

IS DOSAGE IMPORTANT? PARENT  
AND CHILD OUTCOMES WITH  
PROJECT IMPACT THERAPY

by

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A THESIS

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## ABSTRACT

The primary purpose of this study was to compare both pre- and post- language and social communication outcomes between two different groups, receiving various dosages of ImPACT (Improving Parents as Communicative Partners) therapy. A secondary objective was to investigate the feasibility of parent adherence to the ImPACT strategies and levels of self-perceived parent competency in implementing the treatment. Parent-mediated therapy has been shown to be a successful form of facilitating social skills and language in children with ASD (Ingersoll, 2012). Specifically, Project ImPACT implemented as an “off the shelf” model has resulted in increased social-engagement and communication as well as decreased parental stress (Ingersoll and Wainer, 2015). Results demonstrated clinically significant gains in social-communication across both groups, particularly in children receiving a higher dose of treatment. Parents also demonstrated increased parental satisfaction. Overall, the study highlights (1) the feasibility of implementing an “off the shelf” approach of the manualized Project ImPACT intervention in a clinic setting, without prior formal training, (2) emphasizes the importance of implementing parent-mediated interventions for the purposes of increasing overall functional communication in children with an ASD.

## DEDICATION

I would like to dedicate this research to all the children diagnosed with an autism spectrum disorder and their families, particularly those children and their parents that participated in the study. May we continue to produce great work to help change the lives of these special children and families.

## LIST OF ABBREVIATIONS AND SYMBOLS

|    |   |
|----|---|
| Df | Degrees of freedom: number of values free to vary after certain   |
| F  | Fisher's F ratio: A ration of two variances   |
| M  | Mean: the sum of a set of measurements divided by the number of measurements in the set   |
| p  | Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value |
| U  | Computed value of Mann Whitney U statistical test   |
| t  | Computed value of t test  |
| <  | Less than   |
| =  | Equal to  |

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# CHAPTER 1

## INTRODUCTION

### **Is Dosage Important? Parent and Child Outcomes with Project ImPACT Therapy**

Early intervention for children with an autism spectrum disorder (ASD) reduces symptomatology and improves developmental and social outcomes. The National Research Council (2001) suggests 25 hours per week of intensive intervention for toddlers with ASD. For many families, quantifying this number of intervention hours can be daunting due to multiple factors including expense and accessibility (Center for Disease Control and Prevention, 2009; Karst & Van Hecke, 2012). Autism costs the United States approximately 126 million dollars per year, with the average cost of a family of a child with an ASD and comorbid intellectual disability being \$2.3 million and \$1.4 million for those who had an ASD but no intellectual disability (Buescher, Knapp, & Mandell, 2014). Often these services are not covered by insurance, requiring families to pay for services out of pocket. The combination of these issues charges researchers to and interventionists to identify more efficient, economical, and qualitative methods of early intervention that may be accessible to all families.

### **Parent Mediated Intervention**

Parenting a child with ASD can impact multiple areas of family functioning in both positive and challenging ways. Parents of children with ASD report decreased confidence in their ability to parent effectively, thus increasing parenting stress (Karst & Van Hecke, 2012). Studies have found a significant difference in the ‘burden of care’ between parents of children with ASD.

Parental stress is more frequently included as an accepted outcome measure for PMI research with findings that indicate a decrease in parental stress when parents are involved in the intervention process (Drew, Baird, Baron-Cohen, Cox, Slonims, Wheelwright, & Charman, 2002 & Ingersoll & Wainer, 2013).

Parent Mediated Intervention (PMI) is a growing platform to deliver effective intervention to young children who have ASD. By definition, PMIs are technique-focused interventions where the parent is the agent of change and the child is the direct beneficiary of treatment (Bearss, Burrell, Stewart, & Scahill, 2015). As the name implies, the parents are the mediators of the intervention. PMIs differ from more general parent support approaches, in which the child is the indirect beneficiary (Bearss, Burrell, Stewart, & Scahill, 2015). Findings from a growing body of literature have demonstrated the effectiveness and significance of a parent-training component with early intervention of children with an ASD (Brookman-Fraze, Vismara, Drahot, Stahmer, Opendent, 2009). Studies suggest that parent training promotes generalization of skills learned, meaning that parents are able to help facilitate the continuation of learned skills with a therapist at home and in other natural settings (Ingersoll and Dvortcsak, 2009; Koegel, Schreibman, Britten, Burke, & O'Neill, 1982; Siller, Hutman, and Sigman, 2013, & Siller and Sigman, 2002).

Much of the parent training literature for children with an ASD focuses on teaching children verbal language. However, there has been a steady increase in research investigating the relationship between non-verbal communication (i.e. joint attention, imitation, pretend play) and play and the increase in development of functional language. Most recent parent-mediated interventions are either behavioral or developmental; however, Project ImPACT is a combination of both styles of parent-mediated treatment. A lot of children tend to have more connections with

their parents and parents administering the actual intervention throughout naturalistic daily activities can lead to more gains in skills over time (Koegel et al., 1982). Typical development is used as a guide to increase social communication in children with ASD, as children with ASD exhibit similar developmental trajectories as children with TD, but at a slower rate (Morgan, Cutrer, Coplin and Rodrigue, 1989). By teaching naturalistic play-based strategies (e.g. following a child's lead, modeling simple language, imitation, engaging in turn-taking activities, etc), children are taught the foundation for communication comparable to children with typical development (Gerber, 2003). Therefore, typical development is used for a guide to choosing goals for a child with ASD. A study conducted by Ingersoll and Gergans (2007) investigated the effectiveness of Reciprocal Imitation Training (RIT) intervention with parents and children with autism. RIT is a naturalistic play-based therapy that focuses on the parents actually imitating the play of their child. Research suggests that teaching object and gestural imitation to children is effective (Ingersoll & Schreibman, 2004). Kasari, Paparella, Freeman, and Jahromi (2008) found greater expressive language gains in children who received naturalistic intervention with a focus on joint attention and/or symbolic play, suggesting that teaching developmentally appropriate social skills leads to increased social communication. Since RIT appears to be a very naturalistic and successful intervention for teaching natural forms of social-communication, it seems reasonable to believe that training parents to utilize these teaching strategies with their young children would be effective in facilitating social communication.

### **Project ImPACT**

Research strongly suggests that children learn and develop language and social communication during play activities but also during parent play interactions. Dosage and the content of the therapy can play a major role in the quality of the intervention administered.

Project ImPACT Intervention, an intervention developed by Ingersoll and Dvortcsak (2009), was developed as a social communicative intervention called *Improving Parents As Communication Teachers* (i.e., Project ImPACT). This intervention for children with ASD focuses on four core skills to increase in children: 1) language, 2) social engagement, 3) social imitation and 4) play. The parents of the children with an ASD are taught both interactive, child directed strategies and direct strategies in which the clinician and parent builds on what the child has contributed, prompting more sophisticated social overtures and use of language. The interactive technique (developmental) includes increasing initiation and engagement of the child by putting them in a highly stimulating play environment, providing various toys and opportunities for them to engage. The direct (behavioral) techniques involve the clinician and parent building on these interactions and prompting/teaching new strategies and behaviors. Current research and previous findings of parents implementing interactive and direct teaching techniques suggest that Project ImPACT therapy helps increase language development and use, social communication, play skills and imitation in children with ASD (Ingersoll & Dvortcsak, 2009). Children who receive Project ImPACT intervention demonstrate increased spontaneous language use (Ingersoll & Wainer, 2013), decreased social impairments (Ingersoll & Wainer, 2011) and increased social engagement (Pierucci, 2013). Parents demonstrate adherence to Project ImPACT strategies (Ingersoll & Wainer, 2011, 2013, Pierucci, 2013; & Stadnick, Stahmer, Brookman, & Frazee et al., 2015), thus indicating greater likelihood of achieving recommended dosage (NRC, 2011) and improving their sense of parenting efficacy, a critical component to child and parent outcomes (Karst et al., 2012). A recent pilot study investigated social-communicative outcome differences between children enrolled in Project ImPACT intervention compared to children in community-based intervention. Results found that the parent-mediated intervention demonstrated significant

changes in social-communication compared to the community treatment group. Secondary findings also revealed Project ImPACT increased parent efficacy in implementing intervention strategies and also decreased parental stress (Stadnick, et al., 2015).

### **A Brief History of Early Intervention**

Children with ASD have language, communication, and social skill impairments with the presence of repetitive and ritualistic behavior (Diagnostic Statistical Manual-V; American Psychological Association, 2013) that interfere in a variety of developmental contexts including development of social skills, social communication, play, and functional language development. Because children with an ASD do not develop natural play and social skills in the same way as children with typical development (TD), they also do not learn language in the same way. Typically, language skills develop within a social context where reciprocal, balanced verbal and nonverbal language is exchanged (Mundy, Sigman, Ungerer & Sherman, 1987). Research has proven that children learn language and social skills best when in a natural environment and with parental support, therefore, this should be the standard for intervention curriculums for children with an ASD (Vismari, Columbi, & Rogers, 2009). Currently, studies support that if we can teach children with ASD to engage in play and social activities, then we can help facilitate language. As play and engagement are the stepping-stones for developing communication (Santos, Garotti, Ribeiro, and Bosa, 2015). Research has shown that play and language development ultimately influence each other (Stanley & Konstantareas, 2007). Therefore, it could be assumed that children with impairments in social communication would require interventions that focus on facilitating not only words, but social communication and play skills to help increase the use of functional language within functional environments with primary communication partners.

The diagnosis of an ASD has increased by 800% in the United States since 1992. With the steady increase in early identification of autism, so is the concern for early intervention services, types of services and dosage amounts for the population (Individuals with Disabilities Education Act, 1990). However, there has not been one specific type of therapy that has proven to be more beneficial, overall, than another. Some research suggests that applied behavior analysis is the more effective treatment for some children, reporting that 47% of children enrolled in their in-home structured program will eventually mainstream into a general education setting, specifically with a one-to-one Discrete Trial Training approach (Lovaas, 1987; McEachin, Smith, & Lovaas, 1993). There are also other types of therapy, not behavioral, that have demonstrated benefits to treatment. A functional, comprehensive technique in North Carolina called Treatment and Education of Autistic and related Communication handicapped Children (TEACCH) uses a structured environment and strategies to facilitate functional language and social-communication for play, implementing strategies such as visual cueing, picture exchange and schedules. This program has proven to be successful in facilitating language and play skills (Ozonoff & Cathcart, 1998; Schopler, Mesibov, & Baker, 1982). A more child directed and developmental model, Floor Time, has also shown some promising results (Greenspan & Wieder, 1997). However, other researchers have shown that a more naturalistic in-home programming, such as Pivotal Response Training (PRT) and Floor Time therapy, help increase social communication and socio-dramatic play skills, ultimately helping increase language development (Ingersoll, 2010). A study conducted by Coolican and colleagues (2010) suggests that an adapted PRT program incorporating parent training proved successful in treatment outcomes for children with an ASD. The purpose of this study was to measure the effects of parent training due to long waitlists and daunting intervention recommendations that are often

hard to obtain. Eight preschoolers with autism and their parents participated in the study. A multiple baseline design was used, in which parents were seen individually for three 2-hour training sessions on PRT. Child and parent outcomes were assessed before, immediately after, and 2 to 4 months following training. The outcomes were measured using standardized tests, checklists and behavior coding through videos. Results demonstrated that the children's functional communication skills significantly increased as a result of the training. Parents' fidelity in implementing PRT techniques also improved after training and demonstrated maintenance of skills during follow-up. A significant relationship was found between parents' increased ability to implement PRT techniques and improvement in the children's communication skills. Other studies also suggest that involving a parent training component to the PRT intervention increased the child's language production (Stahmer, 1995; Thorp, Stahmer, & Schreibman, 1995). Of this group, there were five children with no functional communication prior to the treatment that were able to increase their development of language by 50%. This could be due to the generalization of the skills in the home environment as a result of not only the direct intervention from the therapist, but also the parent-training component. Although the efficacy of these treatments has been established, research suggests that these treatments have not been completely translated into Community Early Intervention (Stahmer & Schreibman, 1995) services that these interventions all seem to have demonstrated to be safe and effective, the amount of intervention a child with autism will receive is also crucial to the development of language and social skills. Parent mediated interventions could ultimately help facilitate the generalization of therapy techniques across a variety of natural settings, potentially allowing for more development of functional social skills and communication. (Ingersoll, 2012).



## **Intervention Dosage**

In determining the appropriate intervention for a child, a number of factors should be considered including the content, dose, method, and timing, all of which contribute to developmental outcomes (Kasari , Freeman, Paparella, Wong, Kwon, & Gulsrud, 2005).

Undoubtedly, most comparative early intervention research has focused on content (what is being taught) and method (how the content is being taught), with limited research focusing on the effects of dose of the same intervention on language/social outcomes.

The typical amount of early intervention provided in the state of Alabama is approximately 30 minutes a week or less (Alabama Autism Collaborative Group, 2008). Typically, community intervention services are not based on a specific intervention curriculum, such as applied behavior analysis, parent training, etc. Therefore, it is safe to assume that the intervention provided is essentially a culmination of various methods. Research examining the translation of behavioral and educational research into community EI programs (i.e., IDEA, Part C, providers for children 0–3 years of age and school districts for children 3–5 years of age served by Part B of IDEA) is limited. Few to no effectiveness trials for EI treatments in ASD have been conducted (Lord et al., in press).

Based on the experience of limited dissemination of evidence-based practices in other service setting (Weisz, Weiss, Hans, Granger,1995; Weisz, Weiss, Donenberg, 1992), it is hypothesized that community EI programs use a variety of interventions. Some of these interventions vary not only in dosage, but in quality and intensity and are often not based on empirical research data. Due to increasing numbers of young children with autism, and the CDC recommendation of 25 hours of intensive therapy a week for children with autism, parents are struggling to find services that provide not only evidence based best practice, but also

interventions including parent training that can be generalized at home, hence increasing the overall dosage as recommended.

There are various components to an intervention that make them successful in various populations. However, the dosage, or amount of intervention given, is potentially one of the most meaningful. The first sign of this pertinent ingredient was the recommendation of 25 hours of weekly intervention for children with an ASD. Dose is the most studied aspect of intervention. One of the most influential studies, as conducted by Lovaas (1987), compared treatment outcomes of children that received 40 hours a week of intervention to those that only received ten hour each week. The children that received the higher dosage of intervention had better outcomes, being placed in regular schools and testing within normal ranges cognitively. Other replicated studies found that outcomes were less promising when the children were more impaired (Smith, et al. 2000). This data suggests that although dosage is an important component to intervention, it may depend on the characteristics and symptomatology of the child as well as the types of intervention the child is receiving. Various core deficits in children with autism, such as joint attention, imitation, and play skills, are the basis of the reason why children with autism also have deficits in the communication (Charman, 2003). These core deficits also carry-over into atypicalities in forming social relationships. Another, primary component of early intervention is that of content of the intervention.

### **Purpose**

The primary purpose of this study is to compare both pre- and post- language and social communication outcomes between two different groups, receiving various dosages of ImPACT therapy. The study will also investigate the feasibility of parent adherence to the ImPACT strategies and levels of self-perceived parent competency in implementing the treatment. Some

research suggests that parent mediated, naturalistic approaches help facilitate language at a more successful rate than more traditional approaches (Roberts, J., et al 2011). Parent-mediated therapy has been shown to be a successful form of facilitating social skills and language in children with ASD (Ingersoll, 2012). However, many young children with ASD receive community-based interventions, which do not typically use the intensive manualized interventions for children with ASD found effective in research (Hume, Bellini, & Pratt, 2005; Shattuck & Grosse, 2007; Stahmer, Collings, & Palinkas, 2005). According to the National Research Council, the inclusion of parent training on early intervention and parent mediated interventions are crucial components to aiding children with autism spectrum disorders (NRC, 2001). Very few studies have examined dosage of parent-mediated therapy in children with an ASD. Past research suggests that equipping parents with intervention techniques can facilitate appropriate skill development and assist with generalizing skills in children with ASD while simultaneously decreasing costs and burdens for families. Therefore, we hypothesize that greater social communication skills will be observed in children who receive a higher dosage of Project ImPACT. Specifically the following aims will be addressed:

- 1) Compare social communication skills among groups who received Project ImPACT intervention delivered one hour per week vs 2 hours per week.

*It is predicted that children's social skills will be higher in Group 1 than Group 2.*

*That is, higher dose will result in better social communication skills.*

- 2) Compare social communication outcomes of Project ImPACT intervention groups to treatment as usual, community based Early Intervention group.

*It is predicted that social communication outcomes will be higher in the intervention groups than the treatment as usual group.*

3) Investigate developmental level and social-communication, pre- and post- Project ImPACT intervention.

*It is predicted that gains will be observed in both developmental and social communication skills from pre- to post- intervention.*

4) Assess parent sense of confidence toward interacting with their children pre- and post- Project ImPACT intervention.

*We predict that more opportunities with parent coaching would help give parents more sense of competency in their parenting as well implementing taught strategies.*

5) Measure parent and clinician fidelity while implementing Project ImPACT strategies with their child.

*We predict that both parents and clinicians will adhere to the Project ImPACT model.*

## **CHAPTER 2**

### **METHODS AND PROCEDURES**

#### **Methods**

##### **Participants**

Eight children diagnosed with an autism spectrum disorder (ASD) were recruited from a university-based Autism Spectrum Disorders Clinic and university-based Speech and Hearing Center. Autism diagnoses were made using a comprehensive evaluation by a multidisciplinary team including a speech language pathologist, clinical psychologist, and a pediatrician. To be included in this study the following criteria were required: (1) diagnosed with ASD, (2) having moderate autism symptoms (i.e., not severe symptoms as measured by the Childhood Autism Rating Scale – Second Edition), (3) having/had minimal (not exceeding one hour per week) or no intervention services prior to commencement, for the group participation in the ImPACT therapy intervention protocol. (i.e., measured using ASD clinic evaluation form). A control group was also recruited that followed the same inclusion criteria; however, they were only receiving early intervention services from the state-wide Early Intervention protocol. See Table 1 for participant demographic and descriptive information.

##### **Measures**

**Parent intake and outcome measures.** Pre-intervention, the parents of children with ASD completed a Child Interest Survey in order to determine individual preferences for therapy materials (toys, activities) The Child Interest Survey is included in Appendix A.

Primary caregivers also completed the *MacArthur Bates Communicative Development Inventories* (MCDI; Fenson et al., 2007) to measure receptive and expressive vocabulary pre- and post- intervention. The MCDI contains two forms: the Words and Gestures form, designed for use with children that have language skills between the ages of 8 and 16 months, and the Words and Sentences form, designed for the use with children that have language skills between 16 and 30 months. Both the MSEL and the MCDI are frequently used by researchers to characterize children's language (Adamson et al., 2013; Luyster et al., 2008). In addition, the MSEL has strong test/re-test reliability for children between 25 and 56 months (Mullen) and the MCDI has excellent validity and reliability for children with autism (Charman et al., 2003).

Parents completed the *Parenting Sense of Competence* (PSOC; Gibaud-Wallston & Wandersman, 1978) scale to assess their feelings of competence implementing intervention strategies, both pre- and post- intervention. It measured satisfaction in two dimensions, satisfaction and efficacy, specifically investigating parental anxiety, motivation, frustration and problem-solving abilities (Ohan, Leung, & Johnston, 2000).

Finally, parents completed the *Social-Communication Checklist* (Ingersoll and Dvortcsak, 2009), which is designed to measure the child's social communication and play skills. This checklist is part of the ImPACT data collection curriculum, in order to help determine progress of intervention (Ingersoll & Dvortcsak, 2010). The SCC includes 47 questions, assessing the child's behavior across 6 different domains. Mother's indicated whether their children engaged in these behaviors with the following responses: 1) not observed 2) rarely/not yet, 3) sometimes, and 4) usually. Higher scores are preferred, as to demonstrate that children are usually displaying the assessed behaviors.

Parents and the lead clinician cooperatively completed a Goal Development Form prior to

implementation of intervention. This form focused on developing appropriate goals for each child based on the four core components of the Project ImPACT curriculum: social engagement, language, social imitation and play (Ingersoll and Dvortcsak, 2009). The form focused on developing a goal for each domain of the intervention protocol (e.g. social engagement, social imitation, language, and play). After pre-testing scores and checklists were completed, clinicians and the parents used the information to develop appropriate goals for each domain, using the developmental form.

**Child measures.** A research assistant administered the *Mullen Scales of Early Learning* (MSEL; Mullen, 1995) to assess language and developmental skills pre- and post- intervention. The MSEL is an assessment of developmental functioning for children from birth to 5 years 8 months with 5 subtests: gross and fine motor skills, visual reception, and receptive and expressive language (Luyster et al., 2008).

Clinicians also completed the *Social Communication Checklist*, pre- and post-intervention, to assess changes in the child's social-communication domains (Ingersoll and Dvortcsak, 2009).

## **Procedure**

### **Intervention Delivery**

Delivery of intervention can be described as an “off the shelf” delivery protocol in that interventionists did not receive formal training in Project ImPACT. Specifically, graduate clinicians, with the supervision of trained speech language pathologists, delivered the intervention to the children and provided coaching, with no previous ImPACT intervention training. Weekly, clinicians learned strategies to implement to both the children and for coaching the parents. The primary researcher led the parents through the Project ImPACT protocol while their children interacted with the graduate clinicians.

Participants were assigned to an intervention group based on availability. Group 1 received Project ImPACT two hours per week and Group 2 received the intervention 1 hour per week. After pre-testing and goal selections were completed, the parent-mediated ImPACT intervention sessions commenced. The intervention sessions lasted for 1 hour, twice a week for 12 weeks for Group 1. The sessions lasted 1 hour, 1 time a week for Group 2. See Table 2 for a breakdown of sessions by group. The intervention was approved by the institutional review board and took place at the UA Speech and Hearing Center, functioning as a graduate clinician directed language intervention that occurs at the clinic on a daily basis. We chose this type of intervention delivery to observe the feasibility of continued implementation of ImPACT therapy within a clinical structure, thus increasing the likelihood for replication and sustainability. This specific implementation was used to observe the feasibility of continued implementation of ImPACT therapy within a clinical structure specific to student training. That is, the length, intervention approach, frequency of sessions per week, materials, and basic intervention structure are comparable to the treatment as usual language programs at the Speech and Hearing Center. During the initial meeting with parents, and before pre-testing occurred, the parent signed a consent form that outlined the purpose, procedures, and potential risks and benefits. Table 2 below illustrates group measures.

Table 2

| <b><i>Group Descriptives</i></b> |                      |                      |                                |
|----------------------------------|----------------------|----------------------|--------------------------------|
| <b>Group:</b>                    | <b>Group 1 (n=3)</b> | <b>Group 2 (n=3)</b> | <b>Group 3 (Control) (n=2)</b> |
| Hours per Week:                  | 2 hours              | 1 hour               | 0                              |
| Individual Parent Coaching:      | 1 hour; 15 minutes   | 15-20 minutes        | 0                              |
| Pre-Testing                      | MSEL, MCDI, CARS-II  | MSEL, MCDI, CARS-II  | MSEL, CARS-II                  |
| Post-Testing                     | MSEL, MCDI           | MSEL, MCDI           | MSEL, MCDI                     |



## **Setting and Materials**

Intervention was delivered in the pediatric wing of the UA Speech and Hearing Center. The investigator set up the intervention room based upon the child's motivation and the particular goals directed per the IMPACT intervention schedule. Targets were chosen based upon the IMPACT therapy manual goals, parent report and concerns, and child's developmental skills. The graduate clinician assigned to the child spent each session playing along with child's preferred toys and implementing the newly learned intervention strategy. Simultaneously, the parents received direct training on the actual IMPACT therapy by the lead researcher. The direct intervention given to the child was based on the interactive and direct teaching techniques.

## **Impact Intervention Strategies**

Project ImpACT therapy uses an interactive, child directed intervention technique and a more direct technique involving the clinician and parent. The interactive techniques include highly stimulating play environment, providing the child with various opportunities to engage with the clinician and caregivers. The direct techniques involve more of the clinician and caregiver prompting the child for more sophisticated overtures, teaching new strategies, and modeling appropriate play. See Table 3 for the intervention schedule.

Table 3

*Project ImPACT Weekly Strategies*

|            |                                 |
|------------|---------------------------------|
| Session 1  | Follow Child's Lead             |
| Session 2  | Imitation/Animation             |
| Session 3  | Modeling and Expanding Language |
| Session 4  | Playful Obstruction             |
| Session 5  | Balanced Turn-Taking            |
| Session 6  | Communicative Temptations       |
| Session 7  | Social Imitation                |
| Session 8  | Teaching Play Skills            |
| Session 9  | Teaching Expressive Language    |
| Session 10 | Teaching Receptive Language     |

The first language strategy is child directed or interactive. For example, the parent and clinician should provide the child with an opportunity to respond to cues and initiate without having to do so in a specific way. Some techniques include: following the child's lead, creating an opportunity for the child to engage or to communicate, wait for the child to engage or communicate, and respond to the child's behavior as meaningful, comply with it and *model* a more complex

response. For example, the child should acknowledge the therapist in some way (e.g. eye contact, vocalization, gesture, facial expression), causing the therapist to then respond in a more complex way, prompting the increase of social interaction. For example, Sammy is playing with two cars. Dad drives his car in front of Sammy's to block Sammy's car. Sammy pushes Dad's car away. Dad then moves his car away by saying "move!".

The second strategy is the direct or behavioral technique. These techniques are meant to actually build on the child's interaction by prompting or teaching new skills that facilitate social communication. These techniques include the following: follow the child's lead, Create an opportunity for the child to communicate, Wait for the child to communicate, Prompt the child to use more complex language, imitation or play, Give a more supportive prompt if needed, Reinforce and expand on the child's response. The point of these techniques is to try to teach a new skill by adding on to the child's baseline skill demonstrated. For example, Sammy is playing with two toy cars. Dad drives his car in front of Sammy's to block it. Sammy pushes Dad's car away, so Dad immediately prompts Sammy to say, "move", dad moves his car and then says "move car".

### **Project ImPACT Interventionists**

Six graduate student clinicians served as interventionists, along with the lead researcher who coached the parent groups. Clinicians varied in prior experience with children with an ASD; however, all clinicians had some experience with children who had developmental disabilities. Clinicians were randomly assigned to children and were supervised by a trained speech language pathologist at the UA Speech and Hearing Center. Clinicians interacted with the children while their parents participated in the group ImPACT sessions with the lead clinician.

Clinicians participated in weekly trainings on specific ImPACT strategies, from both the

speech language pathologist and lead graduate clinician. Prior to weekly sessions, the clinicians met with the lead graduate clinician to reinforce the use of specific strategies and review the main points of the intervention protocol relative to each child's goals.

### **Treatment Fidelity/Adherence**

Fidelity was measured at multiple levels including group sessions, parent coaching, and clinician implementation. Fidelity sheets were completed by the supervising speech language pathologists on each graduate clinician. Also, four trained video coders used the same fidelity checklists to code fidelity of procedures with both clinicians and parents. Two coders were assigned to code clinician fidelity, using the specific clinician fidelity checklist provided by the ImPACT manual. The other two coders were responsible for coding fidelity of procedures for the parents participating. The ImPACT manual also provided a specific coding sheet for parent and group leader adherence to procedures. Each coder watched and coded every session, a total of 42 videos. The lead researcher implemented a systematic way to code behaviors in order to determine reliability. The lead researcher watched 5-7 videos with the coders, coding and comparing results, in order to earn fidelity. Meetings were held weekly, with lead researcher and coders reviewing coding sheets until inter-rater reliability was achieved. Inter-rater reliability was calculated based on percent agreement. Reliability with the lead graduate clinician and parent coach was also conducted based on percent-agreement. There was 85% percentage agreement with lead graduate clinician on both clinician and parent fidelity.

Parent use of ImPACT strategies with their children was measured from video recorded sessions and rated on a scale of 1 (not implemented during session) to 5 (parent implemented during the session). A rating of 4 or above (80%) was considered implementing the strategy with fidelity (Ingersoll & Wainer, 2013). In group 1, Parent A's average fidelity was 77 %; Parent B:

85 %; and Parent C: 55 %. In group 2, Parent D's average fidelity was: 52 %; Parent E: 56 %; and Parent F: 56 %. Overall, parents in group 1 demonstrated higher fidelity with more consistent gains over time than Parents in group 2.

#### Clinician fidelity

Clinician use of ImPACT strategies was also measured from video recorded sessions and rated on a scale of 2 (observed during the session) to 0 (not observed) across 14 behaviors. In Group 1, Clinician A's average fidelity was 69 %; Clinician B: 59 %; and Clinician C: 54 %. In Group 2, Clinician D's average fidelity: 45 %; Clinician E: 41 %; and Clinician F: 71% It is important to note that opportunities to demonstrate rated behaviors varied across session and child so these fidelity ratings should be cautiously interpreted.

## CHAPTER 3

### RESULTS

First social communication skills were compared among groups (one hour per week vs. 2 hours per week). It was predicted that the children whom received two hours per week of therapy, with one of those hours dedicated to more intensive individual coaching with parents and children, would demonstrate better social outcomes than those receiving intervention only 1 hour per week. We also investigated overall social-communicative outcomes of the Project ImPACT intervention from pre-intervention to post-intervention with both groups combined. We used the Social Communication Checklist (SCC) completed by clinicians pre-and post-intervention to measure changes in outcomes from baseline to the last week of therapy. It should be noted that floor effects could play a role in the results of the analysis, as the SCC is measured on a 0-4 point scale. Data analysis was completed using a Mann-Whitney U test and Repeated Measures ANOVAs. These statistical analysis procedures were chosen because of sample size and because we met assumptions of the Mann-Whitney U and Repeated Measures ANOVA analyses (e.g. non-normal distributions, one independent variable that consists of two categorical or independent group). Mann-Whitney U test to analyze differences in central tendencies means between the groups was conducted and revealed no clinically significant differences in social engagement, ( $U= 5.50$   $p=1.0$ ), language ( $U= 4.00$ ,  $p=1.0$ ), and social imitation ( $U=3.50$ ,  $p=1.0$ ) domains of the SCC between groups. Although there were no statistically significant differences

between groups, clinically significant differences observed which will be discussed later.

To further investigate the outcomes between groups, repeated measures ANOVAs were conducted to compare the Project ImPACT dose on social communication outcomes, using the scores from the Social Communication Checklist (SCC). Again, no clinically significant changes were found between the groups from baseline to post-intervention on total SCC outcome scores, Wilks' Lambda=.190,  $F(1,1) = 10.57$ ,  $p = .19$ . A repeated measures ANOVA was conducted to investigate group differences in all social-communication domains within the Social Communication Checklist (social engagement, language, social imitation and play). No significant differences were found in social engagement mean scores between group 1 and group 2, Wilks' Lambda = .341,  $F(1,1) = 1.94$ ,  $p = .40$ . However, significant differences were found between the two groups in the language domain, Wilks' Lambda = .005,  $F(1,1) = 186.78$ ,  $p = .046$ . When measuring differences between groups on imitation/play, no significant differences were found, although significance was approached, Wilks' Lambda = .011,  $F(1,1) = 86.22$ ,  $p = .068$ . Group 3 findings were reported but not compared to other groups due to difficulties with recruitment.

When investigating differences in social-communication from pre-intervention to post-intervention implementation with both groups combined, statistically significant results were found in language outcomes. However, it should be noted that almost all domains of social-communication investigated were approaching significance. Data analysis was completed using a Mann-Whitney U test and Repeated Measures ANOVAs. Mann-Whitney U test to analyze differences in central tendencies means between the groups was conducted and revealed no clinically significant differences from pre-intervention to post-intervention in social engagement, ( $U = .446$   $p = .055$ ), although these social-engagement differences were closely approaching

significance, language ( $U=.786, p=.008$ ), and social imitation ( $U=.467, p=.063$ ), domains of the SCC. Language outcomes were significantly better from pre-intervention to post-intervention when using the Project ImPACT therapy model with children 1 hour per week and 2 hours per week. The language differences from pre-intervention to post-intervention also nicely correlate with differences of MCDI vocabulary words produced from pre-intervention to post-intervention among both groups combined. A Wilks' Lambda analysis found that differences were almost significant ( $U=.434, p=.051$ ).

Visual analysis revealed that children in Group 1 demonstrated increased social engagement, language, and social imitation from baseline to the completion of intervention, with Group 1 demonstrating a greater increase in social engagement than Group 2. Social imitation skills in both groups increased from baseline. The overall SCC means, across all three domains, demonstrate a larger increase across all domains within Group 1. See Table 2 for SCC Means for both Groups.

Overall gains were observed for all children and were observed as follows. Visual analyses of child performance are provided in Figures 1-6.

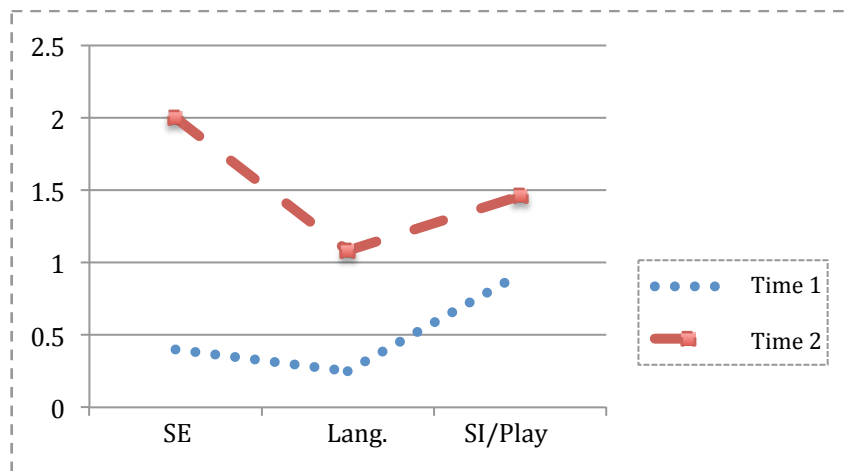
## **Group 1**

### **Child A.**

Child A is an African American male, with a CARS-II rating of 42, placing him in the Moderate-Severe ASD category. Both his mother and father accompanied him to intervention sessions. Before intervention, he was not using words, engaging in play activities with his parents or peers, consistently using eye contact, or sharing attention in activities. Child A scored very low on all domains on the Social Communication Scale in both clinician and parent report. Following the 12-week intervention, 2 hours per week, Child A increased his social engagement



skills in a clinically observable way. Child A also increased his language skills. At baseline, Child A was not making eye contact, using gestures to communicate, using words or gestures to request/protest, or even reaching and giving to request or share enjoyment. However, post-intervention, Child A had developed 8 functional words and was consistently using gestures/signs paired with eye contact to communicate. Finally, he demonstrated a clinically significant increase in social imitation as observed and rated by clinicians and parents. Child A also increased his social imitation and play skills. At baseline, Child A was not engaging in any play activities, pretend play or imitation. However, following treatment, he had invariably developed these skills.

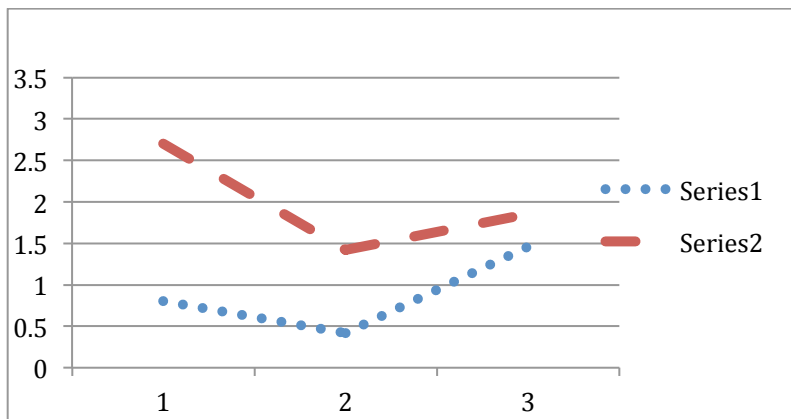


*Figure 1.* Child A Pre- and Post- SCC Outcomes. This figure illustrates outcome variables in all four domains of the SCC (social engagement, language, and social imitation/play), given both pre-intervention (Time 1) and Post-intervention (Time 2).

**Child B.**

Child B is a Caucasian male, who was accompanied to therapy by his mother. Child B received a CARS score of 45, placing him in the Moderate-Severe ASD category. He also has an older sibling with a diagnosis of ASD. At baseline, Child B could be described as hyperactive

and emotionally dis-regulated. He was not consistently using words, eye contact, or gestures to communicate. He would not engage in activities for longer than 5 minutes with a partner. However, post-treatment, Child B increased his overall social engagement, engaging in activities with his caregiver, increasing eye contact, and participating in turn-taking games. He also increased his overall functional language, gaining 10 new words in 12 weeks. Interestingly, Child 2 did not show a clinical increase in social imitation and play. Child B’s mother required more flexibility and encouragement to consistently implement strategies. Child B also demonstrated variable emotional states, with some sessions taking considerable amount of time to help with regulation. Child B has the least noted gains compared to other children in Group 1.

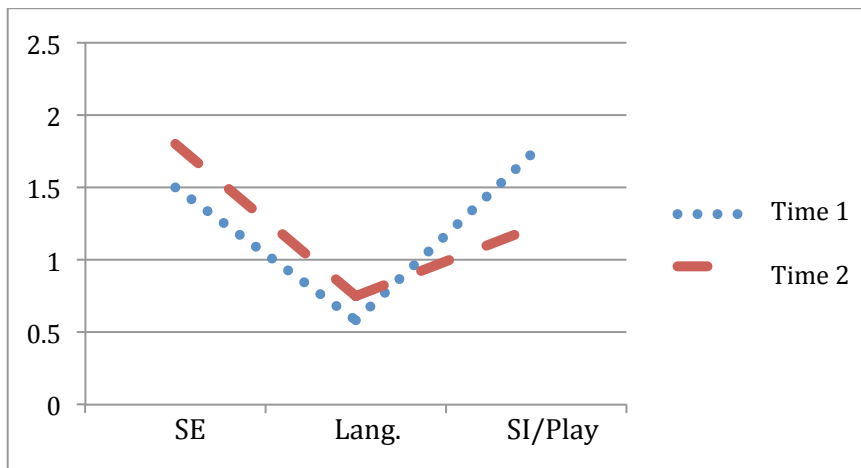


*Figure 2.* Child B Pre- and Post- SCC Outcomes. The above figure illustrates the pre-and post outcome measures of the domains in the SCC from time 1 (pre-intervention) to time 2 (post-intervention).

**Child C.**

Child C is a Caucasian male, who was accompanied to therapy by his mother. He scored a 36.5 on the CARS, placing him in the Moderate ASD severity group. Child C demonstrated clinically significant gains across all social-communication domains measured. At Baseline,

Child C was inconsistently using eye contact, engaging in social play and turn-taking activities. He would rarely share enjoyment with others and often preferred to play alone, not even attending to others in his play area. Following intervention, Child C demonstrated clinically significant gains in all domains of social-communication measured. He showed the greatest gains in the domain of social engagement, a key foundation for language development and social-communication. At baseline, Child C rarely interacted with others, often not using eye contact, joint attention, or sharing enjoying. Following the intervention, Child C was engaging with others in majority of activities presented. He increased shared enjoyment in activities and initiation of interactions. Child C increased his use of functional language, using up to 104 words. Child C also increased his social imitation and play skills. Post-treatment, Child C was participating in some pretend play and demonstrating vocal and action imitations.



*Figure 3.* Child C Outcomes Pre- and Post-Intervention on SCC. The figure demonstrates outcomes across the four domains in the SCC (Social Engagement, Language and Social Imitation/Play) from pre-intervention (Time 1) to post-intervention (Time 2).

## Group 2

### Child D.

Child D is a Caucasian male, accompanied to therapy for 1 hour per week by his mother.

He scored a 30 on the CARS, placing him in the Mild-Moderate ASD severity group. Child D is one of the higher functioning children in the group. At baseline, Child D demonstrated some social engagement, using some eye contact and frequently vocalizing to request/protest. He also engaged in some joint activities; however, he often did not engage in turn-taking activities. He preferred to play alone and often did not initiate activities with others. He did demonstrate single words and some two-word phrases for communication. However, he was limited in his use of non-verbal communication/gestures. Following treatment, Child D increased his social engagement, although not quite as much as other children based on observation. This could be because he already was demonstrating more sophisticated social-communication. However, Child D did show clinical changes in his language. Post-treatment, he consistently used two-word phrases and short sentences, making his language more functional compared to other children his age. Child D also increased his social imitation/play skills. He interacted more with people, participating in pretend play and increased imitation. Overall, due to some challenges with attendance as well as an older sibling with ASD, there was still an increase in social-communication.

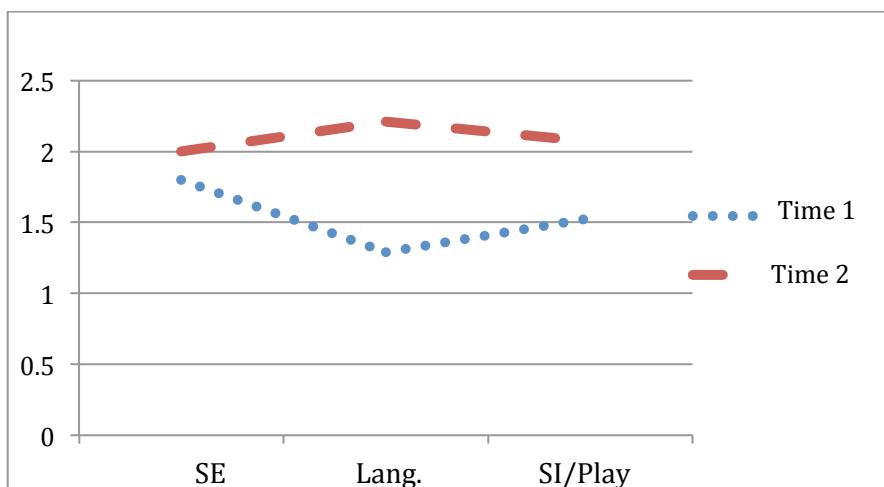
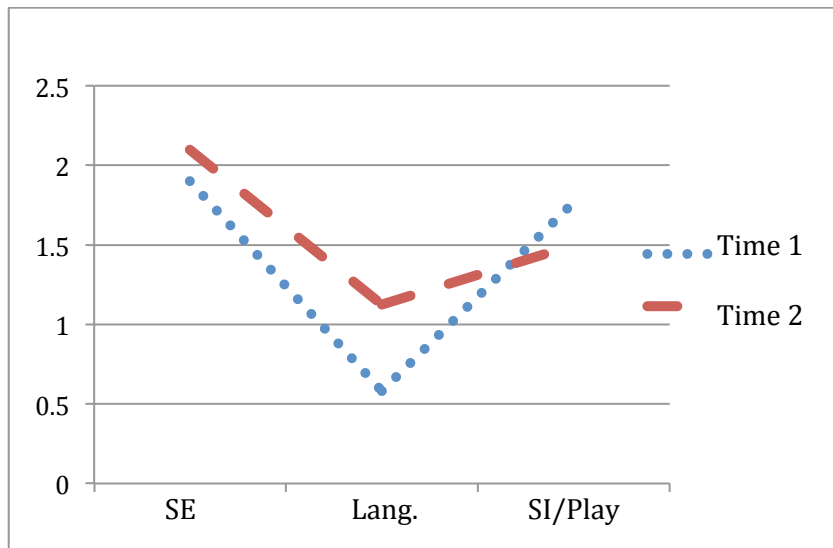


Figure 4. Child D Pre- and Post- SCC Outcome Scores. The above figure illustrates the

outcomes on all four domains of the SCC (social engagement, language and social imitation/play) from pre-intervention (Time 1) to post-intervention (Time 2).

### **Child E.**

Child E is an Africa-American female that was accompanied to therapy by her mother. She scored a 43.5 on the CARS Autism Severity rating scale, placing her in the Moderate-Severe ASD category. At baseline, Child E was extremely dis-regulated, often falling asleep or crying during sessions. She required support from her mother to transition to new activities. Interestingly, she was somewhat engaged in activities when her mother was present during intervention. She used some eye contact and jargon to indicate pleasure and/or request more activities. She used limited language, mostly echolalic, and often did not combine language with gestures. However, her overall SCC ratings from both the clinician and her parent demonstrated improvements across all domains. Child E increased her social engagement, participating in play activities for longer than five minutes and sharing enjoyment with another person. She also increased her use of vocalizations and joint attention throughout activities for pleasure. Child E increased her use of functional words for the purposes of requesting, using up to 63 words throughout the day. Child E did not demonstrate changes in social imitation and play. This could be attributed to attrition, challenges with emotional regulation, and flexibility parent support. Child E's mother worked two jobs and often had to reschedule. This disrupted Child E's schedule and potentially caused issues with her learning.



*Figure 5.* Child E pre- and post- intervention SCC outcome scores. The above figure illustrates outcome scores across all four domains of the SCC (social engagement, language, social imitation/play), from pre-intervention (time 1) to post-intervention (time 2).

**Child F.**

Child F is a bi-racial (African-American, Caucasian) female, with a rating of a 41.5 on the CARS autism severity scale. She was accompanied to therapy sessions, 1-hour per week by her mother. This places her in the Moderate-Severe ASD category. At Baseline, Child F was not engaging in interactive activities unless physical in nature. She also preferred to clutch items, and run around the room. She used some canonical babbling; however, it was not consistently functional. Following the intervention, Child F was demonstrating increased social engagement with her mother. She had increased her joint attention and was able to interact in activities that did not involve her restricted interests for at least 5 minutes. Child F increased her use of signs to communicate and began to use her babbling/jargoning intentionally for the purposes of requesting upon prompts. Child F also increased her social imitation/play skills. She began playing with more appropriately with toys (i.e. cause and effect) and also began imitating.

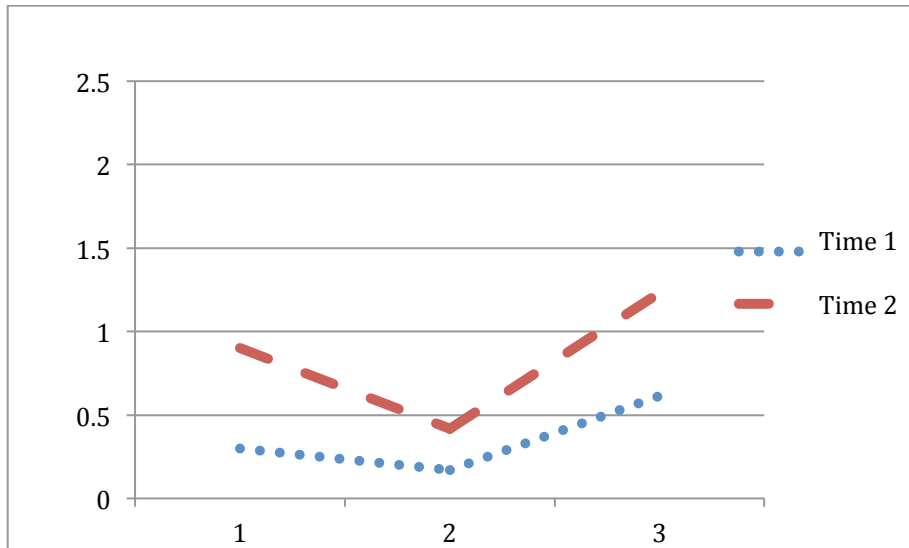
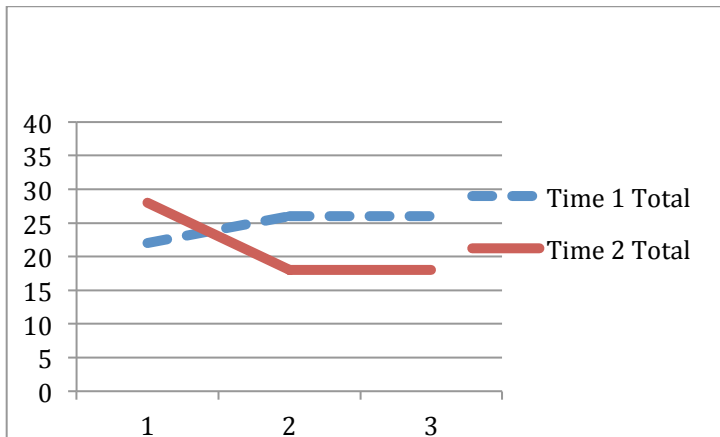


Figure 6. Child F pre- and post- intervention SCC outcome scores. The above figure illustrates outcome scores across all four domains of the SCC (social engagement, language, social imitation/play), from pre-intervention (time 1) to post-intervention (time 2).

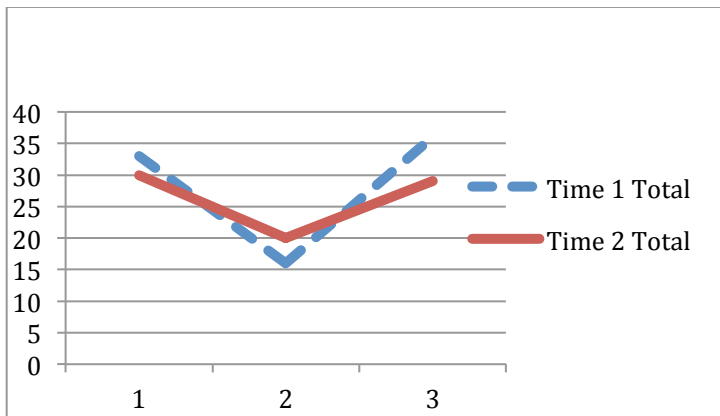
The next research aim predicted that more opportunities with parent coaching would help give parents more sense of competency in their parenting. Parent confidence in implementing the intervention and satisfaction of parenting before and after intervention was assessed using the *Parental Sense of Competency Scale (PSOC)*. The measure is scored based on two different scales: Parental Satisfaction and Parental Efficacy. Ideally, we predicted that parent-mediated interventions, involving more opportunities with parent coaching, would help give parents more sense of competency in their parenting as well implementing taught strategies. We also predicted an increase in overall confidence in parenting skills.

Results demonstrated an overall increase or maintenance in parental confidence from pre-intervention to post-intervention, across both Project IMPACT groups. However, both groups had 1 parent who remained stable or whose satisfaction ratings slightly decreased. Both of these families indicated some family stress, mostly due to stringent work schedules and anxiety about correct implementation throughout the intervention. However, their scores were not clinically

significantly deviant from the group scores. Interestingly, there was a decrease in parental satisfaction in the Control group. It is hypothesized that this is due to potential lack of parental support and individualized coaching of intervention strategies provided in the community. As a reminder, a lower Satisfaction score means a parent reported higher satisfaction. These items were reverse coded, as they were considered “negative” items. PSOC Satisfaction scores are illustrated in Figures 7-9.



*Figure 7.* Group 1 PSOC Satisfaction Scores pre- and post-intervention.



*Figure 8.* Group 2 PSOC Satisfaction Scores pre-and post-intervention.



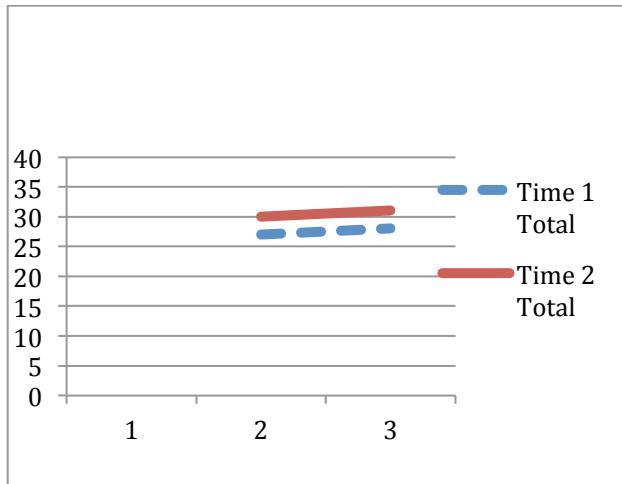


Figure 9. Group 3 PSOC Satisfaction Scores pre-and post-intervention.

Parent sense of efficacy of implementing the intervention strategies decreased or remained the same across both ImPACT groups. On this domain, higher scores indicate higher sense of efficacy. One parent in Group 1 and one parent in group 2 decreased their self-efficacy in intervention implementation post-intervention, with two parents remaining stable throughout the course of intervention. Interestingly, the control group showed an increase in efficacy of implementation. This was interesting considering the families in group 3 were receiving treatment as usual in a clinic setting. Parents reported to the clinician that they were not receiving any parent coaching and were not involved directly with the child’s interventions. PSOC Efficacy scores are displayed in Figures 10-12.

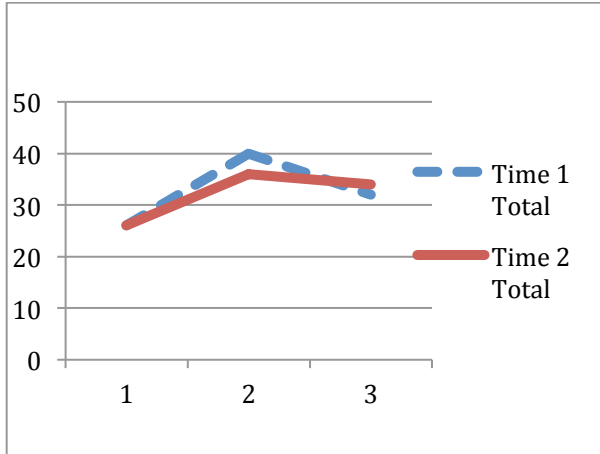


Figure 10. Group 1 PSOC Efficacy Scores Pre Intervention (Time 1) vs. Post Intervention (Time 2).

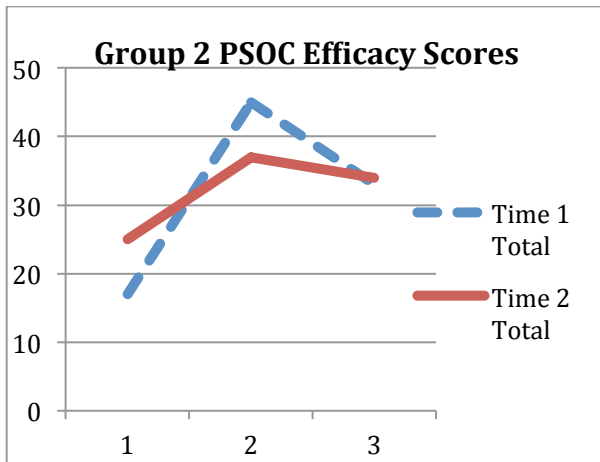


Figure 11. Group 2 PSOC Efficacy Scores Pre-Intervention vs Post-Intervention.

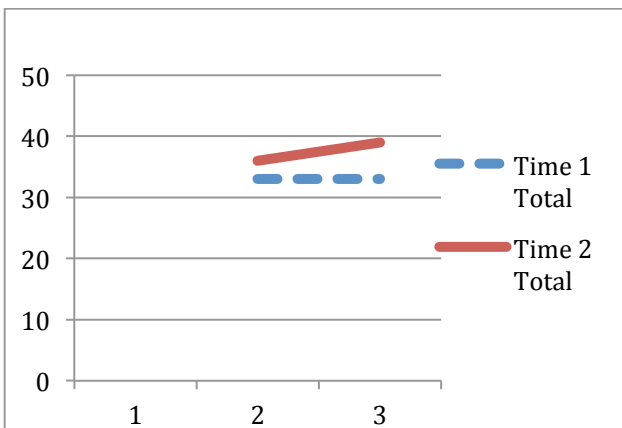


Figure 12. Group 3 PSOC Efficacy Scores Pre-Intervention vs. Post-Intervention.

Overall total scores on both satisfaction and efficacy domains demonstrated increased overall parental competence in groups 1 and 3, but not in group 2. Group 2 received less individual parent coaching and also demonstrated several stressors, posing potential concerns with implementation of taught techniques. These families tended to have problems with attendance, multiple children with an ASD, stringent work schedules, and problems with transportation.

Total PSOC scores are displayed in Figures 13-15.

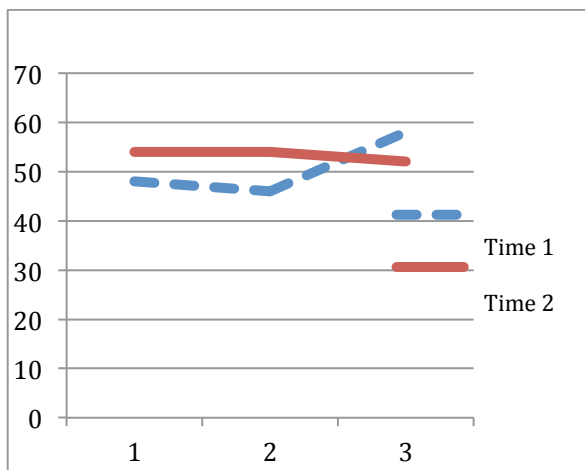


Figure 13. Group 1 Total PSOC Scores Pre-Intervention vs. Post Intervention.

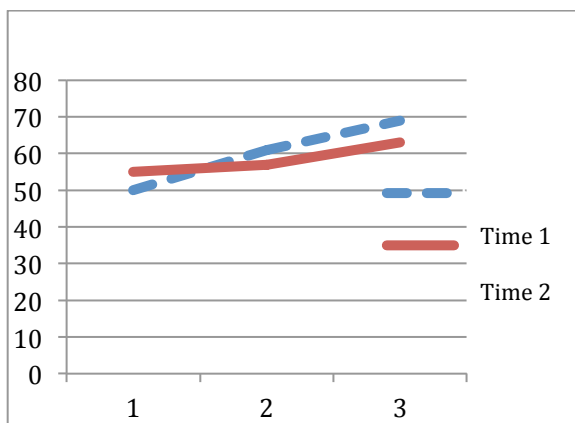


Figure 14. Group 2 PSOC Total Scores Pre-Intervention vs. Post-Intervention.

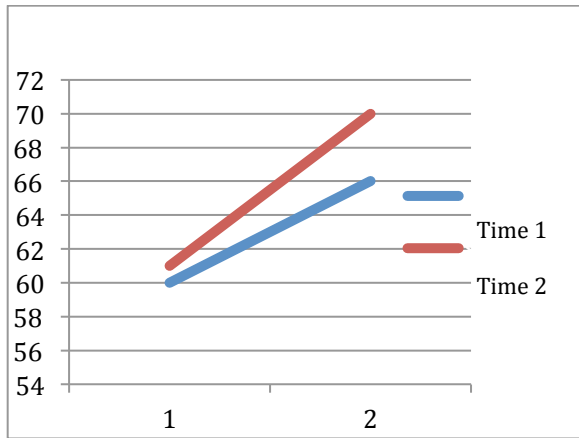


Figure 15. Group 3 PSOC Total Scores Pre-Intervention vs. Post-Intervention.

### Group Intervention Fidelity

Fifty percent of the parent group intervention sessions were observed. Fidelity of the primary clinician leading the groups was measured using a 20-item scale, which rated behaviors as observed, partially observed, or not observed. The primary clinician achieved a 95.8% average fidelity for implementing group intervention with parents.

#### Parent fidelity.

Parent use of ImPact strategies with their children was measured from video recorded sessions and rated on a scale of 1 (not implemented during session) to 5 (parent implemented during the session). A rating of 4 or above (80%) was considered implementing the strategy with fidelity (Ingersoll & Wainer, 2013). In group 1, Parent A's average fidelity was 3.85; Parent B: 4.02; and Parent C: 2.73. In group 2, Parent D's average fidelity was: 2.6; Parent E: 2.8; and Parent F: 2.8. Overall, parents in group 1 demonstrated higher fidelity with more consistent gains over time than Parents in group 2.

#### Clinician fidelity.

Clinician use of ImPACT strategies was also measured from video recorded sessions and rated on a scale of 2 (observed during the session) to 0 (not observed) across 14 behaviors. In

Group 1, Clinician A's average fidelity was 1.33; Clinician B: 1.16; and Clinician C: .54. In Group 2, Clinician D's average fidelity: 1.2; Clinician E: .41; and Clinician F: 1.53. It is important to note that opportunities to demonstrate rated behaviors varied across session and child so these fidelity ratings should be cautiously interpreted.

## **CHAPTER 4**

### **DISCUSSION**

The purpose of this study was to measure change in social outcomes in children with ASD and overall confidence in their parents, following implementation of an “off the shelf” Project ImPACT intervention protocol. Specifically, this intervention examined differences in dosage of the intervention and access to more individualized parent coaching vs. group coaching only. Parental confidence and efficacy were also measured to determine parental competency outcomes when provided with more intensive coaching. Changes were measured from pre-intervention to post-intervention.

#### **Between-Group Differences**

When measuring social-communicative outcome differences based on the intervention dose, no statistically significant differences in social-communicative outcomes were found between groups; however, significant clinical differences between groups were observed. The children in Group 1 demonstrated clinically significant increases in social-engagement vs Group 2. This could be attributed to attendance and parent participation. Group 1 not only attended therapy twice per week, but they had approximately a 90% attendance rate, higher parent fidelity of intervention implementation and greater gains clinically. The basis of the Project ImPACT intervention is to teach social-communication. With more individualized coaching, the children and parents in Group 1 had more opportunity and practice with social engagement strategies. Conversely, the children in Group 2 demonstrated increased gains in language compared to

children in Group 1. This may be because one of the children in this group had significantly higher functional language use than the rest of the children recruited. This may have skewed the results. Interestingly, the social imitation skills in both groups increased from baseline. The overall SCC means, across all three domains, demonstrate a larger increase across all domains within Group 1.

Interestingly, when measuring social-communicative outcomes of both groups from pre-intervention to post-intervention, almost all domains investigated approached significance differences. Language outcomes were significantly different both on the SCC measure and closely approached significance on the MCDI vocabulary measure. Children that participated in the Project ImPACT intervention protocol, regardless of 1 hour per week or 2 hours per week demonstrated higher gains in language. Also, differences in social engagement were also closely approaching significance. This reiterates the fact that children did gain social engagement skills, as illustrated in the clinical graphs and information provided.

It is important to note that all of the children in Group 1 began therapy with limited use of eye contact, gestures, engagement, attention to other people, participation in play activities and use of words and /or gestures to communicate. Children in Group 2 had higher communication scores at baseline.

### **Within-Group Differences**

**Group 1.** Overall, results suggest greater social-communicative gains in those children in Group 1. These children also demonstrated the most clinically significant gains from pre-intervention to post-intervention. According to parent and clinician baseline report, Child A was rarely using eye contact. He would not attend to people in a room and did not integrate others into his play. It was difficult to engage him in activities and almost no vocalizations were

observed, especially for the purposes of functional communication. Following intervention, Child A consistently integrated eye contact, engaged in social activities, used gestures/signs paired with eye contact consistently to communicate, and gained approximately 8-10 new words. These are clinically significant gains across a 12 week intervention period.

Child B also demonstrated significant clinical gains, according to parent and clinician completion of the SCC pre- and post- intervention. At baseline, Child B was rarely using eye contact, inconsistently engaging in play activities and often not using words for functional communication. However, post-intervention, Child B was consistently using eye contact paired with gestures to communicate. He increased his use of words from 53 to 104. Child B's greatest gains were with his language. He also remained engaged in activities for increased periods of time and with a variety of peers.

Child C demonstrated some increase in social-communication and engagement, per parent and clinician report, pre- and post-intervention. At baseline, Child C had issues with emotion-regulation and was unable to engage in activities for extended periods of time. He also did not use functional communication/signs. However, following intervention, Child C was able to participate in activities for at least 5 minutes with a partner, needing significantly less emotional support throughout the sessions. Child C also increased use of words from 7 to 17. It should be noted that Child C did not demonstrate as many clinically significant changes as the other two children in Group 1. This could be attributed to attrition, family stressors, and lack of flexibility of schedule.

**Group 2.** Although clinical differences were observed, there were not as many individual clinical differences from pre- to post-treatment. Child D demonstrated gains in overall engagement and language, however, he already demonstrated increased social engagement and



use of language compared to the other children in the study. This helped contribute to his gain in language, specifically two-word combinations and some sentences.

Child E demonstrated clinically significant differences in overall social-communication, according to parent and clinician report. Pre-intervention, child was not consistently engaging in activities for longer than one minute and also was not using increased amounts of functional communication. However, following intervention, Child E did gain some new words and was using them for the purposes of functional communication, increasing her words from 37 to 63, post treatment. It should be noted that clinically observable increases in behaviors were not observed as significantly, potentially due to emotion regulation issues, attrition, and parent schedule. Child E's mother had a difficult time attending sessions due to her work schedule. This also contributed to fidelity in coaching of intervention strategies. It was difficult to assess fidelity because of increased need to console her child as well as attrition. Simultaneously, Child E had an extremely difficult time participating in activities, due to emotion regulation issues.

Finally, Child F did show some clinically significant changes in social outcomes. These results are based on parent and clinician report, pre-and post-intervention. Prior to intervention, Child F was not engaging in activities, demonstrating joint attention, and rarely vocalizing. However, following treatment, she demonstrated increased overall engagement during activities and use of a few words, although inconsistently, for communication.

Overall, there were changes, although not as prevalent as children in Group 1. Again, attrition was an issue for this family, following transportation issues. This could have played a role in implementation of intervention strategies and face-time with clinician to help facilitate social-communication.

**Group 3.** Both participants in Group 3 demonstrated increased social-communication from

baseline to post-testing. However, these participants were noted to be significantly higher functioning than the Project ImPACT groups. They already had significantly more language and also were more socially engaged overall.

### **Parent Sense of Competency Measure**

Parent confidence in implementing the intervention and satisfaction of parenting before and after intervention was assessed using the Parental Sense of Competency Scale (PSOC). The measure is scored based on two different scales: Parental Satisfaction and Parental Efficacy. Results demonstrated overall increase or stability in parent sense of competency across both Project ImPACT groups. When broken down based on sub-categories of Satisfaction and Efficacy, group differences were observed.

Results demonstrated an overall increase or stability in Satisfaction Scores across the Project ImPACT groups. However, both groups had 1 parent who remained stable or whose satisfaction ratings slightly decreased. Both of these families indicated some family stress, mostly due to stringent work schedules and anxiety about correct implementation throughout the intervention. However, their scores were not clinically significantly deviant from the group scores. These scores support previous literature (Ingersoll and Wainer, 2013 & Stadnick, et al., 2015), that parent-mediated interventions help decrease parent stress and increase overall satisfaction. Interestingly, there was a decrease in parental satisfaction in the Control group. It is hypothesized that this is due to potential lack of parental support and individualized coaching of intervention strategies provided in the community.

When looking more specifically at the efficacy domain, there was a decrease or overall stabilization in both Project ImPACT groups. These results could be due to challenges with attrition, family stressors, and stringent work schedules. Some families found it difficult to attend

therapy sessions on regular basis, therefore, it can be deducted that some families may have decreased confidence in implementing taught techniques. Conversely, Group 3 demonstrated increased parent efficacy of intervention implementation. This was interesting considering the families in Group 3 were receiving treatment as usual in a clinic setting. Parents reported to the clinician that they were not receiving any parent coaching and were not involved directly with the child's interventions.

Overall, the general increase in parental satisfaction and efficacy indicates that parent-mediated interventions can help improve parental stress and satisfaction.

### **Challenges**

It is safe to say that every study has some challenges. The current study was conducted as an “off the shelf” clinical intervention study, requiring no prior certified training to participate as a clinician. The study was conducted in a University-based Speech and Hearing Center, utilizing graduate clinicians, with varying degrees of prior experience with children with an ASD. However, all clinicians were provided with some training each on intervention strategies taught. Education was provided with an experienced Speech Language Pathologist and supervisor. Because the intervention delivery was an “off the shelf” protocol, with no prior training required, participants were asked to attend session during times that were available for the clinic, graduate clinicians, and graduate supervisors. However, families signed consent forms and were assigned to times based on their availability. Families committed to participating in all 12 weeks of intervention delivery and were given detailed schedules, providing dates and times of therapy.

Because of uncontrollable family variables, there were problems with participant attrition. Participants varied in degrees of socio-economic status, family status and flexibility of schedule. Although makeup sessions were offered each week, and families took advantage of these

sessions, there still was not perfect attendance in groups.. Specifically, one family had an issue with transportation to and from the facility, and a few families had a stringent and challenging work schedule. One mother worked two jobs, often working a night and day schedule, making it difficult to attend therapy. Two of the families had multiple children with ASD, limiting their flexibility for making up sessions. Also, one of the children had significant emotion regulation issues. It was often hard to calm her down prior to sessions, even with her mother staying in the room during the entire session with her.

Intervention was delivered in the pediatric wing of the UA Speech and Hearing Center. Each room had a video system to record therapy sessions, in order to provide clinician feedback. Again, since this was an “off the shelf” intervention delivery, clinicians utilized the cameras in each room to record intervention delivery instead of in-person videographers. A new video recording system and storage system was also put into place at the UA Speech Hearing Center in the same semester. There were a few videos that were not useable for coding purposes due to poor camera positioning and/or recording quality, which limited the coding opportunities for certain participant data.

Finally, recruiting participants from the control group was somewhat difficult, as most children receiving a diagnosis of an ASD from the approved recruiting sources were receiving other intervention services. The control group participants were all receiving speech therapy in a preschool/school session. This treatment is considered “treatment as usual”, since the families had not been educated on ImPACT. Ideally, researchers would have been able to measure parent implementation of intervention strategies and levels of social-engagement with the children, both pre-, post- and during treatment. However, this was not feasible due to clinician flexibility.

## **Conclusions**

Parent-Mediated Interventions that focus on core features of ASD and teach parents how to promote social communication, play and language with their children can be successfully delivered in home and community settings (Bearss et al., 2015). Thus, PMIs provide an intervention platform that can increase the quality and quantity of intervention a child receives in his or her natural environments. These findings support that parents are more likely to understand and use strategies with more practice and coaching from a provider, suggesting the need for more early intervention providers to receive training in PMIs. However, it also suggests that parents with better resources for accessing intervention demonstrate the most success with implementation. Meaning that those parents that had limited environmental stressors, flexibility, and education, were more successful in adhering to the intervention implementation. However, the child outcomes for parents with increased environmental stressors and less flexibility did still demonstrate increased social-communication post-treatment. Interestingly, these results pose potential future research questions regarding how we can bridge the gap between those parents with more accessibility to quality services vs those families that require more assistance and how we can help achieve this gap in providing parent-mediated intervention protocols.

Overall, this study illustrates the feasibility in implementing an “off the shelf” delivery method of Project ImPACT by an early intervention provider, resulting in positive outcomes for children and families. Specifically, a clinician with some experience with children with an ASD can implement Project ImPACT with no certified training and still see improvements in child social outcomes. The lead clinician achieved a 95% reliability score on implementation of family coaching without previous formalized training. This reliability in combination with highly motivated parents, resulted in clinically significant social outcomes for both children and parents. The children with the best overall social-communicative outcomes were children of those parents

who were extremely motivated to implementing techniques, consistently attended therapy with few absences, and achieved the best fidelity. These particular families believed in the intervention, actively participated in training activities, sought clarity in implementation, and shared stories of successful implementation in home activities. As previously mentioned, Bearss and colleagues, 2015; Ingersoll and Wainer, 2013; and Brookman-Frazee, et. al, 2009), parent-mediated interventions involving motivated parents and dedicated clinicians can be implemented successfully in an “off the shelf” model, resulting in social-communicative gains in children with ASDs. Moving forward, this study is more evidence to demonstrate the need for PMIs to not only facilitate social-communication and language in children, but also to decrease family stress and help with costs of otherwise expensive lifetime services.

Table 3.

*Child Descriptives Pre-Intervention vs. Post-Intervention*

|                | Baseline      |            |                |                   |                         | Post-Intervention |                         |
|----------------|---------------|------------|----------------|-------------------|-------------------------|-------------------|-------------------------|
|                | <i>Gender</i> | <i>Age</i> | <i>CARS-II</i> | <i>Mullen ELC</i> | <i>MCDI-Total Words</i> | <i>Mullen ELC</i> | <i>MCDI-Total Words</i> |
| <b>Child A</b> | Male          | 32 months  | 42             | 49                | 0                       | 49                | 8                       |
| <b>Child B</b> | Male          | 28 months  | 36.5           | 78                | 53                      | 78                | 104                     |
| <b>Child C</b> | Male          | 31 months  | 45             | 49                | 7                       | 49                | 17                      |
| <b>Child D</b> | Male          | 33 months  | 30             | 51                | 136                     | 56                | 197                     |
| <b>Child E</b> | Female        | 40 months  | 43.5           | 49                | 37                      | 49                | 63                      |
| <b>Child F</b> | Female        | 37 months  | 41.5           | 49                | 2                       | 49                | 2                       |
| <b>Child G</b> | Male          | 49 months  | 32             | 65                | 602                     | 69                | 632                     |
| <b>Child H</b> | Male          | 41 months  | 31.5           | 54                | 323                     | 59                | 461                     |

## CHAPTER 5

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IRB Project #: 11-019 (Rev)

UNIVERSITY OF ALABAMA  
INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS  
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying information

|             | Principal Investigator  | Second Investigator     | Third Investigator |
|-------------|-------------------------|-------------------------|--------------------|
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Title of Research Project: A Comparison of Project IMPACT and Community Based Early Intervention on Developmental Skills of Young Children with Autism Spectrum Disorder

Date Submitted: March 3, 2015

Funding Source: Department of Communicative Disorders

Type of Proposal  New  Revision  Renewal  Completed  Exempt

Please attach a renewal application

Please attach a continuing review of studies form

Please enter the original IRB# at the top of the page

UA faculty or staff member signature: Angie Barber

II. NOTIFICATION OF IRB ACTION (to be completed by IRB):

Type of Review: \_\_\_\_\_ Full board  Expedited

IRB Action:

Rejected Date: \_\_\_\_\_

Tabled Pending Revisions Date: \_\_\_\_\_

Approved Pending Revisions Date: \_\_\_\_\_

Approved-this proposal complies with University and federal regulations for the protection of human subjects.

Approval is effective until the following date: 11/15/2016

Items approved:  Research protocol (dated \_\_\_\_\_)

informed consent (dated \_\_\_\_\_)

Recruitment materials (dated \_\_\_\_\_)

Other (dated \_\_\_\_\_)