is called semantics. Other information is gathered by both the speaker and the person spoken to. This information is often conveyed nonverbally.

One common nonverbal communication issue for children with ASD is difficulty making and maintaining eye contact with others. This issue can affect their comprehension of social situations, as well as speech and language development and use during social interactions. Luyster et al. (2008) examined language development issues in toddlers with ASD to identify receptive and expressive language levels in an early stage. The study involved 164 children ranging in age from 18-33 months. Luyster et al. employed direct assessment, parent interview, and parent questionnaire to measure cognitive and language development. Comparisons of the different assessment measurement methods found strong agreement. The research also showed that receptive and expressive language was positively correlated with social cognitive variables and motor skills. It was found that parents reported that the most important predictors for receptive and expressive language were non-verbal cognitive ability measured by direct observation and gesture use. Typical language development in young children begins with

utterances that become more complex as they add words and other grammatical morphemes. For children who are considered nonverbal, utterances are a point of needed development (Owens, 2001).

Speech and language delays are considered one of the distinctive characteristics of autism spectrum disorder. This characteristic was first identified by the psychiatrist Leo Kanner (1943), who was the first person to identify autistic disorder, calling it "early infantile autism." The dominant features of ASD comprise impairment in verbal and/or nonverbal communication skills development and receptive and expressive language deficits that present at an early age (American Psychiatric Association, 2013). Mitchell et al. (2006) conducted a study investigating whether a reduced use of gesture indicated ASD by examining infants who had siblings with ASD. Data were collected from parents using the MacArthur Communicative Development Inventory-Infant Form at 12 and 18 months. The findings suggested that delays in communication and language skills development are explicit in the early life of children with ASD through observation of reduced gesture (nonverbal communication), and proposed that monitoring for such delay or lack begins as early as possible so that intervention can occur in a timely fashion.

Statement of the Problem

One of the primary traits of ASD involves a lack of communication skills development (Henderson et al., 2014). These deficits are one of the main diagnostic criteria for ASD (Luyster et al., 2008) and are a major concern for children's parents and caregivers (Eigsti et al., 2011; Matson & Horovitz, 2010). Specifically, children deemed as low-functioning tend to have considerable communication deficits, which may hinder their academic and social progress once they enter elementary school (Kanner, 1943). Supporting children with ASD in developing

communication skills is an intensive and potentially lengthy process; furthermore, it is not always possible to determine what methods will be successful (D. Carr & Felce, 2007). It is estimated that roughly 25% of children with ASD may not develop functional language, meaning they may remain essentially nonverbal throughout their lives (Klinger et al., 2002). Thus, evidence-based, effective, and efficient language development interventions must be identified and aligned with children's needs to be implemented as early as possible.

The disparity in language development in children with ASD is noticeable and disconcerting (Watson & Flippin, 2008). The lack of language has long-range impact on their future development and quality of life. Developing intervention programs for these children is a challenge because speech and language deficits can present in very different ways and range from mild to severe. Another concern is that these children sometimes lose language after acquiring it (De Giacomo & Fombonne, 1998). Those who see them in their daily environments must have ongoing maintenance techniques to promote continual use and growth of language skills. McDuffie and Yoder (2010) explored short-term predictive links between several kinds of parents' verbal responsiveness and spoken words in a study that involved 32 children with ASD. The findings showed that when parents focused on the interests of their children through free-play (e.g., talked about the child's interests, did not direct the child what to do, did not deliver an anticipation that the child communicates about their interests) early-stage language acquisition was enhanced. These results support parents' engagement in teaching their children to improve social functional utterances as language development.

Significance of the Study

The current study is necessary for a number of reasons. First, many studies have found that early intervention with children with ASD can positively impact communication skills

development (R. L. Koegel et al., 2005; Rogers & Vismara, 2008). Since language development may be positively affected by early intervention and the delivery of evidence-based interventions, such efforts have great importance. The improvement of communication skills is one of the most significant variables predicting better outcomes for education and into adulthood (Howlin et al., 2004).

Second, since parents can be considered first-responders to language and communication skills development issues, they should be regarded as essential in the training efforts of social interaction and language development. Thus, parents should be trained in the most effective techniques for enhancing communication skills acquisition in their children diagnosed with ASD.

The current study provided training in an evidence-based intervention for parents who have children with ASD with communication deficits. Parent training may lead to more efficient progress in language development than interventions provided by other individuals (e.g., teachers, therapists, and other service providers) in the child's later educational life (Drew et al., 2002). Parents received evidence-based training in how to support their children's communication skills development using pivotal response treatment motivational techniques in their naturalistic home environment. In contrast to clinical interventions, naturalistic behavioral interventions have demonstrated promising long-term outcomes in facilitating social communication of children with ASD. Within natural community settings, such as home and play environments, children with ASD have more significant inclusion opportunities with typical peers. They have a greater chance of being included if they can indicate social engagement through what are termed social functional utterances. Interventions implemented in more naturalistic environments have shown rapid acquisition, generalization, and spontaneity of targeted social behaviors (R. L. Koegel et al., 2002).

Finally, this study was significant as it is the first study to explore training parents from Libya in PRT motivational techniques to use with their children with ASD. It is unknown if PRT can be implemented in a fairly male-dominated culture during play sessions and if the parent, once trained, can maintain implementation of the PRT components with fidelity.

Purpose of the Study

Children with limited communication skills are also limited in their interactions with the adults and peers in their environments. This lack of communication results in these children being isolated and distanced from other people. The development of more effective ways to interact and respond to others around them can lead to a greater quality of life. Engaging parents in training for delivering interventions to their children with ASD might ensure that children are provided with intensive early intervention from significant persons in their natural environment.

The purpose of this research is to investigate the effectiveness of a brief 6-hour training program in PRT for parents of young children with ASD on the increased use of social functional utterances by their children during play sessions. Parents learned PRT motivational techniques and strategies and then applied those techniques during interactive play sessions over 8 weeks to develop their children's language use and social communication skills.

The objective was to have parents, after a training period, implement an evidence-based practice that is predicted to improve communication skills in their children with ASD. In this study, culture and language were examined as the fathers and children were from Libya and spoke Arabic. The cultural parenting interactions played a part in the examination of the results and the researcher needed to be culturally and language responsive during the parent training sessions and the observations of the parent-child pairs in the baseline and intervention phases of data collection.

Research Questions

In keeping with the purpose and importance of this study as outlined in the sections above, the following research questions guided this study:

- Q1 After a brief 6-hour pivotal response treatment training, can parents implement specific motivational techniques with fidelity across interactive play sessions of three sessions per week over 8 weeks with their children with autism spectrum disorder?
- Q2 Do children with autism spectrum disorder show an increase in their use of social functional utterances during play sessions as a result of the implementation of pivotal response treatment motivational techniques by a parent?

Limitations of the Study

Single-case research design across subjects was used for this study, which has been used and is viewed as effective for studying low-incidence populations such as children with ASD (Cakiroglu, 2012). It is cost effective, provides detailed analysis, and is flexible enough to allow the researcher to monitor intervention progress in naturalistic settings. There are limitations associated with this design and the sampling process used in the current research. First, the sample size was small, which was based on the availability of the targeted participants in the region where the study was implemented. The largest Libyan community in the United States is in Colorado. Not all children with ASD shared the selection criteria conditions posed. Since the sample size was small, there was a limit on the amount of data obtained. These concerns limited the data results in terms of generalization. To identify the largest pool possible, the researcher published a post on the Viber application that Libyans residing in Colorado use to get to know each other. Many children with ASD live with their families in Colorado, however, it was unknown how many would meet the selection criteria established for this purposeful sampling

research. The desired target number of parent/child pairings was three. Second, the duration of the study and necessary commitment of time for the intervention (8 weeks) were a source of concern for some parents.

Definitions of Terms

Applied Behavior Analysis. This is an evidence-based science, which includes techniques used in a systematic way to improve socially significant behaviors by determining the elements that lead to the desired change (Cooper et al., 2007).

Autism Spectrum Disorder. The *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association, 2013), the Colorado Department of Education ([CDE], 2020), and the Individuals with Disabilities Education Act ([IDEA], 2004) each identify as primary criteria and characteristics of children with ASD persistent deficits in social communication and social interaction that impede the ability to perform academically and socially across settings.

Child choice. This technique involves the parent employing the following steps: (a) giving the child two (or more) choices; (b) allowing the child to make the decision regarding activity selection on their own; (c) allowing the child to make the decision regarding whether an activity is accepted or rejected; or (d) providing a prompt to the child using an open-ended question that allows the child to choose the activity (R. L. Koegel & Koegel, 2012).

Clear opportunities. This technique involves the parent using clear, brief, and specific statements of instruction to the child. When successful, this also involves the parent being able to keep the child's attention on either themselves (the parent) or on the task, while the parent is giving the instructions (R. L. Koegel & Koegel, 2012).

Contingent. This involves immediately giving the child a reward after “the child’s correct verbal response or attempt.” If the child doesn’t respond or they respond in a way that is inappropriate, no reward is provided (R. L. Koegel & Koegel, 2012).

Inappropriate response. The following fall into this category of response: one which is not functional or communicative; one that just echoes the sound the parent made; one which does not make sense or is unclear to the parent; or one which is in some other way inappropriate – such as it is disruptive (overly loud) or is not connected to the context (Coolican et al., 2010).

Indirect verbal prompt. In this case, the parent gives some kind of prompt via speech or action that does not involve directly modeling the child’s response. For example, would you like the yellow ball or the green ball?"; "yellow ball"), an open-ended question (e.g., "What is it?"), a time delay (e.g., holding up a preferred toy for a while and waiting until the child requests it), or a leading prompt such as "1, 2, 3, ..."; “go (Coolican et al., 2010).

Initiation. Without being prompted by the parent, the child initiates communication. In this case, the speech must have function and be appropriate to the situation (Coolican et al., 2010).

Model prompt. This case begins with the parent modeling the speech and involves the child responding with a functional approximation of the parent’s word or phrase. For example, in this case, the child is considered successful if the parent says “ball” and the child responds with “baw” (Coolican et al., 2010).

Natural rewards. In this technique, the parent utilizes contingent rewards that are relevant to the child’s expressive verbalizations. For example, if the child says “ball,” the parent would roll a ball to the child (R. L. Koegel & Koegel, 2012).

Nature of child utterances. These are fall into the six categories of: “model prompted, indirectly prompted, initiation, inappropriate response, no response, and overall responsivity” (Coolican et al., 2010).

No response. When the child does not respond verbally to the question or the prompt, this is how the response is categorized (Coolican et al., 2010).

Overall responsivity. This is the measure of the child’s rate of response to the parent’s indirect verbal prompt or model prompt, that consists of the proportion of times that the child’s response is made appropriately (Coolican et al., 2010).

Pivotal Response Treatment. This approach was derived from Applied Behavior Analysis (ABA) to teach children with ASD (Smith et al., 2015). PRT focuses specifically on pivotal areas (e.g., motivation, self-initiation, self-management, and multiple cues) critical to supporting communication development in children with ASD (Mohammadzaheri et al., 2014).

Rewards attempts. When the child’s verbalization is simply correct or it meets all the requirements of “functional verbal attempt,” a contingent reward is provided by the parent (R. L. Koegel & Koegel, 2012).

Social Functional Utterance. These consist of: (a) maintaining an appropriate level of *vocal loudness*; (b) the child is facing (both in body posture and face) the parent and/or the object of the exercise (e.g., toy); and (c) the vocalizations the child is making *appear functional or task-directed* and have a purpose related to the task. In this case, the child does not need to actually make sounds that are completely correct or accurate, but they need to seem to the parent to be meaningful (Coolican et al., 2010).

Organization of the Research

Chapter 2 follows this introductory chapter that described the focus of the research and the purpose for carrying out the investigation. The next chapter will provide an overview of the literature regarding the characteristics and needs of students with ASD in the areas of social language and communication skills. Chapter 2 will also discuss the research that has led to the identification of PRT as a promising and evidence-based practice for supporting children with autism spectrum disorder. Chapter 3 will present a detailed explanation of the methodology and procedures used within this research study. The results of the research will be described in detail in the fourth chapter. In Chapter 5, a discussion of the findings, their applicability to the treatment and support of children with autism spectrum disorder, and areas of future research will be presented.

CHAPTER II

LITERATURE REVIEW

Introduction

As previously discussed in Chapter 1, the number of children diagnosed with autism spectrum disorder (ASD) has increased dramatically in the last few decades. Communication impairment is one of the most common characteristics in the diagnostic criteria for ASD, both verbal and nonverbal. More research is needed to investigate evidence-based practices to enhance communication skills in these children.

This literature review presents background on the existing knowledge and research on the challenges that children with ASD experience with communication development. It also provides some background on behavioral treatment models identified as evidence-based for use with children with ASD. The treatments addressed here are (a) ABA-Based Direct Instruction Models, which include functional communication training and picture exchange communication system (PECS; Doherty et al., 2018), and (b) Natural Environment Models, which include home-based parent delivery and pivotal response treatment (Hendricks, 2009a; R. L. Koegel & Koegel, 2006). This chapter highlights the most prominent aspects of Pivotal Response Treatment (PRT) (R. L. Koegel & Koegel, 2006), as PRT was the focus of this study. This literature review focuses on the exploration of theoretical perspectives and applications to ASD, applied research, implementation principles, guidelines, critical areas for PRT, the rationale for using the single-subject design, and illustrations from the literature to identify inconsistencies and gaps in the research.

Challenges in Communication and Behavior in Autism Spectrum Disorder

Challenges in Social Communication

Difficulties for persons with ASD are apparent in all the components of social functioning, such as initiating and maintaining conversation, understanding non-verbal communication cues (e.g., eye contact, facial expressions, gestures), interpreting linguistic cues, and joint attention (King et al., 2014). These challenges with social communication frequently manifest as inappropriate behaviors, and they may significantly interfere with the acquisition of essential skills across social contexts (Barned et al., 2011). These characteristics are of particular concern because social communication deficits are linked with other developmental difficulties, including increased problem behavior, challenges in building relationships with others, and decreased academic performance (Lee et al., 2020).

Restricted and Repetitive Behaviors

The second group of core characteristics of ASD are referred to as restricted and repetitive behaviors (RRBs), which are identified as the expression of repetitive patterns, preoccupations with objects/portions of objects, sensory mannerisms, and strict adherence to ritual and routine (Richler et al., 2007). RRBs include stereotyped movements such as hand flapping, rocking, spinning an object (e.g., the wheels of a toy car), and shaking fingers in front of eyes (American Psychiatric Association, 2013). However, little is known about why individuals with ASD engage in RRBs. Several theories assume that RRBs might indicate cognitive impairment, over-arousal, weak central coherence, or executive dysfunction (Turner, 1999).

A confounding variable that relates to these two core characteristics is impairments in speech and language. Many researchers have illustrated that the consequences of speech and

language delays and deficits are likely causal factors in the social interaction and challenging behavior difficulties expressed by these individuals (Beitchman et al., 2014; Prelock et al., 2008; Voci et al., 2006).

Production and Reception of Language

Language is considered an essential component of communication that can facilitate social interaction with people. Language challenges are one of the critical characteristics of children with ASD. Many children with ASD withdraw from social interaction due to their inability to utilize language to communicate with others (Henderson et al., 2014).

In typical language development, children comprehend words before they begin to use them to communicate. However, children with ASD often show deficits in understanding and producing language (Hudry et al., 2010). In a study that involved roughly 1,000 people with ASD, 41% of the participants demonstrated a delay in words, and 51% showed a delay in phrases. Although many children with ASD can speak, they have impairments in communication pragmatics, especially regarding the social aspects of language (Folstein & Rosen-Sheidley, 2001).

Research has emphasized that the lack of spoken language in children with ASD can be attributed to the atypical processing of sounds. Several research studies have indicated that children with ASD manifest atypical responses to social stimuli such as speech (Boddaert et al., 2004; Chevallier et al., 2012; Dawson et al., 2004). Other researchers have proposed that these children might be expressing hyper- or hypo-arousal to nonspeech and speech sounds (Järvinen-Pasley et al., 2008; K. Markram & Markram, 2010). They might have abnormal processing of nonspeech sounds that appear as impaired speech sounds' impaired processing abilities (Gervais et al., 2004; Kuhl et al., 2005). The need for further investigation of language development,

particularly receptive and expressive language abilities in individuals with ASD, has been asserted by several researchers (Hudry et al., 2010; Prévost et al., 2017).

Treatment Models

Recent reviews of interventions for children with ASD have demonstrated that intervention programs based on Applied Behavior Analysis (ABA) can be described as evidence-based practices (Lord et al., 2005). ABA is “the science in which tactics derived from the principles of behavior are applied systematically to improve socially significant behavior, and experimentation is used to identify the variables responsible for behavior change” (Cooper et al., 2007, p. 20).

Comprehensive programs designed based on such research fall into the following two categories: ABA-based Direct Instruction Approaches (e.g., Functional Communication Training and Picture Exchange Communication System) and Natural Environment Approaches such as home-based parent delivery and pivotal response treatment (Odom et al., 2010; Stansberry-Brusnahan & Collet-Klingenberg, 2010). The following sections discuss these two approaches to instruction, beginning with the direct instruction approaches.

Applied Behavior Analysis-Based Direct Instruction Approaches

This section includes two approaches based on the principles of Applied Behavior Analysis (ABA): functional communication training and Picture Exchange Communication System. Here, the author highlights a brief history of each approach, provides example from the research on how to address target behaviors, and describes the primary steps for implementing these approaches accurately.

Functional Communication Training

Carr and Durand (1985) developed functional Communication Training (FCT) in the 1980s; it is one of the prescribed interventions for the types of severely destructive behavior that is sometimes displayed by children with ASD and those with intellectual disabilities (Falcomata & Wacker, 2013; Greer et al., 2016). Reviews of the literature show that FCT is one of several evidence-based practices for children with ASD. FCT has been demonstrated to be effective and is one of the 27 interventions identified by the National Professional Development Center on Autism Spectrum Disorder (Wong et al., 2015). The FCT approach has been found to reduce disruptive behaviors and improve communication skills. For example, Matter and Zarcone (2017) used a multiple baseline design to examine the effects of systematic reinforcement on both existing and novel communicative responses and problem behavior of two children with ASD. A significant finding in the study was that the FCT process resulted in increased communicative behaviors and problem behavior reductions. A second finding was that when the participants were examined separately, each seemed to favor using their novel responses over the responses that were already in their repertoires. The authors concluded that FCT's effectiveness may vary based on the types of responses targeted during the intervention, suggesting that clinicians need to pay closer attention to the target behaviors when implementing FCT with children with ASD.

There are three essential steps to implementing FCT: (a) identifying the function of the challenging behavior, (b) choosing an alternative manner of communicating, and (c) developing a systematic intervention procedure (Mancil & Boman, 2010). These steps are reviewed below. First, when identifying the function of challenging behavior, FCT relies on the Functional Behavioral Assessment (FBA) results to provide an effective intervention that can treat the

destructive behavior. FBA is a process that includes procedures developed to help practitioners better understand the purpose of behaviors displayed by people with/without disabilities (Hanley, 2012). When outcomes of the FBA show that inappropriate behavior is maintained or sustained by social reinforcement, FCT includes eliminating the identified social reinforcement to prevent the behavior. The reinforcement is only provided contingent upon a socially suitable alternative response, called a functional communication response (Battaglia, 2017).

Second, when choosing an alternative manner of communicating, the FBA results are used to select communicative responses that can replace the problem behaviors. Depending on the capabilities of the child with ASD, alternative communicative responses can be verbal language, gestures, pictures, or assistive technology devices (Mancil, 2006). For instance, if the FBA illustrated that a child's inappropriate behavior is maintained by escaping an academic task, FCT may include preventing escape for inappropriate behavior and teaching the child to ask for a break using spoken words or symbols/pictures.

Finally, after the practitioner has identified the function of the challenging behavior and chosen an alternative manner of communicating, it is necessary to develop a procedure to teach the selected alternative communication skills. In this step, the practitioner develops an intervention including a preferred reinforcer to prompt the child's performance of the communicative response and preventing the previous reinforcement that was following the inappropriate behavior (Gerow et al., 2018). Within FCT procedures, a number of different techniques have been researched that can enhance a child's communication. Some of these include social stories, video modeling, power cards, and scripts (Mancil & Boman, 2010).

To summarize, FCT's success relies on three components: completing an FBA to determine motivations, selecting an appropriate response that honors the motivations of the child

with ASD, and developing and implementing intervention procedures. There are several considerations to keep in mind when using the FCT approach. These include: (a) accurately determining the reinforcer (e.g., access to attention, access to tangibles, escape, sensory stimulation) that maintains a challenging behavior; (b) identifying a communicative response that can replace the problem behaviors and is within the capability of the child; (c) providing diverse opportunities to prompt the selected communication response to ensure that the child will acquire it; and (d) withholding the reinforcement identified for the challenging behavior (Tiger et al., 2008).

Battaglia (2017) noted that FCT's success relies on three underlying competencies: understanding, proficiency, and expertise of the team members (e.g., parents, teachers, speech-language pathologists). These are critical for successfully completing each task as accurately as possible and determining the functions served by the targeted behaviors in the child's interactions with the environment so that it is possible to determine the most appropriate substitute forms of communication that will work for the individual child (Battaglia, 2017). Therefore, one limitation that must be recognized in FCT is the difficulty a parent or caregiver who is not an expert might have in employing the training with a child with autism in the natural environment of the family home. This issue is also relevant to the use of Picture Exchange Communication System (PECS), the next set of procedures to be discussed.

Picture Exchange Communication System

Research indicates that roughly one quarter of people with ASD will not improve functional spoken communication (Tager-Flusberg & Kasari, 2013). For this reason, experts in the field have recognized the need to develop alternate methods of communication for such individuals that do not require speech to address this issue. One of these approaches is the

Picture Exchange Communication System (PECS), a picture-based communication technique employed to instruct on communication skills in children with ASD. Research has shown that some children with ASD prefer to utilize low-tech systems such as that developed for the PECS approach (Gilroy et al., 2018).

PECS was designed by Frost and Bondy (2002) in 1986 and has been marketed by Pyramid Educational Consultants. Although the approach is intended to be used with the diverse group of people who face difficulties with communication disorders, it has been found to be useful for children with ASD (Tincani et al., 2006). The PECS approach is a form of augmentative and alternative communication (AAC) used to improve children's verbal or non-verbal communicative and social behaviors. According to peer-reviewed literature, PECS is an evidence-based practice and is useful in enhancing functional communication in people with developmental disabilities, including those with ASD (Flippin et al., 2010; Wong et al., 2015).

Along with potentially increasing the communication skills of an individual child, PECS can improve interactions between peers who have ASD. Doherty et al. (2018) explored the effects of reinforcement and prompting techniques when preschool children with ASD were taught to make requests (mands) of peers using PECS. A second study by the same authors taught a group of children to listen and respond to the first group's requests. Overall, the first study's findings demonstrated that the children improved in peer mands using the prompting technique. Similarly, the children who participated in the second study showed improvement in giving correct responses to PECS cards that their peers used.

The PECS approach consists of six phases as follows. The first phase, *teaching the physically assisted exchange*, requires two practitioners to physically prompt the learner to exchange a picture for a high-interest item. In this phase, PECS aims to teach prerequisite skills

that a child with ASD needs, including looking at, picking up, reaching for, and handing a specific picture to their communication partner (Frost & Bondy, 2002). Once these skills have been learned and are being consistently used, the second phase, *expanding spontaneity*, can begin. In this phase, a communication book is given to the child. The distance is increased between the two partners so that the child learns to move longer distances to reach the target picture. The child learns to select the picture from the communication book without prompting and to move toward the practitioner to request that item (Frost & Bondy, 2002). The overall goal in this phase is to improve spontaneity and generalization in the exchange of the targeted picture across various practitioners and settings using highly preferred reinforcers.

The third phase, *discrimination of pictures*, focuses on teaching the child to choose target pictures from an increasing number of pictures that can be part of communicative exchanges. This phase includes: (a) teaching the child to discriminate between two pictures, (b) teaching the child to distinguish a specific picture from a choice of pictures, (c) increasing the number of pictures that the child can work with on the display, (d) matching pictures to actual objects or items, and (e) systematic progress monitoring (Frost & Bondy, 2002). Once the child can recognize between 12 to 20 pictures and discriminate between them for selecting preferred items, the fourth phase, *sentence structure*, can be implemented. In this phase, the child is taught to request desired items by putting an “I want” symbol in front of one of the pictures on a sentence strip and then to utilize this functionally during communicative exchanges with their partner (Flippin et al., 2010).

In the fifth phase—*responding to “What do you want?”*—the practitioner utilizes the question “What do you want?” as a verbal prompt, alternating this task with unprompted requesting for objects or activities. The child learns to answer the question by using the “I want”

card with the desired item on a picture symbol. This phase is viewed as successful once the child can do this consistently across multiple objects or activities without extensive gestural prompting (Frost & Bondy, 2002).

The sixth phase is, *commenting as a response to a question*, in which the aim is to teach the child to respond to a question with a comment, then eventually fade the use of questions and promote the child using spontaneous comments (Flippin et al., 2010; Frost & Bondy, 2002). This phase is difficult for learners with ASD; yet, significant communication skill development has occurred when the child is successful in this phase.

The PECS approach has a relatively substantial body of evidence to support its use (Doherty et al., 2018; Flippin et al., 2010; Wong et al., 2015). However, given its reliance on specialized instructional materials and the increasing availability of computer-based augmentative technologies, a concern has been raised about how PECS compares to “high tech” approaches for teaching communication skills. Some practitioners may even prefer to use high-tech approaches, such as speech generating devices, when intervening to improve communication skills in children with ASD.

Studies that compare one intervention approach with another to determine differences in communication skill outcomes are relatively rare. However, in a randomized controlled study by Gilroy et al. (2018), a low-tech and a high-tech approach were compared regarding effectiveness for teaching social communication skills. The first approach was the low-tech PECS; the second was a high-tech system utilizing a Speech Generating Device. Thirty-five children with ASD participated in this study. According to their teachers, all of the children had deficits in social communication. The results found the two approaches (i.e., high-tech and low-tech) to be equally effective for improving the social communication skills of children with ASD.

In conclusion, the PECS approach is a picture-based communication technique that can be used to teach children with ASD. The PECS approach consists of six phases: (a) teaching the physically assisted exchange; (b) expanding spontaneity; (c) discrimination of pictures; (d) sentence structure; (e) responding to “What do you want?”; and (f) commenting. PECS is an evidence-based practice that has been shown to be effective in improving social communication skills in individuals with developmental disabilities, including ASD (Flippin et al., 2010; Wong et al., 2015). However, the PECS system requires significant expertise to implement systematically and correctly (National Autistic Society, 2017). Parents may need to receive intensive and extensive training to teach their children social communication skills. The PECS approach was the primary method for teaching natural communication skills in the home and other natural environments. The next section discusses teaching social communication skills using methods designed specifically for use in natural settings in which the child with ASD may reside or interact regularly.

Natural Environment Approaches

In this section, we will discuss the two natural environment approaches: Home-Based Parent Delivery (HBPD) and Pivotal Response Treatment (PRT). The discussion of HBPD comprises a historical view of the approach’s development, the importance of parental involvement in implementing the treatment, and strategies to implement the HBPD approach by parents. The PRT discussion includes a description of the aim of PRT and an overview of the empirical evidence found in the literature demonstrating its effectiveness.

Home-Based Parent Delivery

In the 1950s, many practitioners thought that individuals with ASD would probably not make progress through the implementation of behavioral interventions due to the at that time

presumed severity of the disability. However, between the 1960s and 1980s, much research demonstrated the effectiveness of behavioral treatment to improve these children's abilities in many areas, including: social skills (Odom & Strain, 1986; Ragland et al., 1978; Strain et al., 1979), play (Lewis & Boucher, 1988), self-dependence (Ayllon & Azrin, 1968; Baker & Brightman, 1989), academic skills (McGee & McCoy, 1981), and language skills (Hung, 1980; Lovaas et al., 1966; Risley & Wolf, 1967).

Simultaneously, researchers envisioned the importance of including parents as therapists when implementing interventions. The involvement of family, especially parents, in implementing intervention techniques intended to treat challenging behaviors of children with ASD began in the 1970s (Berkowitz & Graziano, 1972; Schopler & Reichler, 1971). Parents received training from behavior therapists to facilitate interventions and to become interventionists/co-interventionists themselves. This method helped parents be involved in the interventions with fidelity and assisted their children in making significant progress (Vismara et al., 2009).

As described in detail by Hendricks (2009a), the HBPD approach is an evidence-based practice for children with ASD, proven to be effective for the population of children between 2-9 years of age. It has shown success in increasing communication skills, such as joint attention, augmentative and alternative communication, social communication, conversation, spontaneous language, and interaction during play. The HBPD approach has also demonstrated decreases in behaviors (e.g., aggression, tantrums, and disruptive behaviors) that may affect the learning of children with ASD at home or school (Hendricks, 2009a).

In contrast to approaches that target the child without fully considering the environment, HBPD considers family variables even as it works to facilitate communication in the child. As a

product of this broader approach, parents benefit in several ways. When parents learn how to improve their children's skills with evidence-based practices, they are more likely to reduce their stress levels (Dillenburger et al., 2004; Keen et al., 2010). Moreover, the literature illustrates that parent-implemented interventions for children with ASD result in improvements in parent self-efficacy and overall mental health (Dillenburger et al., 2004; Keen et al., 2010). It is also possible that the HBPD approach may decrease the stress levels of other family members by engaging them in the intervention processes. Finally, parent-delivered interventions have been found to reduce the severity of the symptoms experienced by these children due to their ASD (Dillenburger et al., 2004).

The literature on HBPD for children with ASD identifies various strategies that parents can implement to improve their children's skills (Hendricks, 2009b). Hendricks suggested that HBPD requires six implementation steps. The first is to identify the family's needs through parental and caregiver interviews and observations of the child in the naturalistic environment (e.g., home, school, and/or playground; Hendricks, 2009b). This initial step provides a basis for determining child and family strengths, needs, and current overall functioning. The second step is to determine the intervention goals that are to be carried out by the parents and/or others (e.g., teachers, caregivers, other professionals). This step is especially crucial, and it should address both social communication skills and challenging behaviors in need of improvement.

The third step is to design the intervention program (Hendricks, 2009b). This step involves defining and deciding on (a) intervention techniques (broken down into steps); (b) a data collection system for monitoring progress focusing on behavioral frequency and/or duration; (c) reinforcement delivery schedules; and (d) when and where the intervention should take place. The fourth step is to provide training for parents so that they can implement the procedures with

fidelity. The parent training program should include these components: (a) training format (i.e., one-to-one versus group); (b) specified training locations (e.g., home, school); (c) precise training components, such as direct and immediate feedback, modeling, role-playing, how to collect data, and or video analogies; (d) training duration based on family characteristics and peer-reviewed studies that have examined time factors in successful parent training efforts.

The fifth step Hendricks (2009b) described is the implementation of the program by the parents and/or other influential and significant persons. This step requires monitoring by the experimenter to determine if the intervention's implementation has been accomplished with fidelity. Finally, and especially noteworthy, the sixth step requires monitoring the child's progress to determine the intervention's effectiveness and make any needed adjustments along the way.

Research on the HBPD approach has demonstrated that parents trained by professionals with expertise in language, communication, and behavioral methods, can learn systematic interventions and become effective interventionists/co-interventionists. Parent-mediated intervention techniques support parent involvement in the interventions with their children with ASD. This process has been established by the research as being effective in improving the characteristics of both child and parent. To ensure that HBPD is implemented systematically, the necessary six steps are repeated here: (a) accurately identify the strengths and needs of the family and child, (b) determine the goals of the intervention, (c) develop an intervention program, (d) provide training for parents, (e) implementation of HBPD is done by parents, and (f) progress is monitored by therapists/researchers.

Pivotal Response Treatment

Pivotal Response Treatment (PRT), previously known as the Natural Language Paradigm, was developed to systematically integrate natural language interaction systems with ABA to effectively improve generalization and maintenance of intervention effects (R. L. Koegel et al., 1987). PRT aims to improve the core symptoms of ASD (e.g., social and language skills deficits) to help these children reduce challenging behaviors and acquire new skills. PRT emphasizes a family-centered intervention in which the family can recognize the child's hobbies and interests and encourage communication in an everyday environment (R. L. Koegel et al., 2012). Practitioners and parents use PRT to teach children skills to increase their abilities to interact and communicate with others (R. L. Koegel & Koegel, 2006).

Pivotal Response Treatment: Theory and Applications in Autism

Pivotal response treatment has been identified as effective in the remediation of communication skills of children with ASD (R. L. Koegel & Koegel, 2006). The following review of the literature on PRT presents its foundation in theoretical and applied research, implementation principles and guidelines, and key components.

Theoretical Perspective

Although some researchers use “behaviorism” as a synonym for the science of human behavior, it is also a philosophy about what constitutes a valid approach to understanding human behavior (Skinner, 1974). This roots of the science and philosophy of behaviorism can be traced back to the late 19th century and early 20th century, as a branch of psychology (Baum, 2005). Ambiguous concepts (e.g., consciousness, mind, mental states, or content) used in the past were questioned or rejected by a number of scholars of this period, including Ivan Pavlov, J. B. Watson, and Gilbert Ryle. These scholars, especially Watson, are viewed as the founders of the

concepts that established behaviorism. Watson (1913) stressed that causation could only be determined by rigorous, objective experimentation.

In 1945, B. F. Skinner published his seminal work, *The Operational Analysis of Psychological Terms*, which signified a significant advancement in behaviorism. He postulated that *an organism's consequences* lead to the probability of occurrence/nonoccurrence of contingent behaviors in the future (Skinner, 1945). Skinner also emphasized the S-R-S process's importance to changing a behavior – *S discriminative stimulus --> R operant response --> S contingent stimulus* (Silva et al., 2007). Many contemporary intervention approaches use Skinner's basic principles (i.e., S-R-S, reinforcement, punishment, and extinction), all of which emphasize the systematic delivery of consequences to change behavior. Despite differences in style or emphasis, all fall within the broad concept of *applied behavior analysis*. Intervention models based on these principles can be found in numerous social science disciplines and in applications for use across many populations of people (e.g., developmental) and in a diversity of fields, including education, clinical psychology, and counseling (Slocum et al., 2014).

ABA became a unique discipline when Baer et al. (1968) created the seven core dimensions (i.e., applied, behavioral, analytic, technological, conceptual system, effective, and generality). All interventions based on the ABA approach should include these dimensions to ensure effectiveness in changing targeted behaviors (Cooper et al., 2007). Another critical development in ABA is the emergence of ABC analysis (Nijhof & Rietdijk, 1999). Direct observations in both research and practice examine antecedents, behaviors, and consequences to best understand a behavioral phenomenon. For example, Mariah is a second grade student whose teacher states that she is a poor reader and that part of her challenges are due to Mariah's behavior. When a behavior analyst systematically observed Mariah, they noticed that when the

teacher asked Mariah to go to her group (antecedent), Mariah would throw her book (behavior). Next, the teacher would then tell Mariah to go to the principal's office (consequence). In this example, an ABC analysis may reveal that Mariah does this behavior to avoid group reading.

A critical theoretical idea behind PRT is that motivation is one of the most significant aspects that children with ASD need to improve and that when children with ASD show difficulties in learning, it is due to a lack of motivation (R. L. Koegel & Egel, 1979). PRT asserts that using naturalistic motivational sources that are part of the child's natural environment is especially useful to improving the natural language paradigm for children with ASD (Gillett & LeBlanc, 2007; Laski et al., 1988; L. K. Koegel et al., 1998; R. L. Koegel et al., 1987). To teach these pivotal social and communication behaviors, several critical processes that PRT relies upon are based on motivational factors, including: (a) following the child's choices, (b) securing the child's attention, (c) offering obvious opportunities to respond, (d) varying the provided tasks, (e) interspersing (distributing) maintenance tasks across time, (f) utilizing contingent and natural reinforcers, and (g) reinforcing the child's efforts to produce the intended skills (L. K. Koegel et al., 1999; R. L. Koegel & Koegel, 2006). The full implementation of these components has been shown to be effective when addressing social communication deficits, developing motivation for diverse functions, and reducing disruptive behaviors (L. K. Koegel et al., 2010).

As previously noted, the purpose of PRT is to improve the natural language interactions of children with ASD and to enhance that language, using learning opportunities associated with children's natural environments where social interactions can occur (Bradshaw et al., 2017). Initially, PRT was meant to address verbal language acquisition in children with ASD who are nonverbal (R. L. Koegel et al., 1987). In recent decades, however, numerous researchers have demonstrated the effectiveness of PRT to improve language functions such as increasing speech

ability (Gengoux et al., 2015), question-asking strategies (L. K. Koegel et al., 1997, 2014), and self-initiation (L. K. Koegel et al., 1999; L. K. Koegel et al., 2003). PRT has also decreased challenging behaviors (Baker-Ericzén et al., 2007) and has been used to teach academic skills to children with ASD (R. L. Koegel et al., 2010).

PRT focuses on implementing interventions in naturalistic settings (R. L. Koegel et al., 2012) and teaching natural partners (e.g., parents) how to conduct the implementation (Symon, 2005). Delprato (2001) found that “normalized” approaches to teaching language skills, which include PRT, were more effective at developing language than the more commonly applied Discrete Trial Training (DTT) approach. The DTT approach does not stipulate the need for naturalistic settings and natural partners for effective learning.

To summarize, the previous focus in the science of human behavior shifted from the unobservable inner processes (e.g., consciousness) to observable and measurable variables with the introduction of behaviorism. This development has been attributed to many the efforts of numerous scholars, but especially to the work of J. B. Watson and B. F. Skinner. Both scholars focused on systematic experiments as the basis for identifying causation. With the strength of a grounding in behaviorism, applied behavior analysis was launched in the 1960s by Baer et al. (1968). Baer et al. developed the seven fundamental dimensions of ABA (i.e., applied, behavioral, analytic, technological, conceptual systems, effective, and generality). Over the past 50 years, multiple intervention models have been developed based on ABA. PRT is one of these that has grown into an evidence-based technique embedded in the natural language interactions of children with ASD (Bradshaw et al., 2017). Motivation is an essential component of the Koegel PRT model. R. L. Koegel and Egel (1979) illustrated that lack of motivation often leads to learning difficulties in children with ASD. To maximize motivation,

PRT incorporates the following processes: (a) following the child's choices, (b) securing the child's attention, (c) offering obvious opportunities to respond, (d) varying the provided tasks, (e) interspersing maintenance tasks across time, (f) utilizing contingent and natural reinforcers, and (g) reinforcing the child's response efforts (L. K. Koegel et al., 1999; R. L. Koegel & Koegel, 2006).

Applied Research

A number of studies have examined PRT as delivered by trained parents in their homes (Dillenburger et al., 2004; Gengoux et al., 2015; Hardan et al., 2015; Vismara et al., 2009). Others have explored PRT as provided in group settings by teachers and by trained practitioners in one-on-one therapy sessions (Baker-Ericzén et al., 2007; L. K. Koegel et al., 1999; L. K. Koegel et al., 2003; R. L. Koegel et al., 2010). In a systematic review conducted by Verschuur et al. (2014), the researchers reported on 31 studies that demonstrated the efficacy of PRT on language skills (e.g., receptive and expressive language, social functional verbal utterances, responding to others, maintaining interactions). The combined outcomes of these studies provide confidence concerning PRT's effectiveness in increasing the production and reception of language by children with ASD.

Additionally, in a meta-analysis conducted by Bozkus-Genc and Yucesoy-Ozkan (2016), the effectiveness of PRT for children with ASD was reviewed and examined. Similarly to the literature review by Verschuur et al. (2014), these authors found 34 single-subject design studies conducted with children with ASD, most of which (85%) used a multiple baseline design. All the studies were published in peer-reviewed journals between 1979 and 2012. Altogether, these studies involved 125 children, with a mean age of 4.8 years. Most of the participants were male (72.2%), which is not surprising given ASD is four to five times more commonly identified in

boys than in girls. The findings also showed that PRT was implemented in various settings (e.g., schools, homes, clinics, multiple environments), and by parents, peers, professionals, and/or caregivers. All of these studies collected interobserver reliability data. In half of these studies, treatment integrity was evaluated, and maintenance and generalization data were collected. In one-quarter of the 34 studies, social validity data were collected. The results referred to that quantitatively synthesizing single-case research design is a laudable aim since it could increase the objectivity of syntheses and quantify the prospect effects. The authors found that PRT interventions tended to impact core skills, but they also noted that treatment integrity was only examined in 44% of the studies. The authors concluded that these results supported PRT as, in their words, a fairly effective practice (Bozkus-Genc & Yucesoy-Ozkan, 2016).

Hardan et al. (2015) conducted a randomized controlled trial of PRT for parents of children with ASD. Fifty-three children with ASD and significant language delay—ages 2 to 6 years old—participated in a 3-month study. These children were randomly divided into two groups: a pivotal response treatment group (PRTG; $n = 27$) and a psychoeducation group (PEG; $n = 26$). This randomized controlled trial examined the effectiveness of PRT to enhance functional communication for young children with ASD. In the PRTG, parents were taught behavioral methods to improve their children's language skills. In the PEG, parents were provided an overview of ASD. Children's utterances were examined during structured laboratory observations. The findings showed that children in the PRTG demonstrated significant development in the frequency of utterances over the those of the children in the PEG. The most significant improvements occurred in the PRTG, specifically in imitative utterances. The results suggested that systematic instruction in PRT leads to skills acquisition for parents and children, particularly in functional communication skills.

PRT has a strong literature base indicating its effectiveness in improving communication and language skills. In a study conducted by L. M. Turner et al. (2006), PRT was used to explore improved functional language and cognitive skills of 26 children with ASD, aged 2–9 years-old. The interventionist used a set of words to measure receptive language skills, where the children were required to identify identical pictures presented to them. To measure expressive language skills, the children labeled targeted pictures. The findings showed that 88% of the children were able to learn receptive and expressive language skills. In discussing their results, the authors emphasized that early diagnosis of ASD and the provision of early intervention are essential to improving communication skills in children with ASD (L. M. Turner et al., 2006).

Implementation Guidelines for Pivotal Response Treatment

There are three essential guidelines associated with the use of PRT, which are: intensive and early intervention, naturalistic environment, and parental involvement (R. L. Koegel & Koegel, 2006). The following paragraphs provide the review of that research that describes and supports each of these.

Early and Intensive Intervention

Since early childhood is a time of tremendous potential for cognitive development, children can gain many skills early through incidental learning by their participation within natural social contexts. In light of the social and communication issues associated with ASD, children with the disorder often will not have the same opportunity to develop such skills because they cannot participate in these incidental learning opportunities without intervention. Therefore, early and intensive intervention is an extremely significant factor for all children with disabilities and especially for those with ASD. There are a number of studies that provide evidence for the value of introducing comprehensive early intervention for children with ASD.

For example, Eikeseth (2009) evaluated 25 outcome studies that examined comprehensive early interventions developed for children with ASD. This review emphasized that early intensive behavioral interventions can positively address various significant behaviors for children with ASD. Likewise, another review conducted by Rogers and Vismara (2008) reported that early intensive behavioral interventions could address the deficits of ASD. Still, they noted that more comprehensive early intervention research examining developmental functioning and symptom reduction is needed.

Naturalistic Environment

A critical aspect of evaluating an intervention's effectiveness is whether the learned skills or the progress achieved can be generalized by the subject from the artificial setting of the intervention's implementation to the normal or naturalistic settings of the child's life, which can include the school and the home. The PRT approach emphasizes utilizing partners in the natural environments (e.g., parents, extended family, community) for the intervention implementation (Smith et al., 2015). Naturalistic settings are deemed more effective as children have been found to be more likely to generalize skills they acquire within natural environments and to then employ them across multiple contexts (Mohammadzaheri et al., 2014).

The effectiveness of PRT in improving expressive communication skills in natural environments was examined by Smith et al. (2015). This study included a large group of participants ($N = 118$) who were preschoolers diagnosed with ASD. Hierarchical linear modeling was conducted to evaluate this early intervention, community-based, behavioral treatment. The early intervention was implemented in childcare centers and the homes of the children. The study outcomes included observed changes in receptive and expressive language within functional

contexts, along with changes in adaptive skills and improved cognitive skills, as measured by the *Merrill-Palmer Revised Scales of Development*.

Parental Involvement

Parental involvement is the essential component of the PRT approach. The success of the teaching process relies on engaging the families in the intervention implementation, since they are a critical component of what is considered the child's naturalistic environment and a cornerstone to supporting the child's development. Furthermore, family-centered interventions have demonstrated positive outcomes for parents as they gain increased self-confidence as key and respected players in the implementation of the intervention strategies for their children (Brookman-Fraze et al., 2009; Meadan et al., 2009). During the intervention, parents may be called upon to select and facilitate favorite activities, which are crucial to the success of PRT (Al-zayer, 2015). Of course, parents may need instruction on how to methodically and systematically teach their children communication skills in the naturalistic environment of the home.

In a brief parent-training intervention conducted by Coolican et al. (2010), PRT was examined as a parent-implemented technique to improve communication skills with a group of eight preschoolers with ASD. A non-concurrent multiple baseline design was employed. The parents received individualized training on PRT over three sessions of an average of 2 hours each. Children and parent skill sets were measured before the intervention, during the intervention, and in follow-up 2–4 months after the training. These analyses were conducted using questionnaires, standardized tests, and coded behaviors within video recordings. Improvements were also identified in the children's communication skills, including the use of functional utterances. These positive effects were maintained in the follow-up period.

Key Areas for Pivotal Response Training

PRT concentrates on addressing the key characteristics that define autism spectrum disorder – specifically those related to atypical communication and social skills development. The PRT approach includes four core areas: motivation, self-initiation, self-management, and responding to multiple cues (R. L. Koegel & Koegel, 2006). When these pivotal areas are impacted through intervention, the typical result is generalized improvement across behaviors. These four areas are identified as evidence-based through Robert and Lynn Koegel's research at the University of California, Santa Barbara. This husband and wife team have been conducting PRT research for more than 30 years (R. L. Koegel & Koegel, 2006). The pivotal areas of PRT are defined and described below.

Motivation

Human behaviors are linked to motivation and various innate needs. Most people engage in certain behaviors in order to achieve particular goals that they identify as being key to satisfy personal needs. Therefore, motivation emerges as a consequence of internal tension, stimulating people to perform specific behaviors (Moore, 2009). For instance, when people feel hunger (i.e., a need for food), their condition generates the motivation to seek and secure sustenance.

Improving motivation is considered critical to the employment of PRT, as the approach utilizes the learner's natural motivational drives, taking into account from the start child attending, child choice, regular opportunities, and natural and contingent reinforcement (R. L. Koegel et al., 2001; R. L. Koegel et al., 2012). For example, the practitioner can increase a child's motivation by employing activities and toys identified to them by the parents as preferred by the child to encourage the child's participation in the specific task. Part of this process involves the practitioner ensuring that the child's attention is on the specific task and on the

natural partner implementing the intervention before beginning the task. In this way, the child is focused and can understand what is expected. Furthermore, natural and contingent reinforcements are fundamental in PRT. These reinforcements should be relevant to accomplishing the expected task to motivate the child to attempt the activity and learn the target skill (Bozkus-Genc & Yucesoy-Ozkan, 2016). R. L. Koegel and Koegel (2006) noted that when social motivation is improved through the use of techniques in naturalistic settings, it is more likely those improvements can be generalized and will show long-term influence. These findings were supported by Bradshaw et al. (2017), who explored whether parents could implement intervention strategies with very young children (toddlers) with ASD to support the development of communication and social skills across a variety of naturalistic settings. The researchers used a multiple baseline design to examine the effectiveness of the motivational strategies of PRT on verbal communications from three children with ASD, ranging in age from 15–21 months. The findings indicated that a number of language behaviors improved due to the intervention for all participants. Additionally, the treatment effects extended to untreated areas and were sustained when assessed a month after the intervention was terminated.

According to Vismara and Bogin (2009), there are seven steps to effectively encouraging and using motivation as an aspect of pivotal response treatment. These are: (a) *establishing the child's attention* (e.g., making eye contact with the child before offering the communication opportunity); (b) *utilizing shared control* (e.g., doing part of the activity and having the child do the rest); (c) *utilizing child choice* (e.g., providing options among the offered toys and activities); (d) *using different tasks and responses* (e.g., using a variety of tasks, activities, and environments to keep the child's interest and engagement); (e) *interspersing maintenance tasks with acquisition tasks* (e.g., opportunities to learn new skills are incorporated within opportunities to

perform already acquired skills); (f) *reinforcing response trials* (e.g., acknowledging and rewarding all small verbal tries that are clear and that are part of the entire targeted response); and (g) *utilizing natural reinforcers* (e.g., using reinforcers that are inherent to the activities rather than unrelated and artificial).

Responding to Multiple Cues

Many children with ASD have difficulty responding to relevant cues. This characteristic has been called stimulus over-selectivity, which refers to the behavior of concentrating on only one aspect of a stimulus event while disregarding all of the other relevant parts (Lovaas et al., 1979). For example, when multiple cues are presented in the environment, the child responds to only one cue or one area of cues (e.g., only those that are solely visual, solely auditory, or solely tactile) but does not attend to other cues that are equally relevant for producing a correct response. Teaching autistic children to respond to multiple cues helps promote their ability to learn from naturally complex environments (R. L. Koegel & Koegel, 1995). Teaching children with ASD to pay attention to multiple cues also can enhance generalization of a skill learned in one setting to be used across a variety of settings.

The ability to attend to and respond to multiple cues in the environment can be taught using a two-step process that has been described by Vismara and Bogin (2009). The first step involves providing a variety of stimuli and increasing cue complexity. For example, when teaching descriptive characteristics of toys, the instructor identifies two cues (color, size) that are related to recognizing targeted objects. The instructor then begins with these two cues (e.g., red/blue, big/little), teaching the child a receptive language skill for identifying targeted objects. The instructor can then increase the number of cues related to identifying these objects (e.g., object function). The second step involves scheduling reinforcement. In this step, the instructor

determines various reinforcers to support the child's learning to respond to multiple cues, beginning with a continuous schedule (i.e., reinforcing every correct response) and shifting to a variable ratio schedule (i.e., reinforcing one out of every four responses).

Self-Management

In general, self-management is essential for increasing the independence of children with ASD. Teaching self-management involves helping these children to discriminate independently when and where a target behavior should be performed and then performing the behavior in the absence of the instructor or other authority figure (Stahmer & Schreibman, 1992). Instruction in this area includes a number of procedures that strive to promote the child's independence.

Initially, the instructor identifies target behaviors and establishes a reinforcement system for supporting them. Next, the instructor teaches the child how to discriminate between appropriate and inappropriate behaviors within particular situations. For instance, the instructor positively reinforces the target behavior throughout intervention sessions and provides corrective feedback when the child appears to be engaging in undesired or irrelevant behavior. Then, the final phase involves enhancing independence, wherein the instructor increases the intervals at which the child self-manages the targeted behaviors. Once the child begins to demonstrate success, the instructor then reduces the number of prompts provided to the child (Vismara & Bogin, 2009).

Within the PRT approach, conversational skills can be taught using these self-management-focused techniques. These skills can be especially important when supporting the ability of children with ASD to ask meaningful questions in the classroom setting (Palmen et al., 2008). L. K. Koegel et al. (2014) aimed to improve reciprocal social conversation, specifically skills for responding to targeted topics, response elaboration, and question-asking. A multiple baseline design across participants was utilized to investigate the effects of a self-management

procedure, in which the children self-recorded their adherence to the conversational targets of the intervention, on reciprocal conversation skills. The study's findings indicated that the procedures led to improved reciprocal social conversation skills exhibited through on-topic question-asking and elaborated responses. An especially significant component of this study was the assessment of the social validity of the results, using naïve observers who viewed videos of the children responding within conversations after the intervention was completed. These individuals positively rated the children's performance in terms of features such as naturalness and desirability as conversational partners.

Self-Initiations

As R. L. Koegel et al. (2006) noted, the term “initiation” has been defined and used in many different ways throughout the research literature. However, as these authors note, a central feature of self-initiations is that they are “social-communicative behaviors” (e.g., questions, requests) that “children formulate independent of any external support from a communicative partner” (R. L. Koegel, 2006, p. 167). Studies have illustrated that self-initiation is a pivotal behavior that may facilitate positive gains in other communication and language (L. K. Koegel et al., 1999).

R. L. Koegel et al. (2014) investigated the teaching of self-initiated questions in three young children with ASD using PRT instructional techniques. A multiple-baseline across participants design was utilized to examine the effects of teaching a set of “Wh-questions”—“What is it?”; “Where is it?”; “Who is it?”; and “What happened?”—on the social initiations of these children. Several motivational procedures derived from PRT were used, including child choice, natural reinforcers, and interspersing acquisition tasks with maintenance tasks. Results indicated that the children initiated many of the targeted questions following the intervention.

Additionally, all the subjects showed an increase in the initiation of untargeted Wh-questions within their social interaction. The authors also discussed gains seen in other domains, such as socialization and daily living skills, confirming self-initiation as a potential “pivotal” behavior.

Concisely, the PRT approach encompasses four particular key behavioral areas: motivation, responding to multiple cues, self-management, and self-initiation. By using the PRT training procedures, skills can be taught that improve children's social communicative behaviors in specific areas and potentially across other areas of communication, socialization, and daily living (R. L. Koegel & Koegel, 2006). To facilitate understanding these pivotal areas, Table 1 gives examples of how each of the four pivotal areas can be developed.

Table 1*Examples of How to Develop the Pivotal Areas*

Component	Strategy	Example
Motivation	<ul style="list-style-type: none"> • Establish attention of learner • Employ shared control and turn-taking • Employ learner choice • Vary tasks and responses • Intersperse acquisition and maintenance • Reinforce response attempts • Use natural and direct reinforcers 	<ul style="list-style-type: none"> • Parent makes eye contact or taps child on the shoulder before presenting instructions. • Child selects the activity, but the team member first asks for a communicative behavior before giving the object to the child or continuing the interaction.
Responding to Multiple Cues	<ul style="list-style-type: none"> • Diversity of stimuli and increasing relevant cues • Scheduling the reinforcement 	<ul style="list-style-type: none"> • Child learns how to identify words that start with C distinguished from one that begins with D.
Self-Initiation	<ul style="list-style-type: none"> • Teaching social initiations • Question-asking • Naturalistic reinforcement 	<ul style="list-style-type: none"> • “May I play with you?” • Give the child the snack after vocalization
Self-Management	<ul style="list-style-type: none"> • Define the self-managed behavior • Prepare the self-management process • Teach self-management • Create independence 	<ul style="list-style-type: none"> • Child is given access to a preferable activity (playing with toy, computer time, etc.), if the child follows the home schedule independently, the tasks are done well, and completed on time.

Research Study Plan

This section presents an overview of single-case design (SCD) history and the rationale for choosing to employ it for this research study. The role of SCD in the field of special education regarding evidence-based practices is also explained. Finally, this section includes the most important quality indicators for single-case design.

Rationale for the Research Design

B. G. Cook and Cook (2016) examined the use of different research designs utilizing experimental approaches to produce evidence regarding whether interventions cause improvements in target outcomes. The experimental research designs commonly used in the field of special education are single-case research design (SCRD) and group experiments. SCR D has been included in the behavioral sciences since the first description was presented by Sidman (1960) in his book, *Tactics of Scientific Research: Evaluating Experimental Data in Psychology*. Subsequently, Baer et al. (1968) provided detailed scientific clarification on how SCR D could be utilized to evaluate the effectiveness of interventions with individuals. The use of this approach in the current century has become commonplace. SCR D has been demonstrated to be a suitable method for identifying instructional practices. Instructors can systematically capitalize on SCR D when creating individualized educational and support plans (Paul, 1997). Horner et al. (2005) found that more than 45 journals publish research utilizing SCR D. For this reason, SCR D may play a significant role in the evolution of evidence-based practices in special education.

SCR D is a scientific methodology used to determine fundamental principles of behavior and emerge evidence-based practices. SCR D is also an experimental approach rather than descriptive or correlational, and it is used to document functional/causal relationships between interventions (independent variable) and results (dependent variables; Horner et al., 2005). SCR D requires operational characterization of the setting, participants, and how they were chosen (Wolery & Ezell, 1993). Measurements of the dependent variables are evaluated repeatedly for participants across various levels of the independent variables and time (Kratochwill & Levin, 2014). Particularly, SCR D examines causality by evaluating changes and

comparing them to the performance of individuals over time while the intervention is presented and withdrawn (Kilgus et al., 2016).

Horner et al. (2005) suggested criteria that comprise seven essential quality indicators: (a) prominent operational description of settings and participants: clear description that permits other researchers to recruit comparable participants who possess the original characteristics, such as gender, age, and type of disability, (b) independent variable: this item should be reported systematically in a way that allows for repeatability and experimental control—and it is highly recommended that fidelity of implementation measured, (c) dependent variable(s): this/these should be operationally described, including number of dependent variables, measurement procedures, repetition of dependent variable measurements, and interobserver agreement, (d) baseline condition: the repeated baseline should be described accurately in order to identify the effectiveness of the intervention when is introduced in the next phase, (e) internal validity: a significant component of SCRD, which determines whether a behavior change can be attributed to the presented treatment; therefore, minimally three demonstrations of treatment effectiveness are required at three data points (f) external validity: to achieve this trait, the effectiveness of an intervention should be used across behaviors, participants, or settings, and finally (g) social validity: this indicator means that target behaviors (dependent variables) should be socially significant and that the desired changes that are pursued by the implementation of the treatment are socially significant as well. These indicators can be used as a guide that ensures that a study utilized the minimally passable levels. These procedures may make the outcomes to be trustworthy and interpretable.

Illustrations from the Literature

Recent literature suggests several areas for further research regarding PRT interventions. As Bradshaw et al. (2017) asserted, there are many studies on the use of PRT interventions with children with ASD; however, they noted that these studies fail to employ standardized language measures after the interventions are conducted. This may be because the PRT approach emphasizes utilizing the limited range of verbal responses that a particular child can produce and focusing only on those things of interest to the individual child. This approach makes using a standardized measure extremely difficult.

Another issue is that the PRT approach provides principles and procedures designed to support improvement in key aspects of autism spectrum disorder, including the pivotal areas of motivation, self-initiations, responding to multiple cues, and self-management. However, more research is needed to substantiate that changes in these areas are actually pivotal and that changes in these areas impact other skill areas in the child's repertoire.

Related to the above, PRT research shows how changes can occur in targeted communication functions (e.g., asking questions). However, the degree to which these changes impact other communicative functions (e.g., making comments) has not been adequately explored, nor have specific procedures been identified to impact multiple communicative functions efficiently. For example, R. L. Koegel et al. (2014) employed PRT to teach children with ASD how to initiate questions, which demonstrated improvement in their question-asking. The research suggested that the strategies used resulted in developing all four targeted types of questions (the four "Wh-question" categories). However, as is typical of many of these studies, the researchers included no report of the intervention's impact on other language functions, such as clarifying communications or answering questions.

There is also an urgent need for additional evidence-based PRT approaches that effectively address the larger sphere of ASD symptoms (e.g., language delay, repetitive behaviors). Future research should examine the PRT approach's effectiveness to improve the overall production and reception of language in young children (2–5 years old) with ASD, and whether such interventions can assist in producing significant changes in overall patterns of adaptive behavior. Finally, while we know that training in pivotal response treatment methods can boost parents' self-efficacy and confidence in supporting their children with ASD (Coolican et al., 2010), future research should also help identify what quality and intensity of parental training is needed to optimize these intervention effects.

Although an enormous amount of research has examined the PRT approach, few studies have examined PRT across ethnic/cultural groups. For example, one of the participants in Al-zayer's (2015) study, which took place in a western U.S. state, was from the Middle East, and the language spoken at home was Arabic. The study found that the child increased language production in both Arabic and English. Another study, conducted by Mohammadzaheri et al. (2014), examined PRT's effectiveness compared to Structured Applied Behavior Analysis. This study included 30 Iranian children with ASD and was conducted in Iran. The findings illustrated that PRT was more efficient than the structured ABA approach in improving social and communication skills. These results are encouraging; nevertheless, more research is needed to explore the effectiveness of PRT across a variety of ethnic groups and in various cultural settings.

Summary

The identification of ASD in the population has increased considerably in recent years, with roughly one out of 54 children in the United States diagnosed as somewhere on the

spectrum (Maenner et al., 2020). Many individuals with ASD might withdraw from social interactions with others due to a lack of facility in language that prevents them from successfully engaging in social activities and other interactions with typical individuals (Henderson et al., 2014). Although a number of studies have identified the importance of language skills in daily life to improve social functioning in the typical world for children with autism spectrum disorder (Chevallier et al., 2012; Henderson et al., 2014; Prévost et al., 2017), there remains a need to more fully examine improvements in language development deficits when using evidence-based interventions.

The PRT approach is a naturalistic behavioral approach that is guided by three primary principles: early and intensive intervention, a naturalistic environment, and parental involvement. It is specially designed to reduce prompt dependency, increase spontaneity, improve motivation, and facilitate generalization (Suhrheinrich, 2015). A core principle of the method is to achieve improvements in pivotal areas of behavior—motivation, self-initiation, self-management, and ability to attend to multiple cues—which in turn will lead to improvements in other behavioral areas (R. L. Koegel et al., 2001).

As noted, parents are key to the success of pivotal response training techniques. To improve their children's language skills with ASD, parents need to learn a systematic approach that has been demonstrated to be an effective intervention by peer-reviewed literature. Expert reviews of treatments for children with autism spectrum disorder have shown that interventions based on PRT, especially those implemented in the home setting during early childhood, have effectively addressed language delay (Lord et al., 2005). In particular, the PRT approach has been established as an evidence-based practice that has been shown to be an effective method of enhancing receptive and productive language in children with ASD (Bradshaw et al., 2017).

A number of future research directions for pivotal response treatment have been identified in this paper, these include: (a) more research to demonstrate that improvements in the pivotal areas (i.e., motivation, self-initiations, responding to multiple cues, and self-management) can impact other skills/behaviors in children with ASD, (b) future research to identify procedures that can be used to improve communicative function in one area and simultaneously impact other areas of communicative functioning, (c) a continuing need for exploring the overall effectiveness of PRT to improve the production and reception of language in young children with ASD, and (d) the effectiveness of PRT needs to be investigated across ethnic groups and in different cultural communities.

CHAPTER III

METHODOLOGY

Introduction

This chapter outlines the methodology used to investigate the implementation fidelity of PRT motivational techniques by parents and the subsequent communication skills development of social functional utterances in their children with ASD. The purpose of this research study was to investigate the effectiveness of a brief 6-hour training program in pivotal response treatment for parents of young children with autism spectrum disorder (ASD) to improve their language skills, specifically social functional utterances. The training focus was parent implementation of PRT motivational techniques during play sessions with their children with ASD in their home's naturalistic setting. What makes this study significant is that the parents were all male and from Libya. No studies have sought to train male parents in PRT for use during play sessions with their children with ASD, and certainly none have involved fathers from Libya.

The explanation of the methodology for the study includes recruitment methods, eligibility criteria, participant and setting characteristics, procedures, data analysis, interobserver agreement (IOA), and social validity. This study's premise is that parents can enhance language acquisition, specifically social functional utterances, by their children with ASD by implementing the brief PRT training in the naturalistic home environment.

The research questions developed for this research study were:

- Q1 After a brief 6-hour pivotal response treatment training, can parents implement specific motivational techniques with fidelity across interactive play sessions of three sessions per week over 8 weeks with their children with autism spectrum disorder?
- Q2 Do children with autism spectrum disorder show an increase in their use of social functional utterances during play sessions as a result of the implementation of pivotal response treatment motivational techniques by a parent?

Research Method

Participants

Recruitment and Selection

Criteria

This study focused on male parents and their children with ASD between the ages of 4 and 7 years, from Libya, who are currently living in Colorado. The pool of participants was individuals who are members of the Viber app that Libyans residing in Colorado use to connect with one another. The goal was to identify and enlist the participation of at least three fathers with children with ASD; specifically, the children were eligible for special education services under the category of autism spectrum disorder. The criteria for inclusion in this research study were as follows:

1. The family includes a child who has been diagnosed with ASD;
2. The child with ASD has limited receptive and expressive language as identified by assessments for special education services;
3. The child with ASD does not receive any type of applied behavior analysis therapy;
4. The child does not have any other medical, genetic, or neurological conditions or disorders;

5. One male caregiver/parent commits as the individual who will attend and implement the training and deliver the intervention over 8 weeks; and
6. The family authorizes the use of video recordings by the researcher for observations.

Pre-Study Start Procedures

The researcher first obtained approval from the Institutional Review Board of the University of Northern Colorado before beginning the study (see Appendix A). Once approval was received, potential participants were contacted and provided with a description of the research. Only one male parent of each child was given the training and that participant was then the one who implemented the intervention.

The current research study includes three fathers and three children. The researcher met with each parent participant and used the consent form (see Appendix B) to clearly describe the study. After explaining the research plan and answering any questions the parents had, the researcher requested that father sign the consent form committing to their own and their child's participation. The consent form clearly explained the participants' involvement and ensured the participants' confidentiality. Each parent committed to participating in the brief 6-hour PRT training and the 8 weeks required to implement the PRT intervention during play sessions in their home environment. Each parent also consented to video recordings of the play sessions during the baseline and intervention phases. It was also explained that the video recordings will be kept for 3 years after the completion of the dissertation. During the study, the recordings were stored on a password-protected flash drive and locked in the researcher's file cabinet. During data collection and analysis by the researcher, the interobserver, and the research advisor, the videos were kept on OneDrive and to provide added protection, each file had a password.

The benefit of participation, as explained to the parents, was that they learned an intervention that could be used on an ongoing basis to support their child with ASD in improving functional language. All names were replaced with pseudonyms to protect the participants' identities and confidentiality (i.e., parents and children). Consent forms were not provided to the children as they were not of an age or ability to comprehend the need to provide consent.

Descriptions of Subjects

Sara. Sara is a female participant who is 4.2 years old. Her first nationality is Libyan. Sara's parents are from Libya and they have lived in the United States since 2014, meaning that Sara was born in the United States. The family lives in Colorado, in a rented apartment. The primary language spoken at home is Arabic. Sara's mother speaks only Arabic. Sara's father received the training on how to teach Sara social functional utterances. The family comprises six members: the two parents and four children (three females and one male). Sara is the youngest child in her family.

According to Sara's Individualized Education Program (IEP), she was diagnosed with ASD and exhibits very limited functional communication skills. She will often come and pull her parents toward things that she wants. On the other hand, Sara enjoys playing on her tablet, enjoys playing video games and with objects like toy cars, and climbing on things; she prefers playing alone, enjoys traveling on the weekends, likes certain foods (e.g., yogurt, pizza, pasta, tomatoes, and broccoli), uses the toilet with prompts from her parents, and is able to eat her meals without assistance.

Ahmed. Ahmed is a male subject, who was 5.1 years old at the time of the study. His first nationality is Libyan and his parents are from Libya. They have lived in the United States since 2011, so Ahmed was born in the country. The family live in Colorado in a rented apartment. The

primary language spoken at home is Arabic. Ahmed's mother speaks only Arabic. Ahmed's father received the training on how to teach Ahmed social functional utterances. The family comprises seven members: the two parents and five children (three male and two female), of which Ahmed is the youngest.

According to Ahmed's IEP, he was diagnosed with ASD. Ahmed has delays in receptive and expressive language skills. He uses incomplete phrases and is not able to clearly communicate wants/needs. During the evaluation, Ahmed did not use anything but one-word phrases with a speech therapist. Nevertheless, Ahmed loves music, appears to prefer his right hand when using a writing tool, enjoys jumping and climbing, and his gross motor skills appear to be developing nicely for his age. These last include his locomotor and balance skills. Ahmed was able to point to "head, shoulders, knees, and toes," and knows letters and numbers.

Rami. Rami is a male participant who was 4.8 years old at the time of the study. His first nationality is Libyan and Rami's parents are from Libya. They have lived in the United States since 2008, so Rami was born in the country. The family lives in Colorado in a rented apartment. The primary language spoken at home is Arabic. Rami's mother speaks only Arabic. Rami's father received the training on how to teach Rami social functional utterances. The family comprises six members: the two parents and four children (two males and two females). Rami's birth order is third of the children.

According to Rami's IEP, he was diagnosed with ASD. He is demonstrating delays in attention, play, and his ability to interact with peers. Rami mostly produces consonant vowel combinations with very limited functional communication skills. In contrast, Rami has a supportive family, enjoys active play -- such as jumping on the bed, he also enjoys cars, he can put puzzles together, and enjoys sliding and climbing when playing on playground equipment.

Research Design

This study used a single-case research design (SCRD) across subjects to investigate the effect on the social functional utterances of children with ASD when parents implement motivational techniques learned during a brief 6-hour training program in pivotal response treatment. Baseline data were collected before the parent training. Training commenced once baseline trends showed stability. Parents received instruction in PRT motivational techniques for use in the home setting during play sessions. These techniques focused on improving communication and language skills used by children during the play sessions as measured by social functional utterances. In SCRD, all participants served as their own control, which means the researcher can explore the functional relationships among dependent variables (i.e., targeted behaviors) and independent variables (i.e., treatments; O'Neill et al., 2011). In other words, the intervention results can be determined by replicating the treatment with every participant to investigate the effects of the treatment. Replication involves the researcher repeating the same procedures, including the same treatment provider, in the same setting and the same situation, with different participants with similar characteristics (Barlow & Hersen, 1984). The strength of the findings is enhanced by having successful outcomes with these other clients. When the results are inconsistent, the participants' differences can be examined to identify characteristics related to success or failure. Therefore, the researcher was able to obtain trustworthy outcomes.

This study's purpose was two-fold: (a) to investigate the implementation fidelity of PRT motivational techniques by parents of children with ASD, and (b) to investigate children's subsequent change, if any, in SFUs during play sessions in response to the parents implementing

the techniques. The independent variable was the parent training and implementation of the PRT motivational techniques.

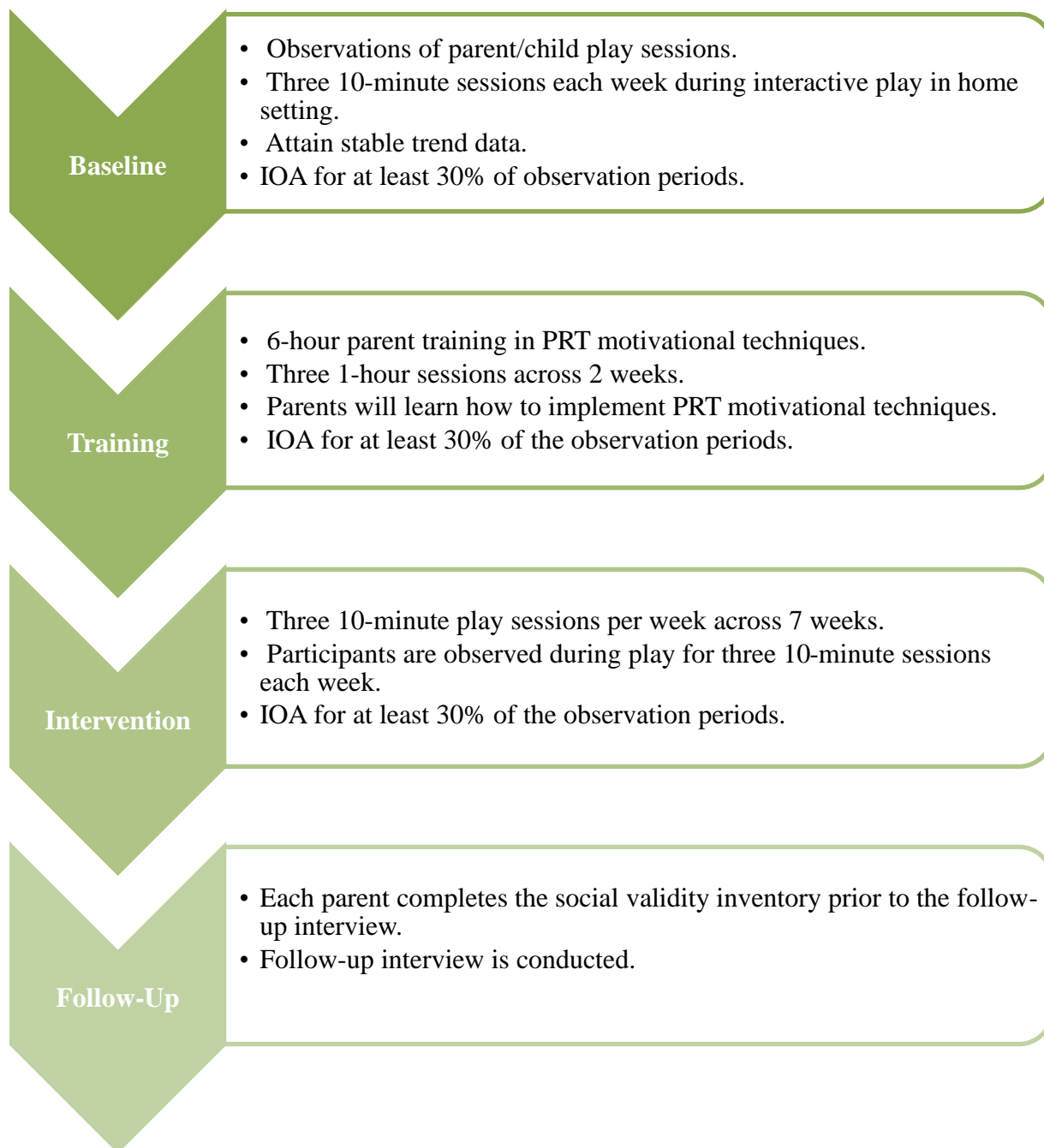
According to Coolican et al. (2010), SFUs include: (a) the use of at least normal vocal loudness; (b) body and facial orientation toward the parent and/or relevant toy/object; and (c) vocalizations that appear functional or task-directed and purposeful. The social functional utterance needs to appear meaningful to the parent; however, it does not need to be phonetically correct. If the child engaged in disruptive behavior or if the utterance was stereotypic or echoed, that portion of the play session was coded as a non-occurrence (see the play session data recording sheet in Appendix C).

Procedures

In a single-case research design, all participants participate in a baseline condition and an intervention condition (Ledford & Gast, 2018). The parent participants in this design each received the same treatment – a 6-hour training on the implementation of PRT motivational techniques. To investigate the implementation fidelity of PRT motivational techniques by parents and the subsequent increase, if any, in social functional utterances of their children with ASD, the change in number and type of SFUs between the baseline data collection and the PRT implementation intervention was analyzed. Data were collected during the baseline and intervention phases to identify the number of times and types of PRT motivational techniques parents used in each 10-minute session, and the number and type of utterances the child produced in reaction to a parent-generated technique.

This study consisted of four procedural components: (a) the baseline data collection phase of parent-child play interactions, (b) the 6-hour PRT intervention parent training across 2 weeks, (c) the intervention phase of parent implementation of PRT motivational techniques

during three weekly play sessions in the home across 8 weeks, and (d) a follow-up survey (see Appendix D) and a parent interview post-intervention (see Appendix E). Please reference Figure 1 for a graphic representation of the progression of the components for this research study and the following paragraphs for detailed explanations of each component.

Figure 1*Component Progress of Study*

Baseline Phase

In the baseline phase, parent and child behavior were observed in play sessions and measurements were taken multiple times without presenting any intervention (Ledford & Gast, 2018). During this phase of the study, each parent/child pair was analyzed for father's use of motivational techniques and child's rate of SFU, during observations in their homes three times each week for 10-minute play sessions until the baseline data showed trend stability. Each baseline session consisted of the parent-child dyad interacting for a period of 10 minutes in a play setting in their home. Each parent was asked to interact with their child as they normally would during typical play. No other specific instructions were provided to the parents or children during these play sessions. These observations were video recorded so the researcher could collect accurate data. Interactions happened at a pace that required they be "re-watched" for accurate collection and language understanding. During baseline, the researcher did not provide any instruction or prompting for the parents to communicate to the child. Frequency data were collected regarding the parents' use of motivational techniques and the children's associated utterances to establish a place from which the intervention's effect could be evaluated.

For this study, baseline data collection was taken from video recorded parent-child play sessions. The target behavior of each participant parent (e.g., use of motivational techniques) and each participant child (e.g., social functional utterances) was measured until a stable trend was identified (Engel & Schutt, 2008). Trend stability was established once the data points in the baseline phase repetitions determined through visual inspection as conducted by the researcher and an independent interobserver.

Training Component

Each parent received 6 hours of training in PRT motivational techniques. Before starting the training sessions, the researcher purchased and provided each parent with the instructional PRT manual translated into Arabic. The manual, *Teaching First Words to Children with Autism and Communication Delays Using Pivotal Response Training* (L. K. Koegel et al., 2013) was used throughout the training sessions. The authors of the original manual provided the Arabic translation of the manual.

The training sessions consisted of three 1-hour sessions each week for 2 weeks. Each father met with the researcher via Zoom to receive the training. The researcher created a PowerPoint for each training session (see Appendix F). During Session 1, the parents were introduced to PRT, beginning with an explanation of what pivotal response treatment is and how it originated. After a thorough overview of the history and underlying concepts of PRT, steps for the technique were provided. In the second session, parents learned how to identify their children's preferred items. The preference identification facilitated the parent's use of the first PRT motivational technique, child choice.

During the online training sessions, the researcher showed recordings of himself with his own child modeling the motivational techniques. The parents were asked to implement and record the Multiple Stimulus Without Replacement (MSWO) with their children for use in the third session. Using the recording in Session 3, the researcher provided the parents with feedback. In addition to feedback during the third session, parents learned how to provide clear opportunities that allow their children to respond. The researcher provided the parents with examples and non-examples of the techniques. In the fourth session, the researcher taught the parents the importance of delivering a contingent consequence and how to use this technique.

The session also included teaching the use of contingent and immediate reinforcement. Session 5 focused on using the natural rewards technique. The researcher provided a case example, "Joey," demonstrating the use of a natural rewards technique. Successful intervention examples and unsuccessful intervention examples were presented and were then discussed within this session. During the sixth session, the parents learned what a rewards attempts technique is and how it is implemented. The researcher provided a case example, "Danny," to clarify successful intervention and unsuccessful intervention implementation. The session also included how these techniques are used together during a play session. Lastly, during the sixth training session, the researcher addressed how to embed all PRT motivational techniques during one play session and addressed parents' questions, concerns, and issues about the use and implementation of the PRT techniques. During this discussion, the researcher addressed identified challenges found in the literature faced by those implementing the techniques and possible ways to avoid troubling reoccurrences during the play sessions for this study.

Intervention Implementation Phase

The training phase start time depended upon the multiple baseline design of the study. Once the baseline had been established and training had been completed, the intervention phase began. During the intervention phase, each parent implemented the PRT motivational techniques (i.e., clear opportunities, child choice, contingent, natural rewards, and rewards attempts) in play sessions with their child.

During the intervention phase, the parent-child play sessions, the parents interacted with their children during scheduled play sessions in the naturalistic home environment. The researcher recorded the parents implementing the technique while in the play sessions with their

children. During the intervention phase, participants were observed and recorded for three 10-minute sessions each week over 8 weeks.

Follow-Up Component

The follow-up component focused on social validity and the parents' thoughts regarding the use of the PRT techniques. The follow-up first involved a nine-question quantitative social validity inventory provided to the parents via email (see Appendix D). As soon as the social validity inventory was completed, a follow-up interview was scheduled with each parent and recorded using Zoom. The interview consisted of qualitative questions focusing on parent successes and challenges regarding the implementation of the technique and any changes they saw in their children as a result of the PRT techniques. The interview questions can be found in Appendix E.

Data Collection Procedures

As explained above, the participants were observed and recorded during the baseline and intervention as well as during the follow-up interview. The dependent variable that was manipulated in the present study was the social functional verbal utterances by the children with ASD during play sessions with their parents.

The researcher did not engage in the parent-child activity during the baseline or intervention phases and also did not participate during the sessions. The researcher did not provide any feedback, whether positive or corrective, nor did he participate in any activity, such as playing or talking with the child or the parent, during the play sessions. To ensure that the aforementioned conditions were met, the researcher did not contact the children until the intervention phase had ended.

The following section describes the measures used during the parent training and those that measured the brief parent training program for PRT fidelity and subsequent change in the children's social functional utterances.

Measurements

Multiple Stimulus Without Replacement Preference Assessment

The Multiple Stimulus Without Replacement (MSWO) Preference Assessment-5 items was utilized (see Appendix G) to identify the child's preferred items. The stimulus preference assessment method is an evidence-based practice (DeLeon & Iwata, 1996; King, 2016; Piazza et al., 1996) used to identify a child's preferred item as a reinforcer (Jeglum, 2020). The parents received training on identifying their children's most preferred items to use as reinforcers during play sessions. During the first training session, the trainer showed the parents how to use the MSWO to establish a list of potential child preferences that they could use in the play sessions.

Social Functional Verbal Utterances Measurement

The operational definitions of social functional verbal utterances as outlined by Coolican et al. (2010) was used to determine child utterances. The utterances were coded using these definitions on the Play Session Data Recording Sheet. Since the utterances were identified in social play sessions, in this study they were referred to as Social Functional Verbal Utterances or SFVUs. The definitions of SFVUs for data collection are: (a) use of the child's ordinary voice, (b) the posture of the child's body and face are required to be directed toward the parent or object used, (c) only those utterances that are considered functional or related to a meaningful task were counted, (d) it is not required that the utterances be phonetically correct, meaning if the child

pronounces “boo” for the object “ball,” this was considered correct, and (e) echoed and stereotyped utterances were not counted.

***Measurement of Parents’ Use of Pivotal Response
Treatment Motivational Techniques***

Parents’ use of motivational techniques is defined in the PRT research by L. K. Koegel and Koegel (2012) as follows:

1. **Child Choice:** This technique involves the parent employing the following steps: (a) giving the child two (or more) choices; (b) allowing the child to make the decision regarding activity selection on their own; (c) allowing the child to make the decision regarding whether an activity is accepted or rejected, or (d) providing a prompt to the child using an open-ended question that allows the child to choose the activity.
2. **Clear Opportunities:** This technique involves the parent using clear, brief, and specific statements of instruction to the child. When successful, this also involves the parent being able to keep the child’s attention on either themselves (the parent) or on the task while the parent is giving the instructions.
3. **Contingent:** This involves immediately giving the child a reward after “the child’s correct verbal response or attempt.” If the child doesn’t respond or they respond in a way that is inappropriate, no reward is provided.
4. **Natural Rewards:** In this technique, the parent utilizes contingent rewards that are relevant “to the child’s expressive verbalizations.” For example, if the child says “ball,” the parent would roll a ball to the child.
5. **Rewards Attempts:** When the child’s verbalization is simply correct, or it meets all the requirements of “functional verbal attempt,” a contingent reward is provided by the parent.

The researcher forwarded 30% of the play session to the individual who acted as the interobserver as soon as the recorded sessions were completed. The interobserver agreement was calculated using these recordings. This independent observer was given the data collection forms, the definitions of PRT motivational techniques, and the definitions of SFVU. The concept of interobserver agreement will be examined in greater detail later in this chapter.

Play Session Data Recording Sheet

Baseline Measurement. Observational data were collected using the Play Session Data Recording Sheet (see Appendix C). Each 10-minute play session was recorded for accurate data collection of parent-child interaction. The researcher counted the number and types of motivational techniques the parent used and the number and types of SFU the child generated in reaction to their parent's use of motivational techniques. The frequency of parent technique use and child utterances was collected, and the subsequent alignment of technique to utterance was identified.

Intervention Measurement. In both the baseline and intervention phases, data were collected in the home setting. Three sessions were conducted per week during the 8-week intervention phase. The data collection process took place using Play Session Data Recording, which was used to measure the type and frequency of child SFVUs and parent use of PRT motivational techniques within the 10-minute video recording. This count of SFVU occurrences was the dependent variable. During the 10-minute video, child utterances were coded based on the definitions created by Coolican et al. (2010). The parent motivational techniques were coded based on the definitions published by R. L. Koegel and Koegel (2006).

Parent Social Validity Measurement

The concept of social validity is important in single-case research design, as it relates to the extent to which the intervention used is acceptable to those participating in the particular study (Carter, 2010). Wolf (1978) stated that the researcher has three standards to take into account when evaluating social validity, which are goals, procedures, and effects.

Although the researcher may view the study as having social significance, treatment objectives, a quality treatment program, and techniques, social viability assessment should be left to stakeholders such as participants, parents, or teachers (Wolf, 1978). For the present study, social validity was assessed using an adapted form of the Treatment Evaluation Inventory-Short Form (TEI-SF; Kelley et al., 1989). The form comprises nine items and it was provided to the parents after the completion of the intervention and before the follow-up interviews. The form was used to assess the acceptability and value seen by the trained parents regarding the intervention. The nine items are rated on a 5-point scale, where “1” corresponds to *Strongly Disagree* and “5” corresponds to *Strongly Agree* (see Appendix D). The overall inventory scores can range from 9-45, where “9” is the lowest possible score, and “45” indicates the highest degree of acceptance of the intervention (Kelley et al., 1989).

Parent Follow-Up Interview

The researcher conducted a short follow-up interview with each father after the intervention had been completed. The interview was not analyzed as a qualitative research component but was used as a tool to gather information on social validity regarding the training and for future research identification. Questions focused on parent successes and challenges while implementing the PRT motivational techniques. Other questions inquired about parent-

observed changes in their child for future research about parent-child interactions resulting from parent training.

Data Collection and Analysis

Each baseline play session was recorded. An online meeting application (i.e., Zoom) was used to observe and record the play sessions during the baseline and intervention phases. After recording each session, the recording was transferred to a computer and classified according to the component/phase and session number (e.g., “B-S3” represented the third session of the baseline phase).

Using the recordings, the researcher collected data using the Play Session Data Recording Sheet to identify the frequency of a parent's use of a PRT motivational technique. Each technique used the coding identified on the data recording sheet for each sub-technique within the larger categories. For instance, the category of Child Choice has four sub-techniques included within it. Each time a parent used a technique, the researcher checked to see if it was followed by the child responding with a functional utterance. Functional utterances were also coded on the Play Session Data Recording Sheet. Please reference Appendix C for the Play Session Data Recording Sheet and coded parents' use of motivational techniques and children's social functional utterances.

Each parent-child action/response was counted if it occurred within 30 seconds of one another. If a child initiated an utterance without an associated parent technique, it was also counted. Frequencies were counted and associated responses were counted. The same type of count in frequency and associated responses was used during the intervention phase to examine gains from baseline to the end of the intervention for parent techniques and associated child utterances.

Treatment Fidelity

Verification of the accuracy of implementation of the intervention is crucial in experimental designs, and particularly in single-case research design (SCRD). Therefore, establishing criteria to ensure the implementation's accuracy is a necessity for SCRD, according to What Works Clearinghouse (Kratochwill et al., 2010). Treatment fidelity is significant because the interpretation and generalization of results depends on how accurately the intervention was implemented (Capin et al., 2018). In this research study, the researcher trained the parents of children with ASD to implement PRT motivational techniques within the naturalistic setting (i.e., the home) to increase social functional utterances during play sessions.

Treatment fidelity data were collected systematically to assess the parents' adherence to the study's intervention practices. Each scheduled baseline and intervention play session was recorded, and a data collection form was used to count the frequency and type of technique used by the parents and the utterances used by the children. To ensure fidelity, an interobserver also completed observations to be compared with the researcher's evaluation. The methods for achieving fidelity are further discussed in the following section on interobserver agreement.

Interobserver Agreement

To ensure that the highest possible degree of measurement reliability was achieved, this research study included a second observer who independently analyzed the recordings of the parent/child baseline and intervention play sessions to obtain what is called interobserver agreement (IOA). This method is used to avoid bias and human error by having two or more individuals observe the target behavior (Cooper et al., 2007; Ledford & Gast, 2018). The advantage of obtaining such agreement between the observers is to provide the minimum amount of inconsistency in the data (Kazdin, 2011). The individual who agreed to provide interobserver

checks has extensive experience in treatment and intervention services for autism spectrum disorder. This person has a PhD in Psychology from a university in the United Kingdom and he is experienced in quantitative research.

To determine interobserver agreement, 30% of the videotapes were coded by the independent observer, approximately evenly distributed across the study phases. Prior to coding the video recordings, the interobserver was trained to use the recording sheet for parent technique use and subsequent child utterances. Observer training included: (a) discussion of definitions, examples, and non-examples using written guidelines and video examples, (b) practice of coding using 1-min segments, (c) discussion of any discrepancies and revision of written guidelines as necessary, and (d) independent coding of 10-min training videotapes (Ledford & Gast, 2018).

Video recording helps observers more accurately code the participants' sessions since they can watch the video in a comfortable setting, alone, and with no distractions. Video also gives the observers the option of replaying parts of the recording to ensure that they have accurately documented and scored the session, including the occurrence of the targeted response (Ledford & Gast, 2018). The formula utilized to determine interobserver agreement was the following: $\text{TOTAL COUNT IOA} = (\text{SMALLER OF OBSERVERS' COUNT} / \text{LARGER OF OBSERVERS' COUNT}) \times 100$.

The interobserver agreement was calculated for both the frequency of parent use of motivational techniques and of child social functional utterances. To meet the evidence standards recommended by What Works Clearinghouse for single-subject research designs, IOA was done for at least 30% of the data as randomly selected by the researcher (Kratochwill et al., 2010). Video probes representing 30% of the observation sessions were sent to the interobserver

through an application to maintain confidentiality (i.e., Google Drive). Specifically, in this research study, the researcher compared the data collected for at least 30% of the recorded sessions between each parent and child with that of the second observer's collection. Both observers used the same data collection form to assess the agreement between them of the baseline data collection and the intervention of parent-implemented PRT techniques. The responses of the researcher and the independent observer were compared to obtain the degree of interobserver agreement on treatment fidelity, with the target being the achievement of an IOA percentage of 80% or higher.

Procedure Summary

As described above, during the baseline phase, the researcher observed how the parents participating in the study interacted with their children using motivational techniques as outlined in the PRT during a scheduled play session at home in the natural environment. During the baseline phase, data were collected to determine the level of functional verbal speech production each child used when interacting in play sessions with their parent.

After the baseline had been established, parents participated in a 6-hour training on pivotal response treatment motivational techniques. During the training sessions, parents demonstrated the application of the techniques, verifying their ability to implement them with fidelity.

During the intervention phase, parents no longer received technique feedback from the researcher/trainer. Each parent was recorded during the intervention play sessions with their child three times each week over 8 weeks; observation data were collected.

After the completion of the intervention phase, a social validity inventory was provided via email to each of the three parents to complete. As soon as the inventory was returned to the

researcher, a follow-up session was scheduled and held with each parent to be interviewed regarding the successes and challenges they identified during the implementation of the PRT motivational techniques. Parents were also asked to describe their confidence levels in the intervention implementation and the extent to which they might continue implementation of the acquired techniques.

Summary

This study derives its importance through the exploration of the efficacy of a brief 6-hour training program in pivotal response treatment for parents of children with autism spectrum disorder to improve the children's social functional verbal utterances during play sessions. The study contributes to the research by generalizing the results to a different cultural group than has previously been examined (e.g., Libyan fathers). This research study employed a single case multiple baseline design across participants in the natural setting of the home. The study consisted of four conditions: (a) baseline data collection phase, (b) parent PRT training, (c) intervention implementation phase, and (d) parent social validity survey and follow-up interview. The participants were observed and recorded during the baseline and the intervention phases. Prior to the parent training, baseline data were taken to identify the level of parents' use of motivational techniques and children's utterances made, as well as whether the two were associated with one another. The parents then received 6 hours of individual training sessions in PRT techniques that included a focus on the motivational techniques of: (a) clear opportunities, (b) child choice, (c) contingent, (d) natural rewards, and (e) rewards attempts. After training completion, the researcher conducted the PRT intervention using motivational techniques, the follow-up social validity inventory and parent interviews were completed.

CHAPTER IV

RESULTS

The previous chapter described the methods used to increase language communication skills using pivotal response treatment (PRT) motivational techniques. The purpose of this research study was to examine the effectiveness of a brief (6-hour) training program in PRT for parents of three young children with autism spectrum disorder (ASD) on the increased use of social functional utterances (SFUs) by their children during play sessions in a naturalistic setting (i.e., home). To accomplish this purpose, and to investigate the effectiveness of the training program, quantitative and qualitative data were collected. This chapter presents this data and the results that were obtained from it to answer the following research questions:

- Q1 After a brief 6-hour PRT training, can parents implement specific motivational techniques with fidelity across interactive play sessions of three sessions per week over 8 weeks with their children with autism spectrum disorder?
- Q2 Do children with autism spectrum disorder show an increase in their use of social functional utterances during play sessions as a result of the implementation of pivotal response treatment motivational techniques by a parent?

The following section includes the interobserver agreement (IOA) results, the findings related to the children's social functional utterances, and the data on the use of the PRT motivational techniques during the baseline and intervention phases for each participant pairing of the study.

Interobserver Agreement

Interobserver agreement was obtained for approximately 30% of all the baseline and intervention phase observation sessions; the researcher randomly selected the sessions to be

observed by the second observer to confirm IOA. The individual who performed the duties of IOA, to avoid bias and human error, was professor in Psychology, whose credentials and qualifications to act as second observer were described in Chapter 3. Video probes were sent to Dr. Gadalla using Google Drive to maintain confidentiality. The researcher compared the observation ratings of the recorded sessions between each parent and child with the ratings of the second observer. Interobserver agreement was calculated for the frequency of both parent use of PRT motivational techniques and child social functional utterances.

The researcher and the interobserver used the same data collection form (see Appendix C) to score the baseline and intervention data collection of parent-implemented PRT motivational techniques. The researcher then compared the observation sheet score to assess the percentage of agreement for parent use of PRT techniques in treatment fidelity and child social functional utterances. The intended agreement target of the IOA percentage was 80% or higher. The formula used to determine IOA was: $\text{TOTAL COUNT IOA} = (\text{SMALLER OF OBSERVERS' COUNT} / \text{LARGER OF OBSERVERS' COUNT}) \times 100$.

Interobserver Agreement of Parents' Use of Pivotal Response Treatment Motivational Techniques

Using the data collected during the baseline and intervention phases, IOA was calculated on the frequency of each father's use of the motivational techniques. Interobserver agreement was calculated on a randomly selected 12 out of the 36 observations, equaling 30% of all observed participant sessions. Using the formula to calculate the total IOA, the interobserver agreement of reliability of PRT motivational techniques used by the fathers was 93%, indicating high agreement between the interobservers.

Interobserver Agreement of Children's Social Functional Utterances

IOA also was collected on the baseline and intervention phase data on the SFUs of the children with ASD. Videotaped sessions were independently viewed by the two observers and scored by each for the number of social functional utterances utilizing the operationalized definitions employed in this research study. Again, interobserver agreement was calculated on a randomly selected 12 out of the 36 participant observation sessions, equaling 30% of all the participant observation sessions. Using the formula for determining total IOA, the interobserver agreement for child social functional utterances was 90.65%, which again indicates high agreement between the observers.

Data Analysis

A multiple-baseline across participants research design was used to examine the effect on the social functional utterances of three children with ASD when their three fathers implemented motivational techniques learned during a brief 6-hour training program in pivotal response treatment. The design employed visual analysis of the collected data for each participant's baseline and intervention phases, shown separately.

The presentation of the results in this chapter is first a discussion of each child's social functional utterances and the fidelity in implementing the PRT motivational techniques by each father after receiving the brief PRT training. This section also provides a discussion of the follow-up component of the study, which consisted of two items. The first of these was the Parent Social Validity Inventory results regarding social validity and the fathers' thoughts related to their experience of using the PRT motivational techniques. The second part comprised the findings obtained from the follow-up interviews, which consisted of qualitative questions

focused on parent-identified successes, challenges during technique implementation, and child changes the fathers attributed to the implementation of the PRT motivational techniques.

Explanation of Percentage of Non-Overlapping Data Calculations

The descriptive statistics related to the mean frequency of PRT motivational techniques and social functional utterances are provided and support the visual analysis of the graphic data. The percentage of non-overlapping data (PND) point values was conducted. PND was used to compare the data of the PRT motivational techniques implemented by the parent (independent variable) and the social functional utterances of the child (dependent variable) to determine the effectiveness of the intervention used (Ledford & Gast, 2018).

To evaluate the intervention effectiveness using PND, the standards presented in Table 2 were utilized as recommended by O'Neill et al. (2011). PND calculations identify the standards used, and are calculated by: (a) determining the highest data point in the baseline phase as a frame of reference; (b) counting the number of data points of the intervention phase that are higher than the highest point (that was determined in a) in the baseline phase; and (c) dividing the number of non-overlapping data points that are plotted above the highest point in the baseline phase by overall number of data points of the intervention phase and multiplying by 100.

Table 2*Standards Used to Evaluate the Effectiveness of the Intervention*

PND ^a	Effectiveness of Intervention
90% - 100%	Highly Effective
70% - 89%	Moderately Effective
50% - 69%	Minimally Effective
> 50%	Ineffective

Note. Adapted from the standards described in “Single Case Research Designs in Educational and Community Settings” by R. E. O’Neill, J. J. McDonnell, F. F. Billingsley, and W. R. Jenson. Copyright 2011 by Pearson Education.

^a PND is the Percentage of Non-overlapping Data.

Analyses of the observations for each of the three fathers during the baseline (i.e., before receiving any training or insight into therapeutic intervention) and intervention (i.e., after receiving a 6-hour training program in PRT) phases are presented on Figure 2. In Figure 3, the data collected on each of the three children’s use of social functional utterances in response to each of their father’s interaction are shown. In multiple baseline research design, measurements of interventions are evaluated repeatedly for subjects across various levels of the independent variables (e.g., participants, behaviors, or settings) and time (Kratochwill & Levin, 2014). Thus, staggered baselines were used in this research study to establish a functional relationship between the independent variable (social functional utterances) and the dependent variable (PRT motivational techniques; O’Neill et al., 2011). In other words, introducing the intervention on a staggered schedule provides evidence for causal inference, which means the reason for the progress then can be directly attributed to the intervention used (Rhoda et al., 2011).

Figure 2

Number of PRT Motivational Techniques Parents Implemented Per Session by Parent/Child

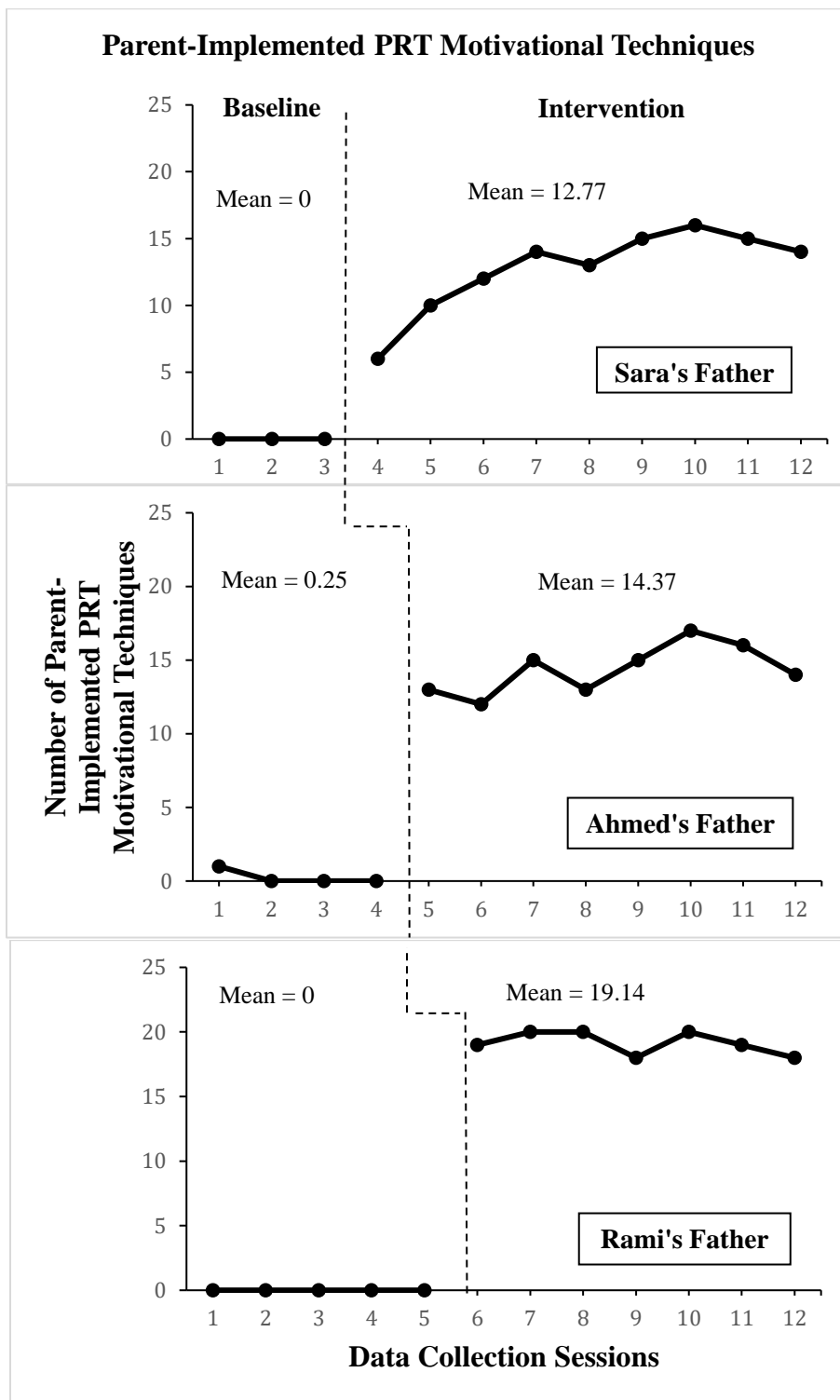
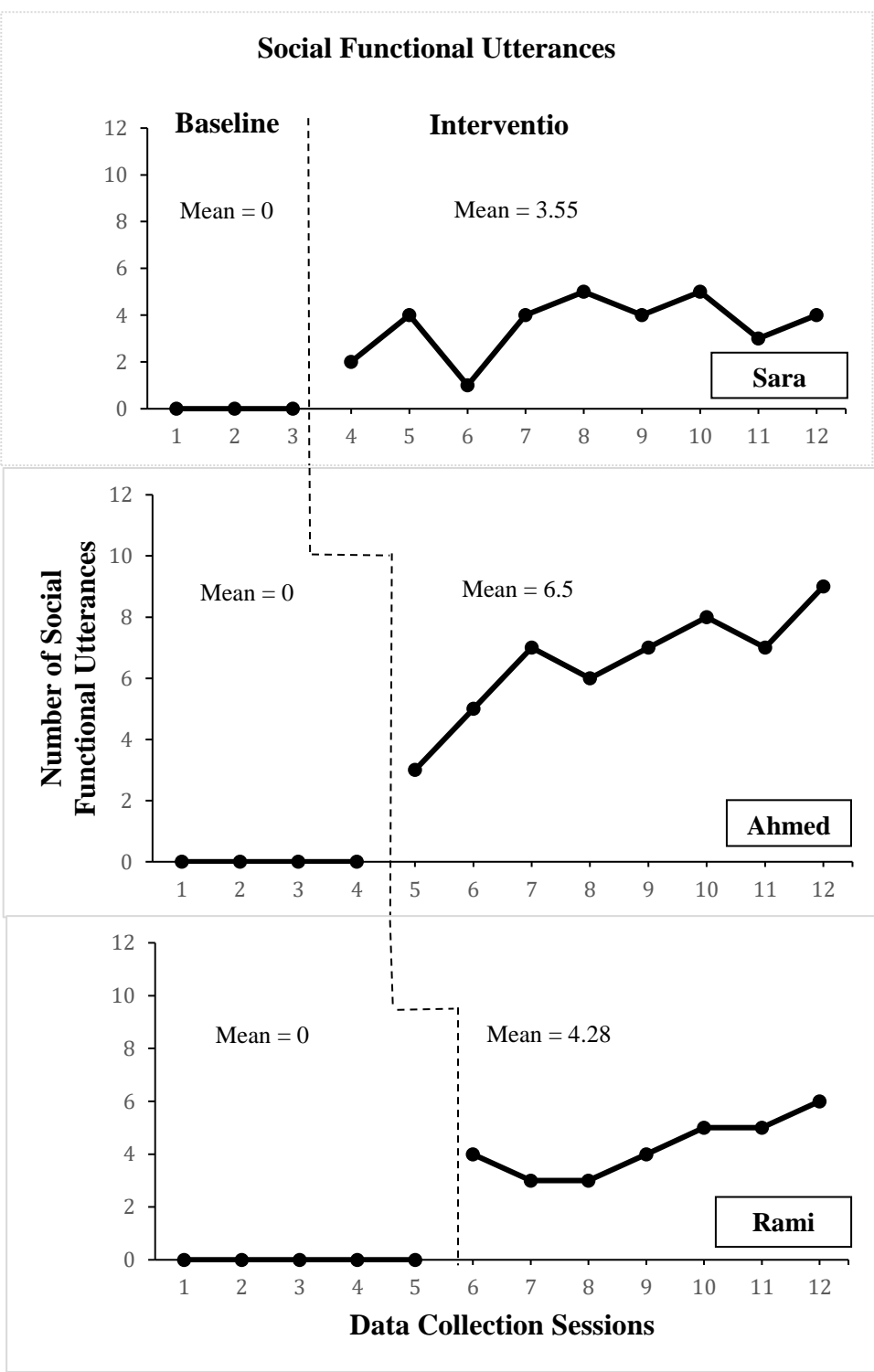


Figure 3

Number of Social Functional Utterances Produced by Each Child



Results for Sara/Sara's Father

Sara/Father: Baseline Phase

Sara's baseline phase consisted of three data collection points. Her social functional utterances were observed for the 10-minute scheduled play session period with her father in their home. Figure 3 illustrates that Sara's number of SFUs was zero during each of the three baseline data point collection sessions and therefore the mean frequency was also zero. Sara did not produce any spontaneous social functional utterances during the three sessions of the baseline phase. Likewise, as indicated in Figure 2, Sara's father did not utilize any motivational techniques to motivate Sara to produce interactive communication during the baseline. Her father did sometimes try to find other ways to encourage Sara to produce a word (e.g., "Papa"); however, the child did not respond to any of her father's efforts. Not one identified PRT motivational technique was used by Sara's father.

Sara/Father: Intervention Phase

After baseline and prior to the intervention phase, Sara's father received 6 hours of evidence-based training in how to support his child's communication skills development using PRT motivational techniques in the naturalistic home environment. Visual analysis of the intervention target (i.e., improvement of communication skills) was conducted to establish a causal relation between the use of PRT and improvements in social functional utterances. The child - father intervention sessions consisted of nine data point collection sessions. During these sessions, Sara's father implemented the PRT motivational techniques to motivate Sara to interactively communicate. During these nine play sessions, he used the PRT motivational techniques with a mean frequency of 12.77. Please reference Figure 2, which shows that the

frequency of Sara's father's use of PRT motivational techniques ranged from 6-16 PRT motivational techniques during the intervention phase.

Sara's intervention phase also included child-father nine data point collection sessions. During these sessions, Sara produced several words to mand items that her father utilized within the play sessions at a mean frequency of 6.85 social functional utterances. Visual analysis of the intervention target was conducted to establish a causal relationship between the use of PRT and improvements in social functional utterances. In the intervention phase, when Sara's father implemented the PRT motivational techniques, Sara produced several words. Please reference Figure 3 for a display of the frequency of Sara's SFUs, which ranged from 1-5 per session during the intervention phase.

Visual inspection showed that Sara began uttering new words she had not attempted during baseline. These utterances occurred during each of the intervention sessions. She attempted and used new words during the play sessions with her father more frequently during the intervention phase than during the baseline phase. The PND was calculated to determine if the frequency of social functional utterances increased due to the use of the PRT motivational techniques. Figures 2 and 3 demonstrate no data point overlaps between the baseline and intervention phases for either Sara or her father, respectively. Thus, the PND is determined to be 100%. This visual inspection of PND (i.e., 100%) demonstrates that the intervention was highly effective (O'Neill et al., 2011).

Results for Ahmed/Ahmed's Father

Ahmed/Father: Baseline Phase

Ahmed's baseline phase consisted of four data point collection sessions. Ahmed's social functional utterances were observed for four 10-minute play sessions with his father in their

home. Figure 3 illustrates that Ahmed's number of social functional utterances during the baseline was zero for each of the four collection sessions. Thus, the mean frequency was also zero. Ahmed did not produce any spontaneous SFUs during the baseline phase. Ahmed's father only used motivational techniques to motivate Ahmed to produce interactive communication one time during the first session, when the father used a clear opportunity technique. Thus, the mean frequency of PRT motivational techniques was 0.25 during baseline. The father did try other ways to encourage Ahmed to interact during the interactive play sessions but these did not result in any acknowledged responses from Ahmed.

Ahmed/Father: Intervention Phase

After baseline and before the intervention implementation phase, Ahmed's father received 6 hours of evidence-based training in how to support his child's communication skills development using PRT motivational techniques in the naturalistic setting of their home. Visual analysis of the intervention target (i.e., improvement of communication skills) was conducted to establish a causal relationship between the use of PRT and improvements in social functional utterances. Ahmed's father had eight data point collection sessions for the intervention phase. During these sessions, Ahmed's father implemented the PRT motivational techniques to motivate Ahmed to communicate interactively. The father used the PRT motivational techniques during the play sessions with a mean frequency of 14.37. The father's frequency of use of PRT motivational techniques ranged from 12-17 during the intervention phase.

Ahmed's intervention phase encompassed eight data point collection sessions. During these sessions, Ahmed produced sentences asking to have the items his father used or requested preferred activities within the play sessions with a mean frequency of 6.5 social functional utterances. Visual analysis of the intervention target was conducted to establish a causal

relationship between the use of PRT and improvements in the rate of social functional utterances. Once Ahmed's father was able to implement the PRT motivational techniques, Ahmed produced several sentences during the intervention phase. Ahmed's frequency of SFU ranged from 3-9 per data collection session during the intervention phase.

Visual inspection of the intervention phase showed that Ahmed began using words and phrases to label objects used or to mand preferred activities that he had not previously used during the baseline interactive play sessions. These utterances happened during each of the child-father intervention sessions. Ahmed said new words during the play sessions with his father at a higher frequency during the intervention phase when compared to the baseline phase. The PND was calculated to determine whether the frequency of SFUs increased as a result of the father's use of the PRT motivational techniques. Figures 2 and 3 indicate that there was no data point overlap between the baseline and intervention phases for either Ahmed or his father. Thus, the PND was 100%. This visual inspection of PND (i.e., 100%) demonstrates that the intervention was highly effective (O'Neill et al., 2011).

Results for Rami/Rami's Father

Rami/Father: Baseline Phase

Rami's baseline phase included five play sessions of observation for data point collection. Rami's social functional utterances were observed during five 10-minute play sessions with his father in their home. Figure 3 illustrates the data collected showing that Rami's SFU were zero during each of the five collection sessions. Thus, the mean frequency was also zero. Rami did not spontaneously produce any social functional utterances during any of the five occasions of the baseline phase. Rami's father did not use any motivational techniques to motivate Rami to produce interactive communication during the baseline phase. His father did try to find other

ways to encourage Rami to interact during the interactive play sessions, but Rami did not respond to his efforts.

Rami/Father: Intervention Phase

After baseline collection and before the intervention implementation, Rami's father engaged in 6 hours of evidence-based training in how to support his child's communication skills development using PRT motivational techniques in the naturalistic setting of their home. Visual analysis of the intervention target (i.e., improvement of communication skills) was conducted to establish a causal relationship between the use of PRT and improvements in the rate of social functional utterances. Rami's father was observed during the intervention phase for nine data point collection sessions. During these sessions, Rami's father implemented the PRT motivational techniques to motivate Rami to communicate interactively. The father used the PRT motivational techniques during the play sessions with a mean frequency of 19.14. The father's frequency of PRT motivational techniques use ranged from 18-20 during the intervention phase.

Rami's intervention phase encompassed nine data point collection sessions. During these sessions, Rami produced several words indicating he wanted the items his father was using or requested preferred activities within the play sessions, with a mean frequency of 4.28 social functional utterances. Visual analysis of the intervention target was conducted to establish a causal relationship between the use of PRT and improvements in frequency of social functional utterances. When Rami's father implemented the PRT motivational techniques, Rami produced several words during the intervention phase collectively at a frequency of 3-6 SFUs per data collection session.

Visual inspection showed that Rami began uttering new words that he had not previously uttered during the baseline phase. These utterances occurred during all of the child-father

intervention sessions. Rami said new words during the play sessions with his father more frequently during the intervention phase than during the baseline phase. The PND was calculated to determine whether the increased frequency of Rami's social functional utterances was a result of his father's use of the PRT motivational techniques. Figures 2 and 3 demonstrate no data point overlap between the baseline and intervention phases for either Rami or his father. Thus, the PND was 100%. This visual inspection of PND (i.e., 100%) demonstrates that the intervention was highly effective (O'Neill et al., 2011).

Follow-Up Component

The follow-up component included two parts: (a) social validity and (b) parents' thoughts regarding the use of the PRT techniques. The social validity was assessed using an adapted form of the Treatment Evaluation Inventory-Short Form (TEI-SF; Kelley et al., 1989). The form comprises nine items (see Appendix D) that was provided to the fathers after the completion of the intervention and before the follow-up interview. After the social validity was completed, a short follow-up interview was conducted (see Appendix E).

Parent Social Validity Inventory

At the close of the intervention phase, each of the three fathers received a 9-question quantitative social validity inventory via email. The Parent Social Validity Inventory was used here for this research study to investigate the fathers' perspectives of the acceptability and value of the intervention for their children. Table 3 shows how each father responded to the inventory regarding the implementation of the intervention. Figure 4 also presents the survey responses and indicates that the three participating fathers highly rated the techniques they had learned across all of the nine aspects. According to the inventory results, all three fathers reported the PRT motivational techniques used in this research study to be an acceptable method to improve their

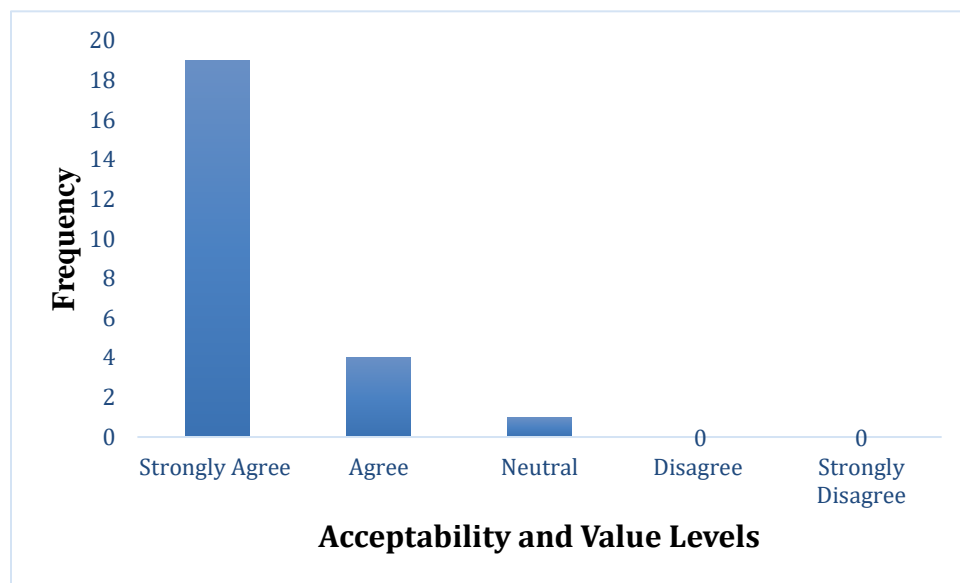
children's language skills, that these techniques were acceptable to be utilized without the child's consent, that the techniques were effective in improving the child's language skills, and all the fathers had positive impressions of this research study, which aimed to increase the social functional utterances by children with autism spectrum disorder. All three fathers indicated that they believed that they would be willing to utilize the PRT motivational techniques again to increase their children's communication skills, that they liked the techniques they learned in the training, that to some degree they had all observed their children enjoying these techniques during the interactive play activities, that they expected these techniques to result in permanent language improvement, and that they would continue to utilize the techniques with their children in order to improve other behaviors.

Table 3*Parent Responses on the Provided Social Validity Inventory*

Item	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1
1. I find this treatment to be an acceptable way of working on my child's language improvement.	3	0	0	0	0
2. I would be willing to use this procedure again to increase my child's language.	2	1	0	0	0
3. I believe it is acceptable to use these techniques without my child's consent.	3	0	0	0	0
4. I like the techniques I learned in the training.	2	1	0	0	0
5. I believe the techniques I used were effective in improving my child's language.	3	0	0	0	0
6. I believe my child enjoyed the techniques I used during the play activities.	2	1	0	0	0
7. I believe these techniques are likely to result in permanent language improvement.	2	0	1	0	0
8. I believe I will continue to use these techniques with my child to improve other behaviors.	2	1	0	0	0
9. Overall, I have a positive reaction to this study.	3	0	0	0	0

Figure 4

Comprehensive Parent Responses on the Provided Social Validity Inventory



Interviews

After each father had completed the Parent Social Validity Inventory, they were scheduled to participate in a follow-up interview via Zoom that was recorded. The interview consisted of qualitative questions focusing on parent successes and challenges during the implementation of the technique and any changes seen in the children as a result of employing the PRT motivational techniques (see Appendix E). The following section includes a discussion of the results from each interview.

Interview: Sara’s Father. Sara's father stated he believed the PRT motivational techniques he learned to use were effective in improving Sara's language. Specifically, he said: Sara had uttered very few words before the age of 2 and by the age of 3, she had completely stopped using even those few words. So, after being trained in using the PRT motivational techniques, Sarah uttered words that she had never used, such as “chips” and “yogurt.”

Sara's father reported that he liked the PRT motivational techniques and openly described his initial hesitation, saying:

At first, I thought that these techniques would not be effective, especially since Sara suffers from severe autism and is not speaking. However, once I started implementing the PRT motivational techniques, I noticed how Sara's responses got better during playing with her.

Throughout the interview, this father emphasized that his greatest success in implementing the PRT motivational techniques came when Sara uttered some words she had never previously spoken. Her father also mentioned that the PRT motivational techniques seemed to be very easy, but he recognized that effective use required his understanding and focused attention to correctly implement them. He said:

These techniques are easy to apply when you understand the meaning behind each technique. I think that at first Sara was not aware of what she was expected to do.

However, with continuity, Sara learned that she would get favorite items during the play activities with me when she followed the instructions.

Sara's father indicated that he noticed Sara's increased attention and focus after using the PRT motivational techniques, as well as saw her maintaining better focus while playing. For example, previously Sara had not joined the family members when they would sit down for meals; however, after the PRT techniques were presented, Sara began to notice how the rest of her family behaved at meals and imitated their behavior with them at the table. This behavior had an impact on the family as indicated by Sara's father when he said, "This matter made us very happy."

In addition, this father reported that the therapeutic intervention used in this research study was an appropriate method to improve Sara's communication skills. Furthermore, he emphasized that he would be willing to utilize the PRT motivational techniques on a daily basis to improve Sara's communication skills.

Sara's father also pointed out that he felt that his relationship with Sara improved because of the techniques he had learned, making their play more enjoyable. He concluded with: "In the past, I was having a hard time understanding Sara's interests and the style of play she prefers. Now I enjoy playing with Sara, and I think she enjoys [playing] with me, too."

Interview: Ahmed's Father. The second interview was conducted with Ahmed's father. He stated that the PRT motivational techniques used had improved Ahmed's interactive communication. His father reported that Ahmed had previously tended to repeat specific sentences throughout the day with no apparent reason for doing so. After using these techniques with Ahmed, the child began to employ different words and sentences to request toys or food with a clear reason for saying the words. Ahmed's father mentioned that the greatest success he observed when using the PRT motivational techniques was related to how he felt. He said he had learned an interactive way to play with Ahmed. He indicated that he was able to use some of the methods he had learned to teach Ahmed during their playtimes. Ahmed's father said that he did not face difficulties in applying these techniques, that they were easy to employ, and were applicable to Ahmed's situation.

Ahmed's father believes that Ahmed enjoyed the Child Choice technique because it requires focusing on what the child likes, not what the parent (or other party) chooses. Ahmed's father thinks that his relationship with Ahmed was positively impacted as a result of the play sessions. The father said that Ahmed loves playing with him more than ever. He added that in the

past, he did not know what Ahmed preferred or how to use playtime to teach Ahmed useful skills. Now, as he stated, “I think the secret to making learning enjoyable during play is due to the use of this technique.”

This father reported that he did not see changes in his son’s other behaviors outside of the play sessions, except for the marked improvement in communication skills. Finally, Ahmed's father mentioned that he would continue to use the PRT motivational techniques with Ahmed, saying, "I have not stopped using these techniques even after completing the intervention sessions, because I found these techniques useful and they made [play time] more beneficial to my son."

Interview: Rami’s Father. The third interview was conducted with Rami's father, who pointed out that:

It was a great opportunity to have been able to learn the techniques. This preoccupation reduced the time I was supposed to spend with Rami. I found the techniques to be useful because, once the techniques used in this research study were implemented, Rami's communication skills improved.

Rami's father reported that the greatest success achieved through the implementation of the PRT motivational techniques was that it had helped Rami to improve his communication skills, saying, “Rami needs professional services to help him learn social and communication skills to be ready to go to school soon. I did not encounter any challenges to implementing the techniques.”

Rami’s father did mention that he had felt challenged by figuring out how to make time to spend with Rami during the intervention sessions because he is usually very busy during the week with his business. He stated that although Rami is temperamental, he seemed to enjoy the

PRT motivational techniques that were used in this research study during the play activities. He attributed Rami's enjoyment to the fact that all the activities introduced during the play periods were based on Rami's choices.

Rami's father did not see changes in other behaviors outside of the play sessions with Rami. However, the father became labeling some objects (e.g., car, train, and tree). Rami's father believed his relationship with Rami changed as a consequence of the play sessions, stating that, "Rami likes to play with me, especially when I use what Rami prefers, such as spin."

Rami's father said he is excited to continue using the PRT motivational techniques with Rami. He pointed out that one of the main reasons he is motivated to continue to implement these techniques is that he noticed improvement in Rami's language and communication skills with his mother and siblings.

Summary of Results

The purpose of this research was to investigate the effect of a brief 6-hour training program in PRT for parents of young children with ASD on the increased use of social functional utterances by their children during interactive play sessions. Parents, specifically fathers, learned PRT motivational techniques and strategies and then applied those techniques during interactive play sessions over the course of 8 weeks in an effort to support the development of their children's language use and social communication skills. In keeping with the purpose of this research, the following research questions guided this study:

- Q1 After a brief 6-hour PRT training, can parents implement specific motivational techniques with fidelity across interactive play sessions of three sessions per week over 8 weeks with their children with autism spectrum disorder?
- Q2 Do children with autism spectrum disorder show an increase in their use of social functional utterances during play sessions as a result of the implementation of pivotal response treatment motivational techniques by a parent?

Given the results described above, mean frequencies of parent-implemented PRT motivational techniques for each father increased during the intervention phase when compared to the baseline phase as follows: (a) 12.77 (Sara's father), (b) 14.12 (Ahmed's father), and (c) 19.14 (Rami's father). Correspondingly, the mean frequencies of social functional utterances for each child also increased during the intervention phase when compared to the baseline phase, these figures were as follows: (a) Sara: 3.55, (b) Ahmed: 6.5, and (c) Rami: 4.28. This increase in the mean frequencies of the PRT motivational techniques that were implemented by the parents can be attributed to the fidelity with which all three fathers successfully implemented the techniques. The percentages of non-overlapping data values were evaluated to identify the effectiveness of the intervention for both the dependent variable (SFUs of the child) and the independent variable (PRT motivational techniques implemented by parent). The visual inspection of PND demonstrates that the intervention used in this research study was highly effective (O'Neill et al., 2011).

In answer to the first question -- *After a brief 6-hour PRT training, can parents implement specific motivational techniques with fidelity across interactive play sessions of three sessions per week over 8 weeks with their children with autism spectrum disorder?* – the findings confirmed that the participants were definitely able to implement the techniques—as rated by the researcher and confirmed by the interobserver—with fidelity over the 8 weeks of the implementation.

The findings of this study also confirm an affirmative to the second research question -- *Do children with autism spectrum disorder show an increase in their use of social functional utterances during play sessions as a result of the implementation of pivotal response treatment motivational techniques by a parent?* These children, as observed over the 8 weeks of play

sessions with their fathers implementing the PRT motivational techniques, increased their use of social functional utterances as defined in this study. According to the fathers during the follow-up interviews, their children also attempted to use social functional utterances—and even sentences—outside of the play sessions and with other family members. The Parent Social Validity Inventory was administered, and the responses showed that all three fathers were satisfied with the PRT intervention, found the intervention to be highly acceptable in addressing the rate of social functional utterances, and expressed a willingness to utilize the PRT motivational techniques as part of their daily routine with their children with ASD. Finally, the interviews with the fathers demonstrated that they felt that the PRT motivational techniques they learned through the study provided several benefits, which were: that the use of PRT motivational techniques helped their children with ASD to improve their social communication skills, that they believed their children enjoyed the use of the techniques during the interactive play sessions, and in their opinion, that the use of the techniques improved their relationships with their children, especially during playtime.

CHAPTER V

DISCUSSION

A lack of communication skills development is one of the main characteristics of autism spectrum disorder (Henderson et al., 2014). This deficit is one of the main diagnostic criteria for ASD and is a significant concern for the parents/caregivers of these children (Eigsti et al., 2011; Luyster et al., 2008; Matson & Horovitz, 2010). The purpose of this research study was to examine the effectiveness of a 6-hour training program in pivotal response treatment for parents of young children with ASD to support the increased utilization of social functional utterances by their children during interactive play sessions. The objective was to have the participating fathers implement an evidence-based practice after going through the brief training program. It was hypothesized that fathers could implement PRT motivational techniques to improve communication skills in their children. In this study, culture and language were factors considered as the parents and children were from Libya and spoke Arabic. This study is the first time these techniques have been implemented with this population of individuals. Cultural parenting interactions played a part in examining the results. The researcher needed to be culturally and linguistically responsive during the parent training sessions and the observations of the parent-child pairs during the baseline and intervention phases of data collection.

This chapter begins with a discussion and interpretation of the results described in Chapter 4. Then, a summary and discussion of the findings are presented, specifically, how the findings relate to the research questions, data obtained from the fathers regarding their

perceptions of the benefits of the intervention, the implications for future research, and the study's limitations.

Discussion of the Findings

This research study aimed to explore two research questions: (a) *After a brief 6-hour pivotal response treatment training, can parents implement specific motivational techniques with fidelity across interactive play sessions of three sessions per week over 8 weeks with their children with autism spectrum disorder?*; and (b) *Do children with autism spectrum disorder show an increase in their use of social functional utterances during play sessions as a result of the implementation of pivotal response treatment motivational techniques by a parent?*. The following discussion focuses on the identified improvement in each of the subject children with ASD regarding the increased frequency of social functional utterances from the baseline phase (when that frequency was “0” for each child) to the intervention phase, after their fathers had received training in PRT motivational techniques.

Findings for Subject Sara

During Sara’s baseline phase, there were three points of data collection to measure social functional utterances. The frequency at all three data points was observed and calculated to be zero. This calculations means that Sara did not produce any functional utterances, as defined by this research and as shown by the data recorded on the Play Session Data Recording Sheets. While her father was trying to play with Sara, she was distracted and uninterested in play. During this baseline phase, Sara did not engage in any interactive play activities. Furthermore, it was noted that Sara did not show the typical signs of child indication of playtime enjoyment. This was based on the observed evidence of her lack of interest and nonattendance to her father’s interactions, verbally and physically, and her surroundings in the play session area.

Sara's father was also scored “0” at all three data points of the play sessions, indicating that he did not use any motivational techniques (i.e., child choice, clear opportunities, contingent, natural rewards, and reward attempts) with Sara during their three baseline sessions. Specifically, Sara's father did not choose toys or activities that Sara preferred. He tried to communicate with her by calling her name or some words in an effort to get her attention. Sara did not respond to any of these efforts on the part of her father. During the baseline play sessions with his daughter, Sara's father had a very serious demeanor, which contributed to the researcher’s impression that playtime seemed unpleasant for Sara.

Sara progressed through the intervention phase of the study with relatively stable results related to use of functional utterances when playing with her father. The visual inspection showed that Sara produced new words beginning with the first intervention session. Her frequency of SFUs vocalized was at the highest level during Sessions 8 and 10. However, the sixth intervention session was notably inconsistent in comparison with the other session data points. During Session 6, Sara did not seem interested in a specific item or activity and moved from one item to another without sustained attention or focus. This made it difficult for her father to determine Sara’s preferences. Thus, he could not implement child choice effectively. This action is addressed by L. K. Koegel et al. (2013) in their manual, *Teaching First Words to Children with Autism and Communication Delays Using Pivotal Response Training*. They write that children's preferences might change from minute-to-minute even though parents have compiled lists of activities and items their children enjoy. Thus, it is sometimes difficult for a parent, especially one who has only just learned the techniques, to accurately gauge the child’s preferences. This could have been one of those incidences and might explain Sara's low frequency of social functional utterances during the sixth session.

Sara's father showed considerable progress regarding implementing the PRT motivational techniques. During the intervention sessions, even when Sara's frequency of social functional utterances dropped – such as during Session 6 – her father's frequency of implementing PRT motivational techniques remained consistent. Among the parent participants, Sara's father was the one who most frequently asked questions regarding the implementation procedures during the training. Although Sara's father reported that he was enthusiastic about learning the techniques to help Sara communicate with him and the rest of their family, he expressed concern about implementing the intervention properly. This concern might explain why Sara's father progressed gradually during the intervention phase in terms of his rate of implementing the techniques (please reference Figure 2 in Chapter 4).

Findings for Subject Ahmed

There were four points of data collection during Ahmed's baseline phase to measure his rate of social functional utterances. His frequency of SFU at all four data points was found to be zero. The score means that Ahmed did not produce any functional utterances, as noted on the Play Session Data Recording Sheets across sessions. While Ahmed's father was trying to play with Ahmed, the child was either quiet, did not speak, or uttered words unrelated to the activity or the item presented. Ahmed engaged in interactive play activities during the baseline phase, but he did not use vocalizations that appeared functional or task-directed as defined by the data collection sheets and training. Ahmed's father would choose activities and games based on his belief that Ahmed would enjoy them. For example, in the third baseline session, Ahmed's father involved Ahmed and his brothers in the same activity, but Ahmed did not engage in play with his siblings and did not exhibit purpose or focus regarding the task.

During the baseline, Ahmed's father did not use motivational techniques to motivate Ahmed to produce social functional utterances, except during the first session when he employed a clear opportunity technique, as recorded by the observer. Similarly, Ahmed's father did not pick objects or activities for which Ahmed indicated a preference. He did attempt to involve Ahmed in either individual or group play activities. Moreover, although Ahmed was observed to echo the sounds his father made, his responses were not aligned with the context of the situation. Even though Ahmed's father attempted to be interactive and showed humor during the baseline sessions, he lacked understanding of the evidence-based practices of motivational technique use that would have supported Ahmed's language skills.

Ahmed progressed through his intervention phase with relatively stable results related to his social functional utterances with his father. The visual inspection illustrated that Ahmed produced several sentences from the first session of the intervention. Ahmed steadily progressed during Sessions 1, 2, and 3, during which the number of social functional utterances he was observed to express were three, five, and seven, respectively. The frequency of social functional utterances Ahmed vocalized was at the highest level within Session 12. Ahmed was able to initiate communication with his father without being prompted. For example, during the last three sessions of the intervention phase, Ahmed specifically requested preferred activities/objects, including "horse," "ball," and "car."

Ahmed's father significantly progressed related to his implementation of PRT motivational techniques during the intervention sessions. Specifically, Ahmed's father had a consistently strong rate of implementing the PRT techniques he had learned, which was much higher than his rate during the baseline during which he had utilized only one technique, one time. This slow start rate of technique implementation was very reasonable since he had no

knowledge of these techniques before the training. However, what is notable is that once Ahmed's father was exposed to the brief training, he was observed to be motivated and consistent regarding utilizing the PRT motivational techniques he had learned with Ahmed during the intervention phase.

Ahmed's father played with his son actively and energetically. He used Ahmed's choices as well as clear, brief, and specific statements of instruction. Following the training, he was also able to keep Ahmed's attention on the task, and he immediately gave Ahmed natural contingent rewards after correcting a verbal response or attempt. Once Ahmed's father began implementing the PRT motivational techniques he had learned, Ahmed exhibited a higher rate of social functional utterances during all the intervention sessions. While it is difficult to draw firm conclusions, the increased rate of SFU by Ahmed indicated that he reacted positively to the introduction of his father's newly learned PRT motivational techniques. The father's fidelity to implementation may explain the remarkable progress Ahmed made during the intervention phase.

Findings for Subject Rami

Rami's baseline phase consisted of five points of data collection to evaluate his social functional utterances. The frequency during all five baseline sessions was zero, meaning Rami did not produce any functional utterances, as noted on the Play Session Data Recording Sheets. In addition, although Rami's father was trying to play with his son during the five baseline sessions, Rami preferred to play alone. During this phase, Rami engaged in limited interactive activities. Rami did not seem to enjoy playing with his father and tended not to select items his father presented. For example, Rami was observed throwing toys that his father presented and running away to avoid playing with his father. Moreover, Rami experienced and exhibited mood

swings during some of the baseline sessions. For instance, he cried for short periods during the second and third sessions of the baseline.

During the baseline sessions, Rami's father used a clear opportunity technique one time during the first session. Throughout the baseline, Rami's father did not select items or activities that Rami preferred and did not engage Rami in activities. His father sat next to him and played with the building blocks without using the interactive play techniques defined for this study, nor did he attempt any use of language. Additionally, Rami did not interact with his father nor were his responses connected to the context of the interaction. Although Rami's father tried to find ways to engage Rami in interactive play during the baseline sessions, his inability to do so successfully was obviously attributable to his lack of knowledge about the evidence-based practices that could help him work with Rami successfully to improve his child's language skills.

Rami progressed through the intervention phase with relatively stable results regarding functional utterances with his father. The visual inspection showed that Rami produced new words starting with the first intervention session. Rami substantially progressed throughout the intervention phase, especially from Sessions 8 to 12. The number of social functional utterances observed over these sessions were three, four, five, five, and six, respectively. The frequency of SFU Rami vocalized was at the highest level during Session 12, where he was observed to provide six responses. In some sessions of the intervention phase, Rami produced utterances that were not functional or communicative, therefore these utterances were not counted as SFUs. Overall, Rami was able to name some of the objects used and to choose between two options by naming his preferred choice.

Rami's father was able to implement the PRT motivational techniques he had learned through the brief training during the intervention phase at a consistently high rate, especially

compared to his single incidence of the use of a PRT motivational technique during the baseline phase. Once he learned the PRT motivational techniques and began implementing them from the first session of the intervention phase, Rami's rate of SFU immediately began to increase and to improve throughout each session, culminating in his frequency of SFU during Session 12.

Rami's father utilized Rami's choices and used clear and brief language to keep Rami's attention on the task. He also immediately gave Rami natural contingent rewards after correct verbal responses or attempts. Rami's father modeled the language for certain objects/activities during some of the intervention sessions and encouraged Rami to respond with functional approximations of those words. These actions may be a potential explanation for the notable progress Rami made during the intervention phase.

Findings in Relation to the Research Questions

One of the essential traits of autism spectrum disorder is a lack of communication skills, which is a primary diagnostic criterion of ASD (Henderson et al., 2014; Luyster et al., 2008). Speech delay and challenges with communication skills are cited as a major concern by parents and caregivers of these children (Eigsti et al., 2011; Matson & Horovitz, 2010). The current study provided training in an evidence-based intervention for parents who have children with ASD with communication deficits. The purpose of this research study was to examine the effect of this brief training plan in PRT for fathers of children with ASD on increasing the utilization of social functional utterances by their children with ASD during interactive play sessions. The participating fathers learned how to utilize the PRT motivational techniques and then implement them within interactive play sessions over 8 weeks to improve their children's social communication skills and language use. In this section, the research questions in relationship to the findings of the study are examined. The review of the literature presented in Chapter 2 is

once again reviewed with points of support or disagreement with other studies. Discussion of the contributions of this study and the intervention used is provided to promote future research.

Findings Related to the First Research Question

The first research question was: *After a brief 6-hour pivotal response treatment training, can parents implement specific motivational techniques with fidelity across interactive play sessions of three sessions per week over 8 weeks with their children with autism spectrum disorder?* Three fathers who have children with ASD participated in this research study. Each father received 6 hours of training in PRT motivational techniques. Prior to receiving the training, each father was provided with an Arabic translation of the instructional PRT manual -- *Teaching First Words to Children with Autism and Communication Delays Using Pivotal Response Training* (L. K. Koegel et al., 2013) – which was then utilized in the training sessions.

The training program sessions encompassed three 1-hour sessions each week over 2 weeks. Each father met with the researcher via Zoom to receive the training, due to the COVID-19 pandemic. The researcher created a PowerPoint for each training session. Briefly, the training sessions had six main components: (a) introduction to PRT, (b) how to identify the child's preferred items related to the first technique of PRT, child choice, (c) how to provide clear opportunities that allow the child to respond, (d) the importance of delivering a contingent consequence and how to use this technique, (e) the use of the natural rewards technique, and (f) what the reward attempts technique involves and how it is implemented (see Chapter 3 for more information).

The analysis of parent fidelity of technique use and implementation through observation was used to answer the first research question. The frequency of the parents' use of PRT motivational techniques before and after the training (in the baseline and intervention phases),

was documented followed by verification through interobserver agreement to avoid bias and human error. The responses of the researcher and the second observer were compared for 30% of all of each child's play sessions with his/her father and a 93% degree of IOA was achieved. This IOA percentage is considered to be high and confirms that this research study achieved a high rate of reliability of the collected data. Therefore, according to the data collected and the relatively high agreement as evidenced by the 93% IOA of the two observers, it is reasonable to assert that the results show that the three fathers were able to efficiently implement the techniques they had learned throughout the training sessions.

Two methods were used to visually analyze the fathers' graphic data. First, descriptive statistics were employed to analyze the mean frequency of the fathers' use of the PRT motivational techniques they had learned and of the social functional utterances of the subject children with ASD during the baseline and intervention phases. Second, the percentage of non-overlapping data point values were utilized to determine whether the fathers implemented the motivational techniques efficiently. The results presented in Chapter 4 show the change in mean frequencies for the use of PRT motivational techniques for each father (Sara's father, Ahmed's father, and Rami's father) from baseline to the intervention phase, which demonstrate effective technique implementation. When compared to the baseline phase, where the frequency was very low or at zero, the intervention frequencies are seen to be markedly higher, as follows: (a) Sara's father: 12.77, (b) Ahmed's father: 14.12, and (c) Rami's father: 19.14. The increased intervention frequencies indicate the fathers were able to consistently and with fidelity implement the techniques over the 8 week period after the brief training. Furthermore, the PND was 100% for all three fathers, which demonstrates that they not only implemented the intervention, but did so in a manner that was highly effective.

These results support the research findings regarding the importance of involving parents in developing their children's skills through training that employs evidenced-based therapeutic practices, as emphasized by Bears et al. (2015). Their study found that behavioral training can be most effective when parents receive professional training from specialists to implement the intervention by making it accessible for the participants/subjects to apply (Raulston et al., 2019). In addition, research involving parent-centered interventions, such as the PRT motivational techniques used in this study, have found that parents gain increased self-confidence in the role of fundamental players when developing and applying intervention techniques with their children (Brookman-Fraze et al., 2009; Meadan et al., 2009).

Findings Related to the Second Research Question

The second research question was: *Do children with autism spectrum disorder show an increase in their use of social functional utterances during play sessions as a result of the implementation of pivotal response treatment motivational techniques by a parent?*. After the three fathers received the brief pivotal response treatment training (i.e., clear opportunities, child choice, contingent, natural rewards, and rewards attempts), they were each observed as they implemented the intervention. The intervention sessions were observed and recorded within the naturalistic environment of the children's homes. During the intervention phase, which consisted of three 10-minute sessions each week over 8 weeks, the father-child interactions during play sessions were observed and recorded.

The three children with ASD exhibited zero frequency of SFU during the baseline sessions. Therefore, any incidence of social functional utterances during the intervention after their fathers had received the brief training was deemed notable. Once the intervention phase began, all three children exhibited numerous instances of SFU during 10 minutes of play with

their fathers. These exhibitions of increased SFU were a marked improvement, making the development of the brief training in PRT for parents worthwhile and cost-effective, in terms of personnel and time commitment. The mean frequencies of social functional utterances for Sara, Ahmed, and Rami increased during the intervention phase as compared to the baseline phase as follows: (a) Sara: 3.55, (b) Ahmed: 6.5, and (c) Rami: 4.28. These results are consistent with what was found by Coolican et al. (2010), who examined parents implementing a brief pivotal response treatment for eight preschoolers with ASD to improve their communication skills. The Coolican et al. (2010) study showed that the children's communication skills were improved through the introduction of the parent training. The Coolican et al. study and the current study used the naturalistic home environment, which may have contributed to the improvement in the children's language skills due to familiarity and comfort of both the parent and the child. Furthermore, the current findings were consistent with the results of a study conducted by Koegel et al. (2002), which indicated that interventions implemented in naturalistic environments lead to rapid acquisition, generalization, and spontaneity of targeted social behaviors.

Implications for Future Research

Since parents are essentially the first responders to language and communication skills development issues in their children, they should be regarded as essential in the training efforts on social interaction and language development. Thus, parents should be trained in the most effective techniques for enhancing communication skills acquisition in their children diagnosed with ASD. The current study provided training in an evidence-based intervention for fathers who have children with ASD who also exhibit communication deficits. This study was significant as it is the first study to explore training male parents from Libya in PRT motivational techniques to use with their children with ASD. It was previously unknown if PRT could be implemented in a

fairly male-dominated culture during play sessions and if the parent, once trained, could maintain implementation of the PRT components with fidelity.

The current research study suggests several areas for further research. As Bradshaw et al. (2017) asserted, there are many studies on the use of PRT interventions with children with ASD; however, they noted that these studies have failed to employ standardized language measures after the interventions were introduced. This criticism could not be addressed in the current study because the PRT approach emphasizes utilizing the limited range of verbal responses that a particular child produces and focuses only on those things of interest to the individual child. The focus of the approach makes the use of a standardized measurement extremely difficult.

Another issue raised in the literature is that the PRT approach uses principles and procedures designed to support improvement in key aspects of autism spectrum disorder, including the pivotal areas of motivation, self-initiations, response to multiple cues, and self-management. Future research should be directed to substantiate that changes in these areas are indeed pivotal and that changes in these areas impact other skill areas in the repertoire of children with ASD.

PRT research shows how changes can occur in targeted communication functions (e.g., asking questions). However, the degree to which these changes impact other communicative functions, such as making comments, has not been adequately explored. Therefore, specific procedures should be identified that impact multiple communicative functions and tested for efficiency. For example, R. L. Koegel et al. (2014) employed PRT to teach children with ASD how to initiate questions and as a result demonstrated improvement in their question-asking. This study suggested that the strategies developed all four targeted types of questions (the four “Wh-question” categories). However, as is typical of many of the previous studies, the researchers

included no report of the intervention's impact on other language functions, such as clarifying communications or answering questions.

There is also a need for additional evidence-based PRT approaches that effectively address the larger sphere of ASD symptoms (e.g., language delay, repetitive behaviors). Future research should examine the effectiveness of the PRT approach in improving the overall production and reception of language in young children with ASD (i.e., 2–5 years old) and whether such interventions can assist in producing significant changes in the overall patterns of adaptive behavior. Pivotal response treatment methods have been shown to boost parents' self-efficacy and confidence in supporting their children in both the current study and the Coolican et al. (2010) research. This indicates the need for future research to identify the quality and intensity of parental training to optimize these intervention effects.

Although there have been a number of studies conducted on the effectiveness of the PRT approach for children with ASD whose native language is English, fewer studies have been conducted in this area with children outside of English-speaking countries or with children in such countries whose native language is not English. One of the participants in Al-zayer's (2015) study, which took place in a western U.S. state, was from the Middle East, and the language spoken in the home was Arabic. The study found that the child increased language production in both Arabic and English. Another study, conducted by Mohammadzaheri et al. (2014), examined PRT's effectiveness compared to the findings of using Structured Applied Behavior Analysis. This study involved 30 Iranian children with ASD and was completed in Iran. The findings illustrated that PRT was more efficient than structured ABA approach in improving social and communication skills. These results are encouraging; nevertheless, more research is needed to explore the effectiveness of PRT across a variety of ethnic groups, particularly those whose

native language is not English, and in various cultural settings. Moreover, it should be noted that the limited research with non-native English speakers that exists was found to have achieved promising results. However, no other research studies were found that examined the effectiveness of PRT in improving social and communication skills that involved Libyan father-child pairings.

Limitations of Study

As with any study, limitations should be considered when interpreting the results. Despite the effective outcomes this researcher found in the use of pivotal response treatment motivational techniques implemented by a parent in improving social functional utterances for children with autism spectrum disorder, some limitations need to be identified.

First, this study employed single-case research design across subjects, which is viewed as an effective method for studying low-incidence populations, such as children with ASD (Cakiroglu, 2012). It is cost-effective, provides the opportunity to conduct detailed analysis, and is flexible enough to allow the researcher to monitor intervention progress in naturalistic settings. However, the limitations associated with this design are typically the sampling process that was used. First, the sample size was small due to it being based on the availability of the target population in the region where the study was implemented. The largest Libyan community in the United States is in Colorado. Additionally, not all children with ASD shared the selection criteria conditions posed. Since the sample size was small, there was a limit to the amount of data obtained, which in turn is acknowledged to limit the generalizability of the findings. To identify the largest pool possible, the researcher published a post on the Viber application that Libyans residing in Colorado use to get to know each other. There are many children with ASD in Colorado, however, it was unknown how many would meet the selection criteria established for

this purposeful sampling research. The desired target number of parent/child pairs was three and this number was met for the current study.

Second, the duration of the study and the necessary time commitment were understandably a source of concern for the parents. Specifically, that the intervention phase involved 8 weeks was a deterrent for some, who thought it would be too long and interfere in their lives. For this reason, the decision was made not to conduct further data collection and analysis to establish a generalization phase. The increase in the mean frequencies of social functional utterances, from baseline through the intervention phase, was attributed to the fathers' participation in the training and their implementing the PRT motivational techniques, which was desirable. However, it is unknown whether these improvements in social function utterances would be generalizable to settings other than the naturalistic home environment. It would be useful to follow up on the fathers' assertions that they intend to continue to implement the PRT motivational techniques with their children. Such a study would be beneficial in determining the efficacy of the training regarding parents' ability and/or willingness to continue implementing the methods they had learned.

Finally, although the improvements in SFUs by the three children occurred immediately upon introduction of the PRT motivational techniques, another potential limitation related to an adaptation threat must be considered. For this research study, data were collected in the baseline and intervention phases by video recording. Due to the circumstances created by the COVID-19 pandemic, a family member recorded the baseline and intervention sessions for each participant in the study. It is possible that the fact of that third party – the family member – being present during the sessions, caused the participants (the children and their fathers) to behave differently than they would have had they been alone during the baseline phase for each child. To avoid this

threat, Ledford and Gast (2018) suggest that unfamiliar individuals deal with the participants, especially within the single-case research design.

Conclusion

Although numerous studies have illustrated the significance of language skills in daily life to develop the social function of children with autism spectrum disorder who have deficits in this area (e.g., Chevallier et al., 2012; Henderson et al., 2014; Prévost et al., 2017), more studies are needed to investigate how improvements in communication skills development can be achieved. The PRT approach is a naturalistic behavioral approach that is guided by three primary principles: early and intensive intervention, a naturalistic environment, and parental involvement. It is specially designed to reduce prompt dependency, increase spontaneity, improve motivation, and facilitate generalization (Suhrheinrich, 2015). A core principle of the method is to achieve improvement in pivotal areas of behavior -- motivation, self-initiation, self-management, and ability to attend to multiple cues, which will lead to improvements in other behavioral areas (R. L. Koegel et al., 2001).

The present research study demonstrated an increase in mean frequency of the use of PRT motivational techniques by the fathers who received a brief training and an increase in mean frequency of social functional utterances for all three subject children. The visual inspection of the percentages of non-overlapping data values demonstrated that the intervention used in this research study was highly effective. The significant increase in the mean frequencies of the PRT motivational techniques indicates that all the participating fathers successfully implemented the techniques with fidelity throughout the intervention phase of the research study. In addition, the Parent Social Validity Inventory that was delivered following the intervention found that all three fathers were satisfied with the PRT intervention used and stated that the

intervention was highly effective in improving the social functional utterances of their children with ASD. Their responses to the Inventory also indicated that all three fathers are willing to incorporate the PRT motivational techniques they learned during the study into their daily routines with their children with autism spectrum disorder. The interviews with the fathers suggested that they believed that the PRT motivational techniques utilized in the current research study helped their children with ASD in improving their social communication skills, that their children enjoyed the use of these techniques during the interactive play sessions, and that the techniques helped to develop the fathers' relationships with their children.

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APPENDIX A

EXPEDITED APPROVAL FROM UNIVERSITY
OF NORTHERN COLORADO INSTITUTIONAL
REVIEW BOARD



Date: 04/16/2021

Principal Investigator: Hesham Abda

Committee Action: **Expedited Approval - New Protocol**

Action Date: 04/16/2021

Protocol Number: [2102022627](#)

Protocol Title: Examining the Effectiveness of Brief Parent Training in Pivotal Response Treatment for Young Children with Autism Spectrum Disorder

Expiration Date:

The University of Northern Colorado Institutional Review Board has granted approval for the above referenced protocol. Your protocol was approved under expedited category (7) as outlined below:

Category 7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(2) and (b)(3). This listing refers only to research that is not exempt.)

All research must be conducted in accordance with the procedures outlined in your approved protocol.

If continuing review is required for your research, your project is approved until the expiration date listed above. The investigator will need to submit a request for Continuing Review at least 30 days prior to the expiration date. If the study's approval expires, investigators must stop all research activities immediately (including data analysis) and contact the Office of Research and Sponsored Programs for guidance.

If your study has not been assigned an expiration date, continuing review is not required for your research.

For the duration of the research, the investigator(s) must:



- Submit any change in the research design, investigators, and any new or revised study documents (including consent forms, questionnaires, advertisements, etc.) to the UNC IRB and receive approval before implementing the changes.
- Use only a copy of the UNC IRB approved consent and/or assent forms. The investigator bears the responsibility for obtaining informed consent from all subjects prior to the start of the study procedures.
- Inform the UNC IRB immediately of an Unanticipated Problems involving risks to subjects or others and serious and unexpected adverse events.
- Report all Non-Compliance issues or complaints regarding the project promptly to the UNC IRB.

As principal investigator of this research project, you are responsible to:

- Conduct the research in a manner consistent with the requirements of the IRB and federal regulations 45 CFR 46.
- Obtain informed consent and research privacy authorizations using the currently approved forms and retain all original, signed forms, if applicable.
- Request approval from the IRB prior to implementing any/all modifications.
- Promptly report to the IRB any unanticipated problems involving risks to subjects or others and serious and unexpected adverse events.
- Maintain accurate and complete study records.
- Report all Non-Compliance issues or complaints regarding the project promptly to the IRB.

Please note that all research records must be retained for a minimum of three (3) years after the conclusion of the project. Once your project is complete, please submit the Closing Report Form.

If you have any questions, please contact Nicole Morse, Research Compliance Manager, at 970-351-1910 or nicole.morse@unco.edu. Please include your Protocol Number in all future correspondence. Best of luck with your research!

Sincerely,

A handwritten signature in black ink that reads "Michael D. Aldridge".

Michael Aldridge
IRB Co-Chair, University of Northern Colorado: FWA00000784



Silvia Correa-Torres

Silvia Correa-Torres
IRB Co-Chair, University of Northern Colorado: FWA00000784

2102022627

APPENDIX B
PARENT CONSENT FORM



CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
UNIVERSITY OF NORTHERN COLORADO

Project Title: Examining the Effectiveness of Brief Parent Training in Pivotal Response Treatment for Preschoolers with Autism Spectrum Disorder: A Replication Study

Researcher: Hesham Abda, doctoral student, School of Special Education
Phone Number: (720) 998-7451 E-mail: abda1916@bears.unco.edu

Research Advisor: Francie R. Murry, Professor, School of Special Education
Phone Number: (970) 351-1656 E-mail: francie.murry@unco.edu

Hello, I am a doctoral student at the University of Northern Colorado. Before pursuing my Ph.D. in the United States, I obtained extensive experience in autism spectrum disorder (ASD) by working at the Al-Bayda Center for Autism (ACA) as a rehabilitation and training program supervisor. I was also a practical training supervisor from 2011 to 2014 at the Omar Al-Mukhtar University (OAU), School of Special Education.

I am doing a study for my Ph.D. about parents who use Pivotal Response Treatment (PRT) motivational techniques to improve their children's language skills who have ASD. I am asking you to participate in it.

You will need to commit to 6 hours of training in the techniques provided to you free over the internet. This training will mean you will schedule to meet with me three times a week for 2 weeks for 1 hour each session. I will teach you how to use the PRT with your child. Before the training, I will want to observe and record you and your child in play sessions at your home to see how you and your child communicate. These recorded play sessions will help me know what to include, for example, during the training.

After the training, I will watch you and your child three times a week for eight weeks during play sessions that you will schedule. I will also record these sessions. After eight weeks, I will ask you to meet with me for an interview. You will tell me how you thought you did and if you want any further support from me.

The entire study will take place in your home, so you will not need to travel. The training and research will look at how good it is for parents to work with their children using PRT techniques to improve their communication skills.

I will take every precaution to protect your confidentiality, no part of the study will ask for identifying information (e.g., first or last name, address, the name of your child's school, or/and your town). The video recordings of the sessions will be destroyed after the study is completed.

All video recordings and information collected will be saved on my private computer in a password-protected file during the study.

The potential risks to participating in this research are no more than what you might expect to occur in daily life when discussing your child's needs and language experiences. These discussions may bring up anxiety or negative feelings, but to help minimize any issues, I encourage you to discuss these topics and concerns further with me (the researcher).

Before starting the training sessions, you will be provided with an instructional manual titled, *Teaching First Words to Children with Autism and Communication Delays Using Pivotal Response Training - Arabic Translation* (Koegel et al., 2013). You may get a direct benefit by participating in this study by learning how to use techniques that may help improve your child's communication skills. Also, you can have access to the final study by simply sending me a request. I will happily provide a copy of the work we do together.

There are no costs or compensation associated with participating in this study. The only foreseen cost to you is the time required to participate in the training and the intervention. Your participation is voluntary. After you give your consent, you may decide not to participate in this study at all, and if you agree to participate, you may still choose to stop and withdraw at any time. Your decision will be respected and will not result in any consequences, either personal or professional. After reading the above information, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Nicole Morse at the Office of Research, Kepner Hall, University of Northern Colorado, Greeley, CO, 80639; Ph: 970-351-1910.

I have read the information provided above, and all of my questions have been answered. I voluntarily agree to participate in this research.

Subject's Signature

Date

Researcher's Signature

Date

APPENDIX C

PLAY SESSION DATA RECORDING SHEET

PLAY SESSION DATA RECORDING SHEET

Target Behavior: Social functional utterances

Operational Definition of Behavior: A social functional utterance is operationally defined as including:

- O1 The use of at least normal vocal loudness.
- O2 Vocalizations that appear functional or task-directed and purposeful
- O3 Model prompted
- O4 Inappropriate response
- O5 Initiation
- O6 Indirectly prompted

Social Functional codes

- OO1 Body and facial orientation towards the parent and/or relevant toy/object
- OO2 If the child engaged in disruptive behavior or if the utterance was stereotypic or echoed, during the 10-minute play session code as a non-occurrence
- OO3 No response

The social functional utterance needs to appear to be meaningful to the parent; however, it does not need to be phonetically correct.

Motivational techniques:

Clear Opportunities

- CO1 The parent provides concise commands.
- CO2 The parent provides clear opportunities for language.
- CO3 The parent provides clear instructions to the child.
- CO4 The parent is able to maintain the child's attention either to the task or to themselves while presenting the instructions.

Child Choice

- CC1 The parent provides the child with a choice of two or more alternatives.
- CC2 The parent follows the child's lead in selecting an activity.
- CC3 The parent allows the child to accept or reject an activity.
- CC4 The parent prompts the child to select an activity with an open-ended question.

Contingent

- C1 The parent provides a reward immediately after the child's correct verbal response or attempt.
- C2 The parent does not provide a reward if the child does not respond.
- C3 The parent does not provide a reward if the child responds inappropriately.

Direct and Natural Reinforcers

- NR1 The parent provides a contingent reward that is directly related to the child's expressive verbalizations.

Reinforcer Attempts

- RA1** The parent provides contingent rewards that are delivered following the child's correct verbal responses.
- RA2** The parent provides contingent rewards that are delivered following the child's functional verbal attempts.

Note: If the first technique (i.e., communicative opportunities) is not applied during the session duration, please mark all the following techniques as a non-occurrence.

Example observation sheet**Child:****Date:****Observer:**

Time- 30 seconds		# of Motivational technique used by parent	# of Child Utterance
Start	End		
10:00am	10:30	CO1	01
00:30	10:01	CC1, CO1	00
:01:30	10:02		
:02:30	10:03		
:03:30	10:04		
:04:30	10:05		
:05:30	10:06		
:06:30	10:07		
:07:30	10:08		
:08:30	10:09		
:09:30	10:10		

APPENDIX D
PARENT SOCIAL VALIDITY INVENTORY

PARENT SOCIAL VALIDITY INVENTORY

Please read the items listed below by placing a circle on the response under each question that best indicates how you feel about the treatment.

1. I find this treatment to be an acceptable way of working on my child's language improvement.				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2. I would be willing to use this procedure again to increase my child's language.				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3. I believe it is acceptable to use these techniques without my child's consent.				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4. I like the techniques I learned in the training.				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5. I believe the techniques I used were effective in improving my child's language.				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6. I believe my child enjoyed the techniques I used during the play activities.				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7. I believe these techniques are likely to result in permanent language improvement.				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8. I believe I will continue to use these techniques with my child to improve other behaviors.				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9. Overall, I have a positive reaction to this study.				
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

APPENDIX E
PARENT INTERVIEW QUESTIONS

PARENT INTERVIEW QUESTIONS

1. Do you think the PRT motivational techniques you used helped your child? If yes, in what way?
2. What did you believe were your greatest successes in implementing the PRT motivational techniques?
3. What was most challenging to implement as you were trained to do?
4. Did you feel that your child enjoyed the motivational techniques that were used during the play activities? If so, which ones?
5. Did you see changes in other behaviors outside of the play sessions with your child?
6. Do you think your relationship with your child changed as a result of the play sessions? How so?
7. Describe if and how will you continue to use these techniques with your child? For what reasons will you use them if you will continue?

APPENDIX F

PIVOTAL RESPONSE TREATMENT MOTIVATIONAL
TECHNIQUE TRAINING SESSIONS

TRAINING SESSIONS

First Training Session

Autism Review

- Autism Spectrum Disorder (ASD) appears as a heterogeneous group of neurodevelopmental conditions that are characterized by an early-onset struggle in social communication and remarkably restricted and repetitive patterns of behavior and interests.
- The numbers of children with Autism Spectrum Disorder (ASD) has increased dramatically worldwide.
- It is strongly recommended to use Pivotal Response Treatment (PRT), to improve communication and language skills in children with ASD.

Introduction of Pivotal Response Treatment (PRT)

- PRT is an empirically-validated intervention for infants, toddlers, children, adolescents, and adults with autism spectrum disorder.
- PRT was developed as an extension and evolution of traditional Applied Behavior Analysis (ABA) therapy.
- PRT aims to improve the core symptoms of ASD (e.g., social deficits and language impairment) to help these children reduce challenging behaviors and acquire new skills.

Introduction of Pivotal Response Treatment (PRT)

- PRT emphasizes a family-centered intervention; the family can recognize the child's hobbies and interests and encourage communication in everyday environments.
- By using PRT, practitioners and parents seek to teach children skills to increase their abilities to interact and communicate with others.
- The success of the teaching process relies on engaging the families in the intervention implementation, since they are a critical component of the PRT approach.

How Do I Start?

- The first thing to do is to collect a baseline or, simply put, get an idea of the child's behaviors before you start intervention. There are a few things that you'll want to understand.
- How is your child communicating?
- Does they go to great lengths to do everything independently with no help?
- Does they try and climb up shelves to grab a desired item risking his safety?
- Does they get food all by herself?

How Do I Start?

We will also want to know a bit about the child's behaviors.

- Does they get frustrated easily?
- Does they scream and cry if he doesn't get what he wants?
- Is they aggressive or self-injurious?
- Now, it's important that you don't feel badly if your child has disruptive behavior, remember that a newborn cries for everything- that's the only way they communicate. However, they eventually learn to communicate, so they don't need to cry anymore.

How Do I Start?

- More information is needed
- Does they take your hand and lead you to desired items or activities, like the refrigerator when he's hungry, or the door when she wants to go outside?
- Does they push your hand toward an item they wants? Is they pointing at items yet?

Setting the Stage

- An important thing to remember is that your demeanor should be cheerful.
- Make sure that your facial expressions, tone of voice, and general attitude is positive.
- Remember that this talking stuff is much harder for your child than it is for you and if you come across like you aren't enjoying yourself and are not having fun or are frustrated, you'll risk turning off your child.
- Who wants to talk with an unpleasant person? The relationship that you build with your child is positive and pleasant, so along with the motivational procedures, please make sure that you are a happy and pleasant parent.

Setting the Stage

- Before you start, it's important to remember that PRT is conducted in natural environments.
- You don't need to empty out your basement and seclude your child from other family members.
- You don't need to create a sterile environment free from distractions.
- And, best of all, you don't need to set aside hours to teach your child, you will learn how to provide teaching opportunities in natural surroundings, throughout the day and everywhere your child goes.

Underlying Concepts

- There are a several components of PRT that work together as a package. Each one is integrally important and needs to be implemented in tandem with the others. When you watch PRT being implemented it looks like we are playing with the children and having a great time.

Underlying Concepts

- However, you also have to understand that the components are being implemented systematically and that we have goals that are carefully developed and implemented so that the child will make progress. Below are the basic motivational procedures that are used in PRT:

- ✓ Child Choice
- ✓ Clear Opportunities
- ✓ Contingent
- ✓ Natural Rewards
- ✓ Reward Attempts

APPENDIX G

MULTIPLE STIMULUS WITHOUT REPLACEMENT
PREFERENCE ASSESSMENT FOR FIVE ITEMS

MSWO FOR FIVE ITEMS

Item A: _____

Sum of trial #s for A: _____

Item B: _____

Sum of trial #s for B: _____

Item C: _____

Sum of trial #s for C: _____

Item D: _____

Sum of trial #s for D: _____

Item E: _____

Sum of trial #s for E: _____

Date:		
Child name:		
Teacher name:		
Trial #	Item selected	Placement of item selected
1		
2		
3		
4		
5		

Date:		
Child name:		
Teacher name:		
Trial #	Item selected	Placement of item selected
1		
2		
3		
4		
5		

Date:		
Child name:		
Teacher name:		
Trial #	Item selected	Placement of item selected
1		
2		
3		
4		
5		

Date:		
Child name:		
Teacher name:		
Trial #	Item selected	Placement of item selected
1		
2		
3		
4		
5		

Date:		
Child name:		
Teacher name:		
Trial #	Item selected	Placement of item selected
1		
2		
3		
4		
5		