

TEACHING RECIPROCAL IMITATION TRAINING TO PUERTO RICAN PARENTS OF  
YOUNG CHILDREN WITH AUTISM THROUGH TELE-THERAPY: A PILOT STUDY

By

Keysha A. Martínez-Torres

Dissertation

Submitted to the Faculty of the  
Graduate School of Vanderbilt University  
in partial fulfillment of the requirements  
for the degree of

DOCTOR OF PHILOSOPHY

in

Hearing and Speech Sciences

May 12, 2023

Nashville, Tennessee

Approved:

Stephen Camarata, Ph.D.

Jim Bodfish, Ph.D.

Miriam Lense, Ph.D.

Tatiana Peredo, Ph.D.

Copyright © 2023 Keysha Martinez-Torres  
All Rights Reserved

## **DEDICATION**

To my husband, Ramon Y. Rios Morales, who inspired me to continue my education and was my anchor throughout these years of hard work and dedication.

To my parents, Lissette Torres Cordova and Milton Martinez Collazo, who always believed I could do anything and supported me unconditionally.

To my brother, Milton Martinez Torres, who inspired me from the moment he was born (without me knowing) and sparked my passion for helping others achieve their best potential, especially those with speech and language disorders.

## ACKNOWLEDGEMENTS

I want to thank the American Speech-Hearing-Language Foundation for supporting the perceptual portion of this study (*Student Grant in Early Childhood Language Development*). With this award, I could extend my analysis further to understand Puerto Rican parental perceptions of the implemented program.

I want to thank Brooke Ingersoll, Anamiguel Pomales, and Allison Wainer for their guidance and support while developing this study. Further, thanks to Anamiguel for her significant contributions as a Puerto Rican and woman researcher, with whom I identify in many ways.

Thank you to several professionals in Speech Pathology, Psychology, and ABA disciplines for their contributions to meaningful insight into the project's development. Special thanks to those residing in Puerto Rico who helped me develop the framework for the program used in this study.

Thank you to my mentors, Dr. Stephen Camarata and Dr. Miriam Lense, for their continuous support throughout my journey in this Ph.D. I am eternally grateful for all the shared intellectual and sentimental experiences that have helped me grow as a clinician and researcher. I also thank my committee members (Dr. Stephen Camarata, Dr. Miriam Lense, Dr. Tatiana Peredo, and Dr. Jim Bodfish), who shared their vast knowledge of my topics of interest and have pushed me to think beyond expectations.

A special thanks to all the parents who participated in this study. I admire your dedication and encouragement to learn and support your children. You serve as inspiration to all the “Boricuas” in and outside of Puerto Rico to continue the development of support to all children and families in need.

## TABLE OF CONTENTS

	Page
<b>DEDICATION .....</b>	<b>iii</b>
<b>ACKNOWLEDGEMENTS.....</b>	<b>iv</b>
<b>LIST OF TABLES.....</b>	<b>vii</b>
<b>LIST OF FIGURES.....</b>	<b>viii</b>
<b>1 Introduction.....</b>	<b>1</b>
1.1 Statement of the problem.....	1
1.2 Availability of Parent-Mediated Tele-therapy Programs for Spanish-Speaking Families.....	2
1.3 Puerto Rican Cultural Characteristics Related to Parenting and ASD....	3
1.4 RIT: An Evidence-Based Parent-Mediated Intervention that can be Delivered via Teletherapy .....	5
1.5 Aims of this Study.....	8
1.5.1 Investigate if it is <i>feasible</i> for Puerto Rican parents of children with ASD (three-to-five-year old’s) to learn and deliver the <i>RIT CORE Method</i> during play routines.....	9
1.5.3 Assess Puerto Rican parent’s perceptions of the <i>RIT CORE Method</i> and the program implementation procedures.....	9
1.5.4 Explore changes in child spontaneous imitation in play routines while parents participate in the parent-mediated program.....	10
<b>2 Methods.....</b>	<b>11</b>
2.1 RIT Program Development.....	11
2.2 Participants.....	13
2.3 Design.....	16
2.4 Setting.....	17
2.5 Procedures.....	17
2.6 Aims Measures and Analytic Plan.....	21
<b>3 Results.....</b>	<b>27</b>
<b>4 Discussion.....</b>	<b>37</b>

4.1 Similarities and Differences to the RIT Literature ..... 38

4.2 Recommendations for Clinicians..... 44

4.3 Limitations and Future Directions..... 45

4.5 Conclusion..... 47

**APPENDIX A..... 48**

**APPENDIX B..... 49**

**APPENDIX C..... 50**

**References..... 54**

## LIST OF TABLES

Table		Page
1	<i>RIT CORE Method</i> (p.20, Edmunds et al., 2022).....	6
2	Participant Characteristics at Baseline.....	15
3	Program Schedule .....	20
4	Parent Participation Survey Results.....	24
6	BIRS Scale Varied Perception Across Parents.....	33

## LIST OF FIGURES

Figure		Page
1	RIT Cycle.....	8
2	Geographical Location of Participants.....	16
3	Measures List and Distribution.....	19
4	Average RIT CORE Method Rating by Parent .....	29
5	Child Spontaneous Imitations.....	35



# CHAPTER I

## Introduction

### 1.1 Statement of the Problem

Diagnosis of autism spectrum disorder (ASD) in early childhood has significantly increased over the past several years (i.e., one out of forty-four children; Maenner et al., 2021), which has resulted in increased support needs in communities. It is noteworthy that diagnosis and service delivery differ for historically under-represented communities, including Latinx and African American children (Beauchamp et al., 2022; Mandell et al., 2007, 2009; Zuckerman et al., 2015). However, a limited number of research studies explore the higher incidence of ASD in these communities and the delivery of culturally applicable intervention approaches based on population needs (DuBay, 2022; Martinez-Torres et al., 2021) and suggest that additional studies are needed. Therefore, it can be worthwhile to consider specific cultural features as these relate to ASD interventions, and the potential implications for community-specific cultural factors as these relate to providing support for families of **children with ASD**<sup>1</sup> in diverse communities (DuBay, 2022).

For example, the *Alianza de Autismo de Puerto Rico (ASD Alliance of Puerto Rico)* is a non-profit organization dedicated to supporting individuals with ASD and their families in Puerto Rico, who publicly expressed the need to increase support and services for ASD in the island (Crónicas, 2022; El Nuevo Día, 2022; Puerto Rico Health Department, 2007). This agency analyzed the number of children diagnosed with ASD within the Department of Education in 2020 and observed a 120% increase in the diagnosis rate compared to rates since 2012 (Crónicas, 2022; El Nuevo Día, 2022; Puerto Rico Health Department, 2007). High rates of ASD diagnosis in Puerto Rico have similarly been reported in the literature (2011, 2016-2018) (Martinez-Torres & Camarata, 2022; Puerto Rico Health Department, 2006; Torres et al., 2014).

---

<sup>1</sup> I will use the term **child(ren) with ASD** throughout the document because participating Puerto Rican parents in this study preferred this term.

This suggests that service delivery and family support needs are also increasing. However, despite the known increased identification of ASD in Puerto Rico, as in other countries, early childhood services for individuals with ASD are frequently significantly delayed or not received (El Nuevo Día, 2022; Puerto Rico Health Department, 2006). Delayed or unavailable services for children with ASD could adversely affect overall child development, especially in early childhood (Bal et al., 2016; Ingersoll, 2012; Miniscalco et al., 2014; National Institute on Deafness and Other Communication Disorders, 2022; Tager-Flusberg & Kasari, 2013).

Because of this, the healthcare system in Puerto Rico requires service delivery approaches that attenuate the impacts of limited or inconsistency of care (e.g., in-person therapies such as speech therapy), especially during crucial early childhood development arising from evidence-based family-centered services (see Camarata et al., 2022). Incorporating parent-mediated approaches may address this problem. Moreover, teletherapy parent-mediated approaches may benefit countries such as Puerto Rico, given accessibility and resource needs, as presented by the *Alianza de Autismo de Puerto Rico (ASD Alliance of Puerto Rico)*. Parent-mediated approaches are recommended as a standard of care for children with ASD in the United States of America (US), and there is extensive literature showing “value-added” benefits to parent-mediated teletherapy interventions (Cheng et al., 2022). Nevertheless, parent-mediated teletherapy intervention studies are scarce within under-represented populations such as Latinx Spanish-speaking communities (DuBay, 2022) because parents/caregivers and children of minority communities remain underrepresented in intervention studies (Harris et al., 2021; Jones & Mandell, 2020; Robertson et al., 2017; West et al., 2016). This provides a strong theoretical rationale for focused studies on parent-mediated services with an under-represented population such as Puerto Rico.

## **1.2 Availability of Parent-Mediated Tele-therapy Programs for Spanish-Speaking Families**

A limited number of parent-mediated teletherapy programs for Latinx Spanish-speaking parents of children with ASD are available (DuBay, 2022; Martinez-Torres et al., 2021). In a recent scoping review conducted by DuBay (2022), the author reported only three parent-mediated teletherapy interventions for Latinx parents published in peer-reviewed journals. Of these, only one was directed to help Latinx Spanish-speaking parents of children with ASD

(Buzhart et al., 2015). Buzhart and colleagues (2015) conducted this Spanish parent-mediated teletherapy program to understand the cultural implications and applicability of the Online and Applied System of Intervention Skills (OASIS). OASIS consisted of online modules and direct coaching sessions through teletherapy. Its focus was to teach and coach parents on the behavior management of their children with ASD. However, there has yet to be a report on the outcomes of the adapted intervention regarding parent learning or child improvement with a large sample. Therefore, it is difficult to determine its applicability to Spanish-speaking Latinx populations, and availability remains limited regarding parent-mediated teletherapy approaches with an evidence base. It is noteworthy that OASIS was not designed to address the communication or social skills of autistic children, which, in addition to behavioral challenges (which were the focus of OASIS), are core features of ASD.

Additionally, the scoping review conducted by DuBay (2022) included Mexican families from California or the Midwest, showing minimal representativeness of other Latinx countries within or outside the US. As a result, one can infer that Puerto Rican parents may be less included in these studies because most Puerto Rican parents live in the eastern states of the US (Collazo et al., 2010). Based on the description of the availability of parent-mediated teletherapy approaches for Latinx Spanish-speaking families, cultural differences within and between Latinx cultures are grossly understudied (e.g., Puerto Rican versus Mexican) (McGoldrick, 2005).

### **1.3 Puerto Rican Cultural Characteristics Related to Parenting and ASD**

Latinx culture and parenting patterns are not monolithic. Culturally specific differences and parenting perceptions impact intervention feasibility and perceptions. Puerto Rico is one of the largest Latinx populations in the US and has its own cultural beliefs and characteristics compared to other Latinx countries (e.g., México, Chile, Colombia) (McGoldrick et al., 2005). Vocabulary, family dynamics, parenting traits, and beliefs about daily life practices are some factors that describe differences between cultures (McGoldrick et al., 2005). The following are Puerto Rican characteristics that may influence the feasibility and perceptions of parent-mediated interventions for the community: *personalismo* (Personalism), *respeto* (Respect), and pampering (Gannoti et al., 2001; McGoldrick et al., 2015; Ramos et al. 2018; Rosario Colon, 2019; Torres et al., 2014).

*Personalismo* (personalism) is defined as closeness or comfort with others around you. It relates to the interest in establishing close bonds with people within and outside immediate family members (McGoldrick et al., 2005). This characteristic has been found to be more evident in Puerto Ricans and Caribbean families than in other Latinx countries (Davis et al., 2019; McGoldrick et al., 2005). In a Puerto Rican household, *personalismo* can be represented as positive parent and child interactions and dependency on family members across daily situations (McGoldrick et al., 2005). These families may also be expected to include friends or members from the community as part of their family members (McGoldrick et al., 2005). This is how vital *personalismo* is for Puerto Rican families. As a result, Puerto Rican parents of children with disabilities look for service providers that permit the development of these relationships (McGoldrick et al., 2005). Parent-mediated interventions may offer these opportunities to build comfort and connections between the parent, the child, and the service provider (e.g., Magaña et al., 2015; Matos et al., 2006).

*Respeto* is how individuals acknowledge the importance and significance of others (Real Academia Española, 2023). It is a behavior taught at a young age in Puerto Rican households and strictly enforced by parents compared to other cultures (Calzada et al., 2012; Ramos et al., 2018). The importance of *respeto* comes from authoritative parenting characteristics. Puerto Rican parents tend to teach their children manners within and beyond the household to show respect toward elders and authority figures (Rosario Colon, 2019). Ramos and colleagues (2018) explain that *respeto* is a characteristic that may influence natural parent-child interactions in everyday contexts within Latinx families. The authors report that the presence of *respeto* affects how parents communicate with their children (e.g., Matos et al., 2006, 2009). Puerto Rican parents tend to use questions or commands when communicating with their children, which are less recommended when supporting and developing social engagement or parent-child interaction skills. However, questioning and commands are typical among Latinx parents because they believe it shows children how to respect and follow directions from their elders' (Calzada et al., 2010, 2012; Peredo et al., 2022; Ramos et al., 2018).

Pampering refers to parents "nurturing" positive or negative child behaviors (Gannoti et al., 2001, p. 1512). Puerto Rican parents perceive the need to overly supervise and support children when they demonstrate an interest in independently performing developmental skills (more so with children with disabilities) (Gannoti et al., 2001; Torres et al., 2014). This is

reflected in Puerto Rican parenting (Torres et al., 2014). Authors report that Puerto Rican mothers feel that their children with disabilities “need them” in everyday situations regardless of age (Torres et al., 2014). Based on the Puerto Rican characteristics described in this section, it is evident that differences in parenting and child behavior expectations are present. In parent-mediated interventions, it is essential to consider the presence of these characteristics to inform the feasibility and acceptability of intervention approaches.

#### **1.4 RIT: An Evidence-Based Parent-Mediated Intervention that can be Delivered via Teletherapy**

In the ASD research literature, there are more than thirty interventions with a credible evidence base (French & Kennedy, 2018). Although many have overlapping treatment elements, each has unique features that could potentially be incorporated into intervention studies. One can consider these various intervention programs to pilot a parent-mediated intervention within a culturally diverse population such as Puerto Rico. A potential limitation is that few of these interventions have been translated into Spanish and even fewer have been evaluated in Spanish-speaking communities of any kind. To date, only one intervention has been conducted with Latinx parents of children with ASD through a parent-mediated teletherapy approach (DuBay, 2022) and that intervention was not designed to address communication and social skills in ASD.

Broadly, studies must examine active ingredients that can generate “parent uptake differentially” and which are optimal for supporting development in young children with ASD (French & Kennedy, 2018). Active ingredients refer to “strategies or procedures that are either hypothesized or empirically shown to be responsible for positive clinical outcomes” (p. 2, Edmunds et al., 2022; also presented by (Chambers & Norton, 2016; Holtrop et al., 2022). Thus, identifying active ingredients is essential when implementing and adapting interventions to diverse cultures such as Puerto Rico. French and Kennedy (2018) highlight the difficulty of identifying an intervention that “fits” clinicians’ or researchers’ interests and those of families. Intervention goals, dosage, active ingredients, and outcomes in parent intervention models impact intervention applicability for a specific population. Interventions with identified and reliable active ingredients can increase the validity and effectiveness of their outcomes (Beresford, 2018). If interventions have identified these active ingredients, evaluating which

developmental skills are targeted in the intervention (e.g., pivotal skills) and testing the acceptability of the procedures in the parent-mediated program is essential.

RIT, for example, is a focused naturalistic behavioral developmental intervention (NDBI) that has rigorously been studied for over 15 years. As an exception to a general dearth of focused intervention studies that include evaluation of active ingredients, a recent study by Edmunds and colleagues (2022) reported that the active ingredients of RIT have high fidelity (i.e., *RIT CORE Method*) (Table 1), which could be implemented and evaluated in a culturally diverse population such as Puerto Rico to determine feasibility and perceptions of such ingredients. RIT uses play-based interactions between parent-child or interventionist-child dyads and teaches young children with ASD to imitate spontaneous gestures, movements, play, and other developmental skills (Ingersoll & Schreibman, 2006; Edmunds et al., 2022). Supporting imitation during early childhood in children with ASD is essential because it is a pivotal skill that supports social and communication domains (Ingersoll, 2012; Miniscalco et al., 2014). Moreover, imitation is significantly impaired in children with ASD relative to other children (Edwards, 2014; Miniscalco et al., 2014). Imitation training (i.e., RIT) has been shown to improve imitation in children with ASD and subsequently improve social and communication skills (Dadgar, 2017; Ingersoll, 2012; Ingersoll & Schreibman, 2006; Ishizuka & Yamamoto, 2021).

**Table 1**

*RIT CORE Method* (p.20, Edmunds et al., 2022)

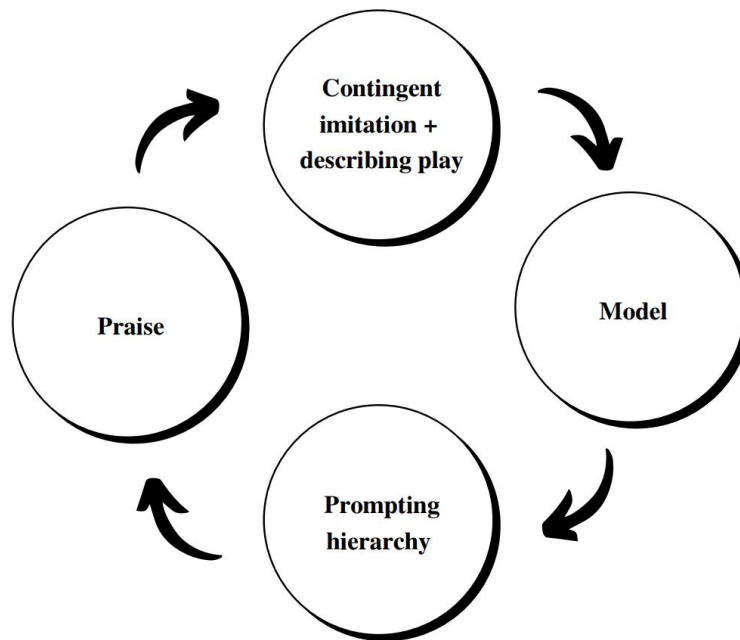
Contingent Imitation	Imitate all the child’s actions, body movements, and gestures
Describe the Child’s Play	Describe the child’s play using simple language
Model a New Action	Model an action for the child to imitate
Pacing	Spend more time on imitation than on asking the child to imitate
Prompting Hierarchy	Offer several opportunities for the child to imitate the model (three models). The offer physical guidance if the child does not spontaneously imitate.
Praise/Reinforcement	Offer praise to the child when he/she imitates, regardless if it is spontaneous or with physical guidance.

RIT is a focused intervention because it targets imitation directly and implements active ingredients in a repetitive/cyclical approach (Figure 1). It has been perceived by parents as an easy intervention to learn and implement (Ingersoll & Gergans, 2006; Wainer & Ingersoll, 2014) compared to other more complex parent-mediated training programs. RIT training focuses on the adult (clinician or parent) imitating the child's vocalizations and play actions (i.e., contingent imitation), modeling actions or gestures with objects to elicit imitation from the child, following a prompting hierarchy (i.e., modeling a new behavior up to three times), and offering positive reinforcement after an imitation event. Ingersoll and colleagues report that RIT is effective in increasing gesture and object imitation, scaffolding language use, developing play, and increasing joint attention in children with ASD (Ingersoll, 2012; Ingersoll & Lalonde, 2010; Ingersoll & Schreibman, 2006).

Several studies of RIT as a parent-mediated approach were initiated in 2007 with an in-person model implemented in a clinical setting (Ingersoll & Gergans, 2007). This in-person parent-mediated RIT program was initially tested in a group of English-speaking families in the US. The program included live teaching of RIT principles and live coaching on applying key elements within a clinical context. The program was delivered over ten weeks (twice-a-week sessions in a clinic). Handouts and a manual (Ingersoll, n.d.) were provided to augment training. During live interactions, parents would have the opportunity to ask questions, clarify concepts, review content, and discuss goal development and homework for the week with trainers. Results demonstrated a significant increase in parent implementation fidelity and positive uptake of RIT key elements. Parents also reported that RIT was an easy intervention because it focused on a specific target (i.e., imitation). Wainer & Ingersoll (2014) published another study of parent-mediated RIT. The authors implemented a *hybrid* program for a group of English-speaking families. This program consisted of a self-paced (asynchronous) portion where each parent would access online training videos and interactive activities to learn about the RIT principles and key elements. After the parents completed this self-paced portion, an interventionist would coach and provide feedback through synchronous live parent-child interactions (about four sessions). Wainer & Ingersoll reported similar outcomes to the in-person version (Ingersoll & Gergans, 2007), indicating its effectiveness and feasibility through parent mediation regardless of the teaching/coaching approaches (in-person versus online/remote).

## Figure 1

### *RIT Cycle*



**Figure 1.** During a play routine, the RIT cycle starts with the parent contingently imitating the child’s choice of play with toys for ~2 minutes. At the end of this period, the parent models new actions or gestures with the toy the child is using. The parent follows the prompting hierarchy to model the new action or gesture. This hierarchy requires the parent to model the new action or gesture up to three times. Between each model, the parent must pause to allow the child to imitate the model. The parent provides physical support if the child has not imitated the model after the three opportunities. The parent will praise whenever the child has imitated, even if the child needs physical guidance. Once the parent praises the child, the cycle restarts. This cycle is repeated for at least 20 minutes.

### 1.5 Aims of the Study

I have presented the rationale for studying parent-mediated teletherapy programs with comprehensive descriptions of active ingredients with diverse Latinx samples such as Puerto Rico. Teaching RIT to Puerto Rican parents may be *feasible* and well-perceived; therefore, it was selected because it has specific established methods and data from English-speaking families which can serve as a basis for comparison in diverse communities. In this study, I will evaluate the *feasibility* and acceptability of a parent-mediated teletherapy program to teach and coach RIT



principals to Puerto Rican parents of young children with ASD. For this study, *feasibility* is defined as the parent's ability to learn and implement to an expected criterion the *RIT CORE Method* during a ten-week program. I will use the RIT *fidelity* framework (Ingersoll & Gergans, 2007) as a more narrowly defined measure that can be performed through a remote program approach.

### **1.5.1 Investigate if it is *feasible* for Puerto Rican parents of children with ASD (three-to-five-year old's) to learn and deliver the *RIT CORE Method* during play routines.**

I hypothesized that Puerto Rican parents participating in the program would reach the expected levels (measured using rating scales) of the *RIT CORE Method* after participating in the ten-week program (e.g., Ingersoll & Gergans, 2007; Wainer & Ingersoll, 2014). This variable was measured by rating parents' implementation of the *RIT CORE Method* across their participation in the study (Appendix A). In other parent-mediated intervention studies, data from Puerto Rican and Latinx parents support this hypothesis. Studies have shown Latinx parents' ability to learn and implement general enrichment (non-RIT) strategies when coached in person and through teletherapy services (Buzhardt et al., 2016; Chlebowski et al., 2018; Magaña et al., 2017; Matos et al., 2006, 2009). However, Matos and colleagues studied children with behavioral and attention deficits exclusively, which is different from the target population in this study. Other interventions studied previously aimed to provide only psychoeducation of ASD (Magaña et al., 2017) or had a behavioral-only focus (Buzhardt et al., 2016; Chlebowski et al., 2018). The program in this study provides a combination of these domains, offering parents a holistic, enhanced, but specific intervention to learn and implement with their children with ASD.

### **1.5.2 Assess Puerto Rican parents' perceptions of the *RIT CORE Method* and the program implementation procedures.**

Literature suggests that Puerto Rican and Latinx parents overall are supportive of developmental strategies (e.g., *RIT CORE Method*) and accept program implementation procedures that support their learning (Agazzi et al., 2010; Bauermeister, 2016; Chlebowski et al., 2020; DuBay et al., 2018; Nuñez & Tejero Hughes, 2018; Peredo et al., 2022). I

hypothesized that Puerto Rican parents would accept the *RIT CORE Method* with some variation in perceptions (e.g., more straightforward vs. more complex to implement). I also hypothesized that they would describe a range of more acceptable and less acceptable program implementation procedures (e.g., videos, amount of coaching time, length of the program) that will guide adaptations for future studies. However, as presented in the previous aim, the intervention studied previously included goals and content that differed from the RIT program implemented in this study.

From a strategy perspective, Puerto Rican parents may find “describing their child’s play” and following the “prompting hierarchy” as more complex (but not unacceptable) to implement. These strategies differ from cultural parenting characteristics of authority and pampering, as described in the sections above (e.g., Ramos et al., 2018). Regarding program implementation procedures, Latinx parents report the need to increase the length of the parent-mediated program and include other family members in the intervention program (Martinez-Torres et al., 2021). I measured these elements using the Behavior Intervention Rating Scale (BIRS; Elliot & Treuting, 1991).

### **1.5.3 Explore changes in child spontaneous imitation in play routines while parents participate in the parent-mediated program.**

I hypothesized that child spontaneous imitation skills would show change compared to baseline data, however studies of parent intervention do not necessarily directly result in changes in child measures, so this hypothesis may not be confirmed in this study. This hypothesis derives from previous studies of RIT parent-mediated approaches (e.g., Ingersoll & Gergans, 2007; Wainer & Ingersoll, 2014). Specifically, Wainer and Ingersoll (2014), who conducted the hybrid remote approach, reported changes in spontaneous child imitations but there was much variability and inconsistency in the outcomes. This variable was measured using the RIT Child Imitation Data Sheet established by the RIT team (Ingersoll & Lalonde, 2010).

## CHAPTER II

### Methods

Before starting the study, the Vanderbilt University Institutional Review Board (VU-IRB) approved the protocols and procedures described below.

#### 2.1 RIT Program Development

A collaborative project is being developed to create a Spanish version of the *hybrid* self-paced online program initially developed for English-speaking families (Wainer & Ingersoll, 2014). However, available published approaches of RIT have yet to be implemented or validated with an under-represented population such as Puerto Rico.

I developed a synchronous teletherapy program to teach the RIT principles to Puerto Rican parents residing in Puerto Rico by adapting Ingersoll & Gergans (2007) and Wainer & Ingersoll (2014) procedures (see the introduction for a description of each study approach). To make adaptations, I followed the framework of Barrera and Castro (2006), which proposes a four-phase in-depth process to adapt interventions to a new population: Phase I Information Gathering, Phase II Preliminary Adaptation Design, Phase III Preliminary Adaptation Test, Phase IV Adaptation Refinement. I conducted Phase I (Information Gathering) and Phase II (Preliminary Adaptation Design) by conducting individual discussions with Puerto Rican parents (with and without children with ASD) and providers who work with children with ASD. This procedure was performed in a consultative way to make initial decisions/adaptations about the study approach (see the following for similar adaptive methods Peredo et al., 2018; Matos et al., 2006); Chlebowski et al., 2018, 2020). A total of eight parents and providers participated in these consultative discussions. I gathered insight into preferred and best practices for the Puerto Rican population to build the conceptual framework of the current study. Both Ingersoll and Gergans's (2007) and Wainer and Ingersoll's (2014) approaches were presented in the discussions to inform

the consultants about the two methods considered for the Spanish Puerto Rican adaptation used within this study.

I emailed and personally called known colleagues to recruit consultants for this procedure. They then referred parents of children with ASD, and I contacted known parents of young children in Puerto Rico. I presented the two approaches described above (Ingersoll & Gergans, 2007; Wainer & Ingersoll, 2014) through phone and video calls and asked open-ended questions about their perceptions of these approaches. I also presented my ideas of how to offer parent coaching to parents derived from the Ingersoll and Gergans (2007) and Wainer and Ingersoll (2014) studies.

There was consensus among consultants on the pressing need for a synchronous teletherapy approach for Puerto Rican parents. Although in-person at-home was preferred, consultants mentioned opposing factors due to COVID-19 pandemic restrictions in Puerto Rico, scarcity of staff to implement in-person services, and recent restructuring arising from response to natural disasters. Synchronous instruction has been reported as a preferred approach by Latinx parents (DuBay, 2022). It offers real-time monitoring of parent learning, which can inform and guide future modifications for developing asynchronous modules. The approach educates parents on using RIT strategies in their homes, providing real-life examples of how to continue care in addition to direct therapies for their children with ASD (when available). From a cultural standpoint, using a synchronous teletherapy approach can support one of the specific characteristics of the Puerto Rican population: *Personalismo*. This concept, as described previously, is unique to the Puerto Rican population because the time to establish rapport with a clinician is meaningful and essential for parents. The interventionist (also Puerto Rican) can build closer bonds with the family through this approach. It can also facilitate access to most Puerto Rican parents, regardless of the yearly environmental factors on the island.

The overall framework of the program used in this study, as recommended by consultants, has yet to be implemented. Consultants agreed that the synchronous teletherapy approach should implement the established ten-week program (e.g., in-person RIT by Ingersoll & Gergans, 2007). Most consultants recommended twice a week ~thirty-minute sessions because it compares to direct child therapy services implemented in Puerto Rico. Therefore, the *RIT CORE Method* will be taught to Puerto Rican parents using a synchronous teletherapy approach that has yet to be implemented or used in the past RIT research literature. The RIT team (e.g.,

Brooke Ingersoll and colleagues) provided a translated Spanish manual for parents as part of the program's teaching materials. I also developed a video library with Spanish examples of the *RIT CORE Method* implementation as part of the parent coaching materials. Additionally, I created a Spanish presentation to teach the *RIT CORE Method* following the lessons in the Spanish-translated manual as used in Ingersoll & Gergans (2007) and Wainer & Ingersoll (2014). Prior permission from the RIT research team was obtained to incorporate the Spanish-translated manual.

## 2.2 Participants

Spanish-speaking Puerto Rican parent-child dyads ( $n = 9$ ) were recruited for this study. The parent-child dyads were recruited by word of mouth, direct referral, flyers, and social media announcements approved by the VU-IRB. Before enrollment, I conducted screenings with each potential participant ( $n = 17$ ). This study's recruitment and screening process was completed in only two weeks. I started recruitment on August 1, 2022, and conducted screeners between August 8-11, 2022. Those parent-child dyads that were screened but did not qualify mainly did not meet the following criteria: child age ( $n = 2$ ), the child did not present difficulty in imitation in baseline ( $n = 1$ ), the child had lower than twelve-month-old language ( $n = 1$ ), the child did not have a diagnosis of ASD ( $n = 1$ ), and parent was already participating in a parent program unspecified ( $n = 2$ ).

Participants *included* in this study were (a) parents of children with ASD (three-five years old: 36 to 71 months), (b) parents that were not participating in another parent-mediated program, (c) parents that had access to the internet in their home, and (c) parents who had access to an electronic device with a camera. Additionally, (d) the same parent had to be available for the anticipated duration of the study, (e) the child with ASD had to present with imitation difficulties, (f) and the child's language level had to be at least 12 months of age (language level at which the child has some understanding of communication). Parent-child dyads were *excluded* from this study if (a) parents were not fluent in speaking, reading, and writing Spanish, (b) parents had conflicting work schedules that precluded their full participation in the program, (c) parents reported having difficulties with technology management, (d) children had co-occurring intellectual disabilities of known etiology (e.g., Down syndrome, Fragile X), and (e) children that

could not interact in play/playful activities with the parent for at least five minutes without displaying significant disruptive behaviors.

The inclusion and exclusion criteria were evaluated by reviewing previously acquired documentation, online questionnaires, and live interviews/observations. The ASD diagnosis was confirmed by the parent report and obtaining the name and location of the provider who diagnosed the child. I used Zoom, the video platform, to conduct the screening process and throughout the study. Parents self-reported all inclusion and exclusion criteria. I completed a structured questionnaire regarding computer and Zoom management use and child imitation skills (i.e., Motor Imitation Scale as a platform) (Stone et al., 1997; Stone et al., 1997b; Rogers et al., 1996; Ingersoll, 2010). The Motor Imitation Scale has been studied and implemented in multiple ASD studies. It has been validated with consistency and accuracy through group study designs (Stone et al., 1997, 1997b) and verified for reliability (Ingersoll, 2010). If needed, I asked the parent to conduct several imitation tasks to observe the child's response based on the Motor Imitation Scale (Stone et al., 1997; Stone et al., 1997b; Rogers et al., 1996; Ingersoll, 2010). After the parent-child dyad was eligible, I reviewed the consent form with the parents and obtained signed consent before data collection. Once consented, parents completed baseline assessments as part of the evaluation protocols: Vineland Adaptive Behavior Scales III and The McArthur-Bates Communicative Development Inventories – Spanish Forms. Data were collected and managed using REDCap electronic data capture tools hosted at Vanderbilt University (Harris et al., 2009, 2019). REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to standard statistical packages; and 4) procedures for data integration and interoperability with external sources.

Nine participants met the inclusion criteria for this study. Out of these, one family could not continue due to parental health issues. Two families were excluded from the analysis due to the child's inability to sustain play for at least five minutes and the inability to obtain continuous, valid data across conditions. Therefore,  $n = 6$  participants completed the study. All were Puerto Rican parents of children with ASD between the ages of three and five ( $M = 48.5$ ), living in Puerto Rico, had not participated in a parent program, and their primary language was Spanish

(Table 2). Participants lived in different areas on the island, ranging from city to rural conditions, as depicted geographically in Figure 2.

**Table 2.**

*Participant Characteristics at Baseline*

Dyad	City of origin	Parent gender	Parent marital status	Parent highest education	Parent occupation
PC1	Mayaguez	Female	Married	Ph.D.	Chemistry professor
PC2	Quebradillas	Female	Married	Bachelors	State police
PC3	Mayaguez	Female	Married	Masters	Not employed
PC4	Santa Isabel	Female	Married	Bachelors	Pharmaceutical operator
PC5	Bayamon	Female	Married	Some college courses	Not employed
PC6	Caguas	Female	Married	Associate degree	Not employed

**Table 2 (continued)**

Dyad	Child age (m)	Child gender	Number of siblings	*Child vocab. level (MacArthur Inventories)	Child communication level (Vineland) SS***	Receptive language (AE)****	Expressive Language (AE)	Child social level (Vineland) SS
PC1	50	Male	1	Expressive: 15 Receptive: 78 Age: 15m	44	1.0	1.2	52
PC2	62	Male	2	Expressive: 94 Receptive: 144 Age: 13m	52	1.7	1.6	60
PC3	36	Male	1	Expressive: 29 Receptive: 77 Age: 17m	66	1.5	1.4	70
PC4	47	Female	1	Expressive: 10 Receptive: 17 Age: 14m	34	0.9	1.3	54
**PC5	36	Male	1	Expressive: 310 Receptive: n/a Age: 27m	66	1.2	1.5	58
PC6	60	Male	0	Expressive: 50 Receptive: 86 Age: 18m	40	1.0	1.7	48

*Note:* \*Based on scoring rules for the MacArthur Inventories, all children were scored looking for the number of words closes to the 50<sup>th</sup> percentile. The number found next to each domain (expressive or receptive) is the total number of words reported by parents within each domain.

\*\*Only child using phrases at the time of enrollment. Therefore, he was administered the words and phrases protocol which does not include number of receptive words.

\*\*\* SS stands for Standard Score

\*\*\*\* AE stands for Age Equivalent

## Figure 2

### *Geographical Location of Participants*



**Figure 2.** Puerto Rico has a total of seventy-eight cities. Cities can be classified as urban, rural densely populated, and rural sparsely populated (Martinuzzi et al., 2006). Bayamon can be classified as urban, where a city-like environment is present with many people. Caguas and Mayaguez can be classified under urban and rural densely populated, where city life is present, but more vegetation spaces such as suburb living are observed (still with a large amount of human population). Quebradillas and Santa Isabel are in more rural and sparsely populated, with less city-like living conditions.

### 2.3 Design

I conducted a single case multiple-baseline across participants design (Hersen, 1982; Ledford et al., 2020). This design consisted of a baseline phase (randomly assigned 3-8 data points), the staggered introduction of treatment phase I across participants (at least 2 data points), treatment phase II (at least 3 data points), and a maintenance phase (1-week and 1-month after the treatment phase II ended).

In the baseline phase, the first participant must display at least three stable data points to initiate intervention. Stability is operationally defined as observing and expecting countertherapeutic trends in the data (downward/decreasing trend of data points), leveled data with no more than .5 from the mean, and no observation of increasing/accelerating trend (upward data indicating improvements on strategy application). Successive participants had to display at



least one more stable data point than the previous participant before being introduced to treatment phase I. I would obtain an additional baseline data point if I observed an outlying data point (not meeting the stability definition described previously). This extra data point had to return to stability levels based on each participant's baseline performance.

## **2.4 Setting**

All parent-child dyads participated from their homes in Puerto Rico using the Zoom platform. Before starting baseline data collection, each family and I identified a consistent location for their participation in the program (e.g., dining room, bedroom, office). The location required minimal interruptions or distractions from people or objects (e.g., siblings, TV, children playing outside). The location also required enough floor space for the parent and child to interact during the play sessions. The computer or phone was placed in a specific area where I could observe the play sessions. Sessions were scheduled individually on the same days and times each week.

## **2.5 Procedures**

This study included baseline, treatment, and maintenance procedures with measures applied at each phase. See Figure 3 for a summary of the measurement distribution throughout the study procedures and phases.

**Baseline Phase:** Parents participated in live recordings of ten minutes of free play through Zoom. Parents were assessed using the Fidelity of Implementation Rating Scale (Ingersoll & Gergans, 2006) (Appendix A) for each video, and children were evaluated using the RIT Child Imitated Data Sheet (Wainer and Ingersoll, 2014). Parents were instructed to choose ten children's preferred toys and play with their child as they usually would; no other instructions were provided.

**Treatment Phase:** Parents participated in the ten-week teletherapy coaching program with sessions twice weekly for ~thirty minutes each. Attendance was monitored throughout their

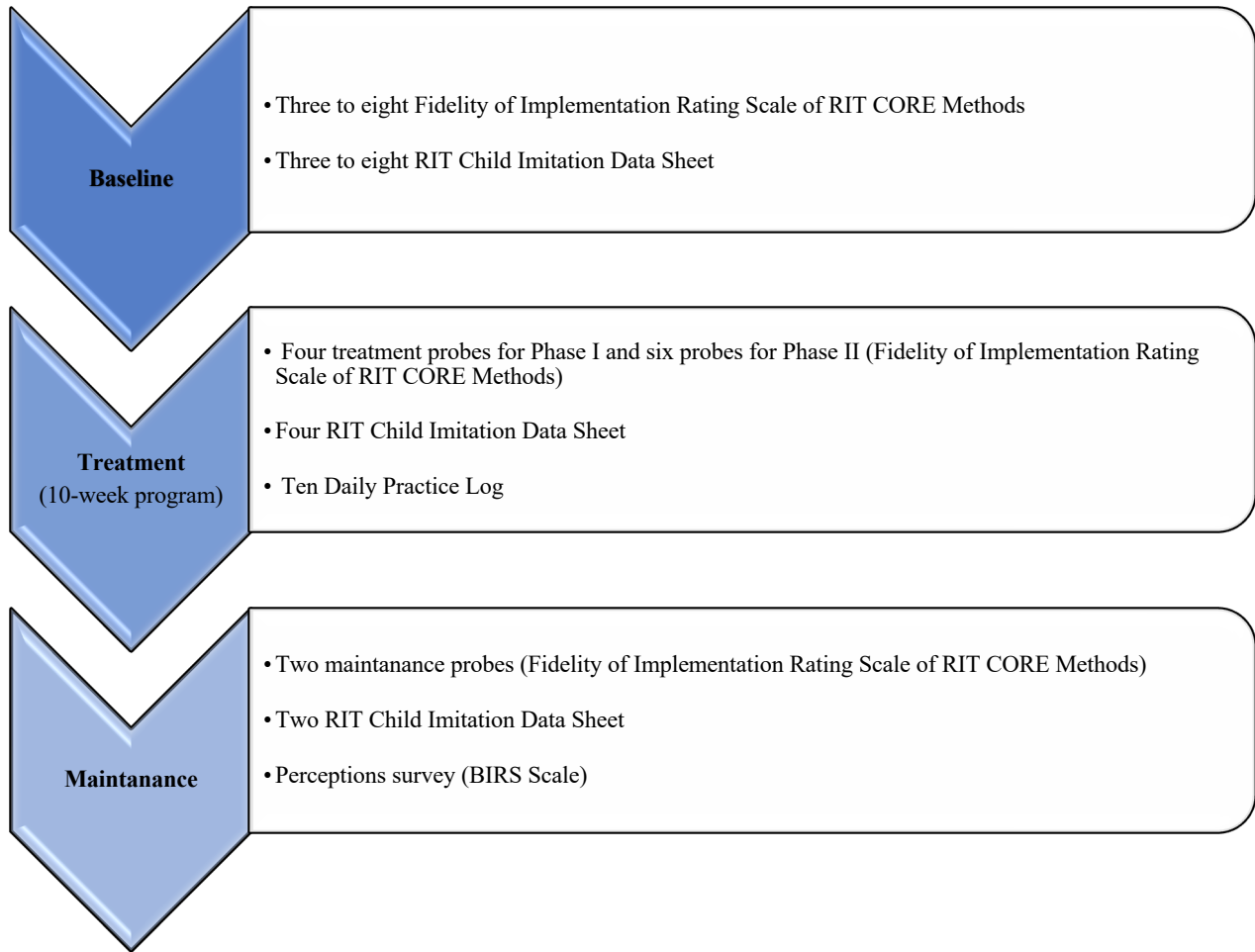
participation in the program; see Appendix B for details. Data probes were gathered once a week, defined as ten-minute video recordings such as in baseline. For these treatment data probes, parents were taught to choose four to six pairs of toys for each session as part of the RIT method. After they were taught the toy selection rules and recommendations, parents could choose the toys for each session. The data probes were recorded at the beginning of the coaching sessions. Parents were told to **practice independently** with their child for ten minutes, where they would apply the strategies, they had learned up to that point in training. It is important to note that in these data probes, which were used to measure parent feasibility as defined previously, parents were recorded playing with their children without direct coaching. I trimmed the data video probes from the start of the probe when the screen was changed to full screen. The interventionist said, “Okay, go ahead and start” when the ten minutes were complete (it is important to note that some videos lasted less than ten minutes because, in some sessions, children were less tolerant of a ten-minute session). The settings in Zoom were arranged to view the participant in full screen, and the audio settings were at the lowest level of sensitivity to sound.

The treatment phase (the ten-week teletherapy program) was divided into two phases (Table 3). Treatment phase I comprised four weeks of teaching and coaching parents on the *RIT CORE Method*. Teaching is defined as discussing theoretical and conceptual elements to understand the logic behind each strategy and providing strategy application examples. Coaching is defined as the *in vivo* parent implementing strategies with their child in a play context where the interventionist provides direct guidance and feedback on their interaction.

At the end of each session, the parent and the coach reviewed the strategies and discussed questions or clarifications needed for their weekly practice. They were asked to complete the daily practice log at the end of each practice week. Parents were also given homework and individualized goals during the week. In addition, to live teaching and coaching, parents had access to an online library with Spanish video examples of the *RIT CORE Method* to supplement their learning. They also received emails with weekly summaries of the material covered in the teaching sessions and feedback on their performance in the coaching sessions.

### Figure 3

#### Measures List and Distribution



**Figure 2.** Parents completed several measures throughout the study. During baseline, parents were randomly assigned several video baseline probes. They were assessed using the Fidelity of Implementation Rating Scale of the *RIT CORE Method*. They implemented the 10-week program to monitor the parents' progress. Parents also completed daily practice logs during the treatment phases. These logs offered insight into independent practice outside direct contact with the interventionist. The fidelity measure was repeated during the maintenance phase. The parent completed the BIRS scale at the end of the program. This scale gathered information on their perceptions of the program implementation procedures and RIT strategies.

**Table 3***Program Schedule*

Design Phase	Week	Topic
Treatment Phase I	1	Structuring the environment
	2	Contingent Imitation
	3	Describing your child's play
	4	Teaching action imitation
Treatment Phase II	5	Expanding play skills
	6	Teaching gesture imitation
	7	Imitation during daily routines
	8	All together
	9	Review: Before and after
	10	Preparing for the future

After parents completed treatment phase I, participants transitioned into treatment phase II. Treatment phase II consisted of continued weekly teaching of additional information regarding RIT applications and coaching continued in applying the *RIT CORE Method*. Parents were not informed of these phases as they participated in the ten-week program. Regardless of parent behavior, phase II was initiated after 4 weeks (after phase I training had been completed).

**Maintenance Phase:** After completing the treatment phases, parents participated in at least two additional data probe play sessions scheduled a week and a month after their last treatment session. Parents also completed the BIRS scale to obtain information on their perceptions of the study. In this phase, I repeated the same procedure as in baseline, instructing the parent to play with the child for ten minutes. No instructions were given.

## 2.6 Aims Measures and Analytic Plan

**Investigate if it is *feasible* for Puerto Rican parents of children with ASD (three-to-five-year old's) to learn and deliver the *RIT CORE Method* during play routines.**

### Measures:

***Fidelity of Implementation Rating Scale of the RIT CORE Method:*** This measure is an established five-point rating scale (Ingersoll & Gergans, 2006) (Appendix A) that evaluates the *RIT CORE Method* components: contingent imitation, describing play, modeling, pacing, prompting, and reinforcement (Edmunds et al., 2022; Table 1). It was used to assess the level to which parents could deliver the *RIT CORE Method* procedures through play session data probe recordings described in the procedures section with a duration of ten minutes. An average score of four or higher is considered the correct implementation of the *RIT CORE Method*.

**Daily Practice Log:** A supplemental survey was developed to monitor parent practice as recommended by the program (ideal twenty minutes each day) (Ingersoll & Lalonde, 2010). The instrument was developed to monitor the continuity of care through parent-independent practice outside of direct teaching and coaching sessions. The instrument is a multiple-choice survey in which I gathered the amount of practice the parent implements during the week. Parents were also asked to report obstacles faced during practice. Parents completed this survey once a week through REDCap.

### Analytic Plan:

**Fidelity of Implementation Rating Scale of RIT CORE Method:** Two approaches were used for this data analysis. Visual analysis served as the primary approach because in single case design, “collecting, graphing, and analyzing data” is a crucial component to evaluating the effect of a treatment on participants’ behaviors (Ledford & Gast, 2018; Wolery & Harris, 1982). I also conducted between-case standardized mean difference (BC-SMD) analysis, an index that can be derived from data collected across participants to estimate an effect size for intervention

in single case design studies; this index is comparable to a Cohen's *d* effect size commonly used in group designs (Hedges et al., 2012, 2013; Pustejovsky et al., 2014; Valentine et al., 2016).

**Visual Analysis:** Visual analysis in single case design permits continuous data analysis and helps researchers make informed decisions about functional relations between treatment and the participant's behavior (Ledford & Gast, 2018). Data of the parent ratings on the application of the *RIT CORE Method* was analyzed by using vertical and horizontal visual analysis as described below (Ledford & Gast, 2018): (1) Data points during baseline stay at a stable level across data points (vertical visual analysis). (2) There is no level change in one tier when other tiers start treatment (vertical visual analysis). (3) There is an immediate change in level upon the introduction of treatment within each participant (horizontal visual analysis) (*immediacy* is defined as the change in level in session four of the treatment phase I, at which point parents have learned and have been coached on all RIT strategies). (4) There is an upward trend during the treatment condition as the session progress within each participant (horizontal visual analysis). (5) Data should maintain the level of data on the treatment phase during the maintenance phase.

A functional relation was determined when at least three demonstrations of the effect of the intervention were evident by meeting all the criteria described in the previous paragraph (three different parents increased the correct application of strategies after participating in the program). Functional independence and equivalence were examined when there was no change in the level of the data for one tier when another tier was being introduced to treatment across all participants. We reviewed missing data points to examine participant attrition or inconsistency in session participation. We reported the missing data in our results and delineated the reason/s the data point was not collected. Second, we collected additional data to meet the pre-established phase criterion as needed.

**BC-SMD:** A supplemental analytic approach involved the calculation and statistical analysis of BC-SMD. This approach was developed as a supplement to offer additional quantitative analysis of the effect size of treatments assessed via single case designs for aggregating studies in reviews and establishing across-study methods for data presentation. I conducted BC-SMD analysis to evaluate the magnitude of the treatment effect. This is an

adaption of independent means tests (with aggregate baseline scores as mean one and aggregate treatment phase scores as mean 2). To conduct this statistical test, we used the *scdhlms* app web version. I synthesized the results across participants determining if there was a significant change from baseline to treatment, using a 95% confidence interval (Pustejovsky et al., 2014; Valentine et al., 2016).

***Interobserver Agreement (IOA):*** I evaluated the interobserver agreement of the parents' implementation of the *RIT CORE Method* data. Before the start of the study, the coders were trained to rate *RIT CORE Method* (see Appendix A) using training videos. Coders reached 80% reliability with the primary coder (author of this manuscript). A blind coder collected IOA on the primary dependent variable on 30% of randomly selected sessions per participant. Feedback to the coder was provided for each video the observer completed in oral or written form (email) if there were significant discrepancies in the coding. IOA was calculated on the percent of agreements between primary and secondary coders using a point-by-point method. Agreements were defined as the same items marked as the same or a 1-point difference score. IOA was reviewed weekly and expected to remain at  $\geq 80\%$ . If the percentage of agreement falls below 80%, we reviewed the errors and offered an overview of the data coding procedure with new videos. IOA between coders was at 94.2% agreement on a point-by-point analysis.

***Interventionist Procedural Fidelity:*** The procedural fidelity delivered by the interventionist who coached the parents (author of this manuscript) was evaluated. The purpose was to assess if the interventionist followed the pre-established procedures of the program using a procedural fidelity checklist (Appendix C). The interventionist should maintain 90% or higher procedural. To confirm the procedural fidelity of the interventionist, a secondary blind observer measured events from the procedural fidelity checklist on 30% of sessions across participants. Randomly selected sessions were assigned to the blind coder for review. I analyzed the session using a direct systematic observation recording system of occurrence (yes) and non-occurrence (no) list of events. Procedural fidelity was calculated using the following formula:  $\% \text{ of yes} = \frac{\text{number of yes}}{\text{number of yes} + \text{number of no}} \times 100$ . I expect the interventionist to maintain procedural fidelity at 90% or higher. The interventionist performed 90%-100% fidelity in

implementing the program across all parents. The secondary coder presented 100% of agreement across sessions.

**Daily Practice Log:** I analyzed the Daily Practice Log by obtaining the frequency of practice in terms of the number of days and minutes. I calculated the percent of each frequency between all participants. I identified which categories had the highest and lowest number of occurrences. The frequency of practice across all participants is described in Table 4. Parents practiced two to three times a week (Frequency: 55%) for 10 to 20 minutes daily (Frequency: 94%). Close to the second half of reported practice sessions (Frequency: 43%), parents could practice four to five days a week.

**Table 4**  
*Parent Participation Survey Results*

Variable	Multiple choice options	Total number of times reported across participants	%
Number of days of the week	0	1	2%
	1	0	0%
	2 - 3	27	<b>55%</b>
	4 - 5	21	<b>43%</b>
	6 - 7	0	0%
Minutes per day	0	1	2%
	< 5	2	4%
	10 - 20	46	<b>94%</b>



**Assess Puerto Rican parents' perceptions of the *RIT CORE Method* and the program implementation procedures.**

**Measure: BIRS scale (Elliot & Treuting, 1991)**

In the English RIT teletherapy study by Wainer and Ingersoll (2014), the BIRS scale was adapted and used to gather information on perceptions about the program and variables/strategies taught to parents. This adapted scale was translated into Spanish and further adapted to capture all Ecological Validity Model components (Bernal et al., 1995), which are essential to inform future adaptations/modifications of the program. In this survey scale, the *RIT CORE Method* and overall program procedures were included because these have high importance for acceptability by this new population and inform future adaptations.

**Analytic Plan:** The data were organized in an Excel spreadsheet to calculate the *range* and *median* of each item. I analyzed agreements (no more than 1 point difference from the median) and disagreements (defined as a two-point or more difference from the median and evident two-point range difference) between participating parents. For example, half of the parents might score an item with a six (completely agree), and the other half score the same item with a four (disagree); this would show a range of scores between four and six, showing a two-point difference. Disagreements were considered items to further analyze and discuss for future adaptations of the program. Quotes from parents were collected and added to the results to inform consumers about the outcomes on acceptability better (Peredo et al., 2022).

**Explore changes in child spontaneous imitation in play routines while parents participate in the parent-mediated program.**

**Measure: RIT Child Imitation Data Sheet**

Unlike other measures, which utilized rating scales for parent compliance with training components, I used the standardized data sheet developed by Wainer and Ingersoll (2014) to gather actual counts of child spontaneous imitations. Wainer and Ingersoll (2014) define child spontaneous imitation as “the child imitates the adult’s model of an action with a toy or a gesture

within ten-s of the model...without physical guidance from, or material manipulation by, the adult” (p. 6, Table 2).

**Analytic Plan:** I calculated child spontaneous imitations as the rate of spontaneous imitations per minute. I conducted visual analysis protocols described in AIM1, where vertical and horizontal inspection rules were followed. In addition, I analyzed the data using BC-SMD to determine independent treatment effects and functional relations. The results of both approaches are presented in the next chapter and were used to generate conclusions about the effects of this aim.

## CHAPTER III

### Results

In this section, I will present the results of each aim. Each aim will describe the results based on the methodology reported in the previous section and present figures to support the findings visually.

#### **Investigate if it is *feasible* for Puerto Rican parents of children with ASD (three-to-five-year old's) to learn and deliver the *RIT CORE Method* during play routines.**

Visual analysis shows stable baselines across participants. No observed change in the level of the data in one tier (parent) when subsequent tiers (other parents) transitioned into treatment phase I. After parents transitioned into treatment phase I, there was an immediate treatment effect across all participants except for PC2. PC2 showed delayed effects of the treatment, reaching consistent expected mastery levels (a rating of four or higher) in the last two sessions of treatment phase II.

After the parents transitioned into phase II of treatment, accelerating and higher levels of strategy application were evident across cases. PC1 showed inconsistency in treatment phase II, reaching consistent expected levels (a rating of four or higher) in the last two sessions of treatment phase II. A slight decrease in the *RIT CORE Method* rating was observed for PC3 and PC6. This decrease fell below a rating of four and was observable for two sessions of the ten-week program (lessons six and seven). During the maintenance phase, all parents could maintain mastery level ratings in strategy application. Data showed a functional relation to the treatment effect because five demonstrations of the effect were evident. There is also evidence of functional independence and equivalence because there was no change in the level of the data for one tier when another tier was being introduced to treatment across all participants.

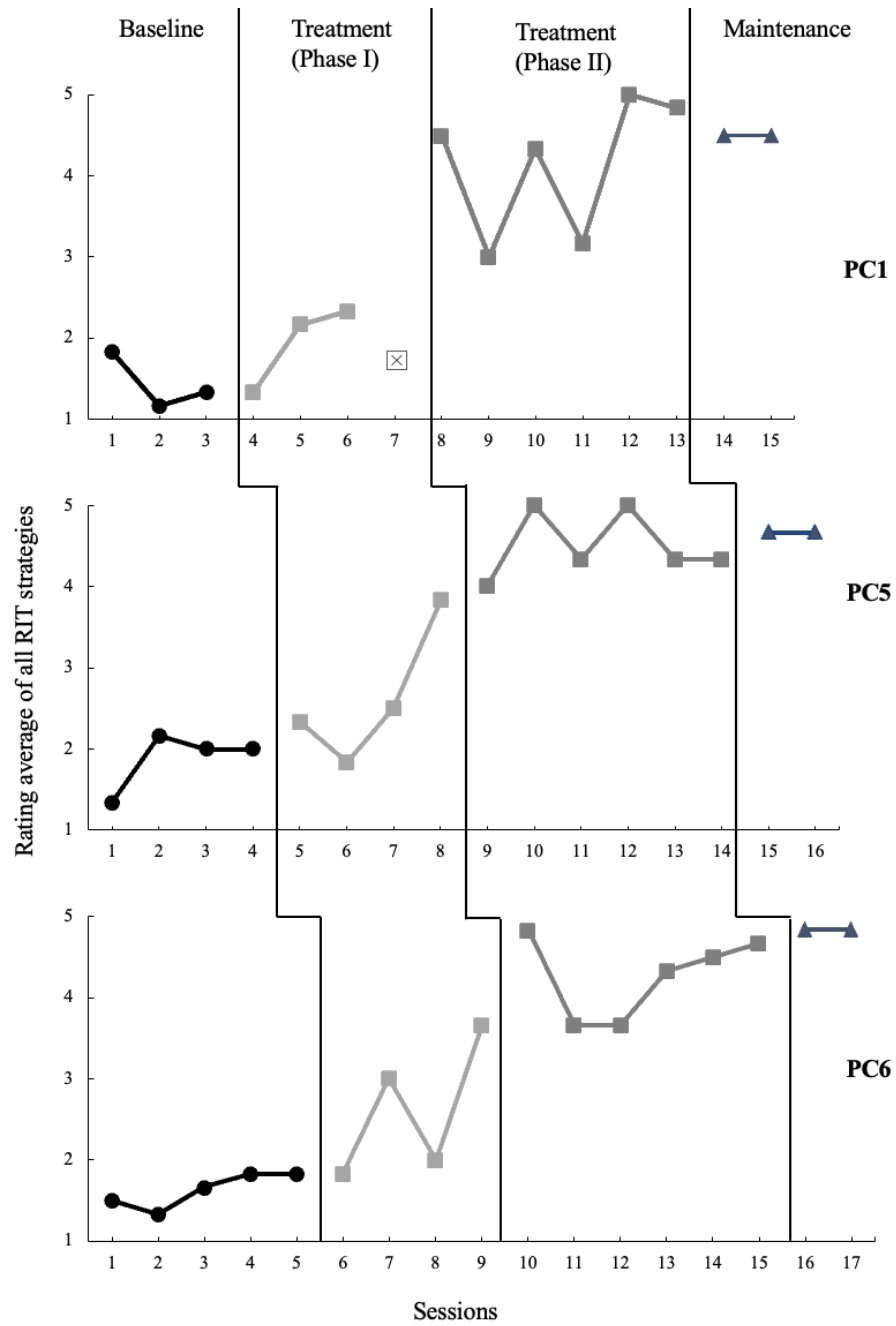
One missing data point was evident in two participants, and one missed two probe sessions. PC1 had one missing data point in session seven because the parent was at a conference

and did not submit nor schedule a video probe on time. PC2 also missed a data probe in session seven. This was due to the hurricane that passed through the island in September, impeding the parent from rescheduling or submitting a video probe on time. PC4 presented two missed data points in sessions nine and twelve. These were also due to the passing of the hurricane (session nine) and a technology malfunction wherein the interventionist could not record the session (session twelve). However, all participants exceeded the minimum number of data probes needed for the phase to maintain control of the study (at least two data points).

The between case standard mean difference indicated a significant effect of treatment,  $BC-SMD = 0.6375$ , 95% CI = [.0.0161, 1.2590]. This effect size supports the visual analysis, showing that all participating parents significantly increased the correct application of the *RIT CORE Method* by participating in the teletherapy parent coaching RIT program.

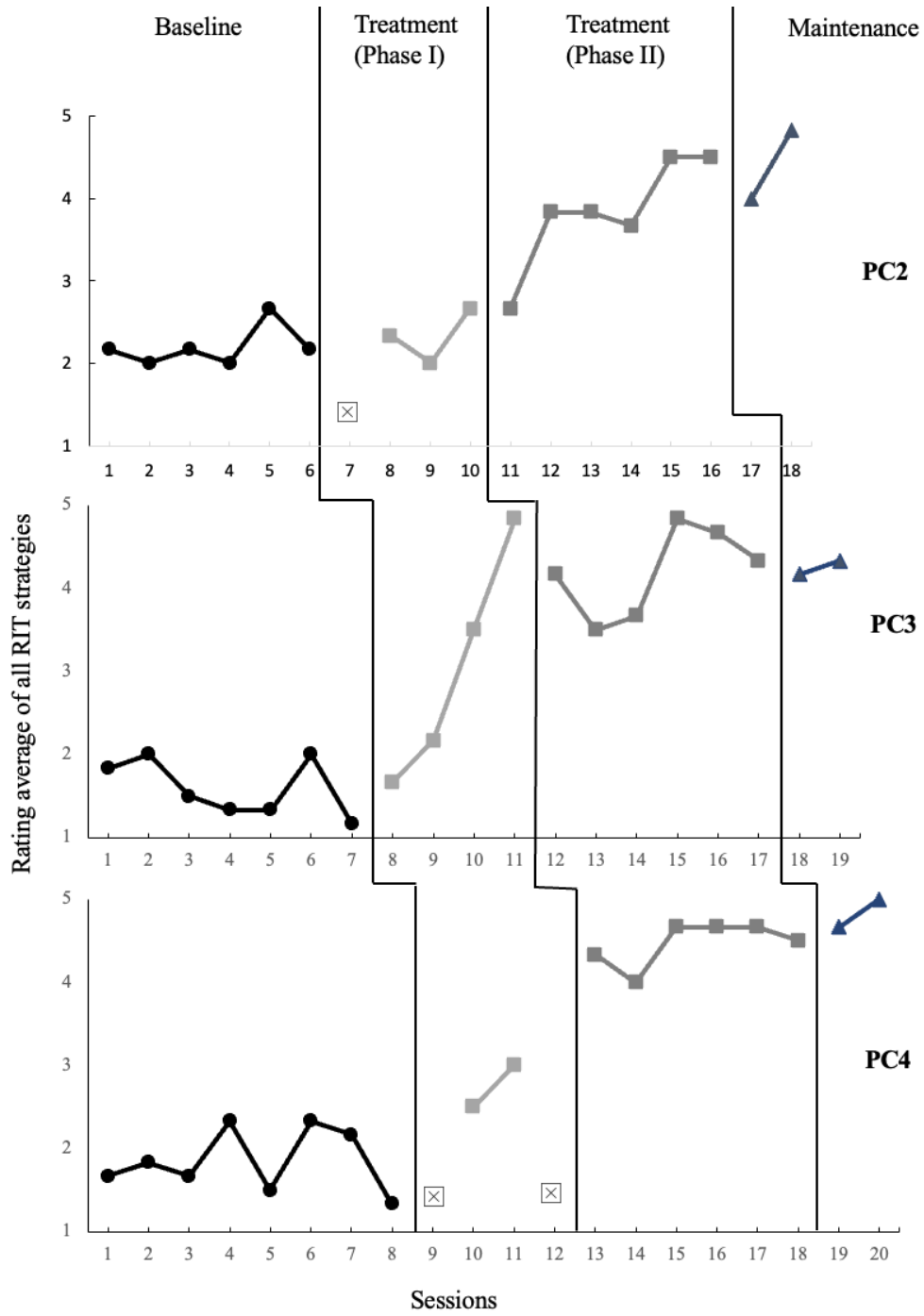
**Figure 4**

*Average Rating of RIT CORE Method by Parent*



*Note:* 1 to 5 scale on the ordinate, with 1 as the origin, because the rating scales do not include a score of 0. Note that participants were randomly assigned to baseline length so that designations are not serial.

Figure 4 (continued)



Note: See previous note (p. 28).

## **Assess Puerto Rican parents' perceptions of the *RIT CORE Method* and the program implementation procedures.**

All participating parents completed the BIRS scale at the end of the ten-week program through REDCap. All parents favorably rated (an average of six) the intervention as easy to learn and implement and that it should be appropriate for a variety of parents of children with ASD in Puerto Rico. In terms of overall program perceptions, all parents rated with a six (completely in agreement) that the intervention would be acceptable and appropriate for other parents of children with ASD in Puerto Rico and that they would recommend the program to other parents. Participant parents also completely agreed (rating of six) that the program supported a change in their ability to apply strategies in interactions with their children and that they would be willing to continue using RIT strategies during play and other daily routines. For example, a parent said “Me siento muy afortunada de haber participado en él y adquirido este conocimiento que seguiré practicando.”/ I feel fortunate to have participated in it (the program) and have acquired this knowledge that I will continue to apply.

Regarding procedures used during the program, parents completely agreed (rating of six) that the procedures used during the program were appropriate and beneficial for them. Procedures in this scale are defined as the elements used in the program to teach parents the intervention (e.g., PowerPoint, videos, duration of sessions, etc.). There was a consensus rating of six (completely in agreement) that coaching sessions, problem-solving conversations with the coach, and feedback during and after the sessions were beneficial to parents while learning the *RIT CORE Method*. For example, a parent said “*Las sesiones de coaching fueron enriquecedoras y la ayuda individual invaluable. A veces quisiera poder tener la oportunidad de tener coaching on demand*”/ *The coaching sessions were enriching and of invaluable help. Sometimes I would have liked the opportunity to have coaching on demand.*

They also agreed that their relationship with the coach was positive. Parents reported that the number of coaching sessions was sufficient to understand the strategies, but they would have liked the program to continue for more time. For example, a parent said “*Estuvo excelente me fue de gran ayuda y vi cambios muy positivos en mi hijo. Estoy feliz!!!! Me hubiese gustado que fuera por mas tiempo*”/ *It (the program) was excellent. It was of great help, and I saw a positive change in my child. I am happy! I would have liked it if it lasted more time.* Parents agreed that

“contingent imitation” (*RIT CORE Method* strategy) helped them interact better with their children and feel comfortable implementing it. They also highly rated using “models” (*RIT CORE Method* strategy) as a benefit for their children.

Regarding perceived child behavior changes, parents agreed that the program benefited their children. They observed positive changes in their children’s behavior (not only imitation but also reported changes in other areas, such as language, that could not be directly assessed in this study). Such change was perceived as immediate based on their children’s needs, and parents indicated that they felt that RIT helped to meet and manage their children’s needs. They also highly agreed that using RIT with their children will positively affect their long-term behavior across different settings, not only within play routines in their homes. For example, a parent said *“y me ayudó en otras áreas no necesariamente de EIR, por ej. técnicas para manejar el que (name of child) no quería compartir sus juguetes.”* / *And it (the program) helped me in other areas not necessarily of RIT, for example, techniques on managing that (name of child) did not want to share toys.*

A total of four items demonstrated a varied range of ratings between parents (Table 6). Parents rated from four to six that “the RIT intervention should improve my child’s behavior to the point that it would not noticeably deviate from other peers.” Half of the parents rated this item as a six, indicating they believe their children could improve their behavior (imitation and engagement) to the point of achieving similar performance as typical children. However, two parents rated it a four, demonstrating a positive but more neutral agreement with this item.

Parents rated in a range from one to four that “I would have liked more formal feedback (e.g., the use of a rating form) on how well I was using the different RIT strategies.” Most parents did not express the need for other forms of monitoring their progress in applying RIT strategies. However, PC1 agreed that she might have liked to obtain information on her progress through other means, such as graphs or tables. Parents rated “it is difficult for me to describe my child's play during my interactions with him/her” in a range between one and five. This item is specific to “describing the child’s play” (*RIT CORE Method* strategy), wherein half of the parents rated it as complex for them to implement, and the other half did not report it was difficult.

Parents rated “when I model something new to my child; I feel the need to immediately provide physical support instead of giving him/her several opportunities (using the Prompting



Hierarchy)” in a range of one to five. These items are related to using the RIT prompting hierarchy (*RIT CORE Method* strategy). Most parents rated this item as a one (completely disagree). However, one parent (PC2) reported a continued need to provide physical prompting to the child immediately. Last, parents rated “RIT strategies feel natural to implement” between four and six. Although all parents agreed on RIT as feeling natural (rating of five or six) to implement, PC3 rated it as four (somewhat agree).

**Table 6**  
*BIRS Items with Varied Ratings Between Parents*

Item	Median	Range	PC1	PC2	PC3	PC4	PC5	PC6
22 - The RIT intervention should improve my child’s behavior to the point that it would not noticeably deviate from other peers.	5.5	4 – 6	4	5	6	6	4	6
30 - I would have liked more formal feedback (e.g., the use of a rating form) on how well I was using the different RIT strategies	1.5	1 – 4	4	1	2	1	3	1
38 - It is difficult for me to describe my child's play during my interactions with him/her	3.5	1 – 5	2	5	2	1	5	5
42 - When I model something new to my child, I feel the need to immediately provide physical support instead of giving him/her several opportunities (using the Prompting Hierarchy)	1.5	1 – 5	3	5	1	1	2	1

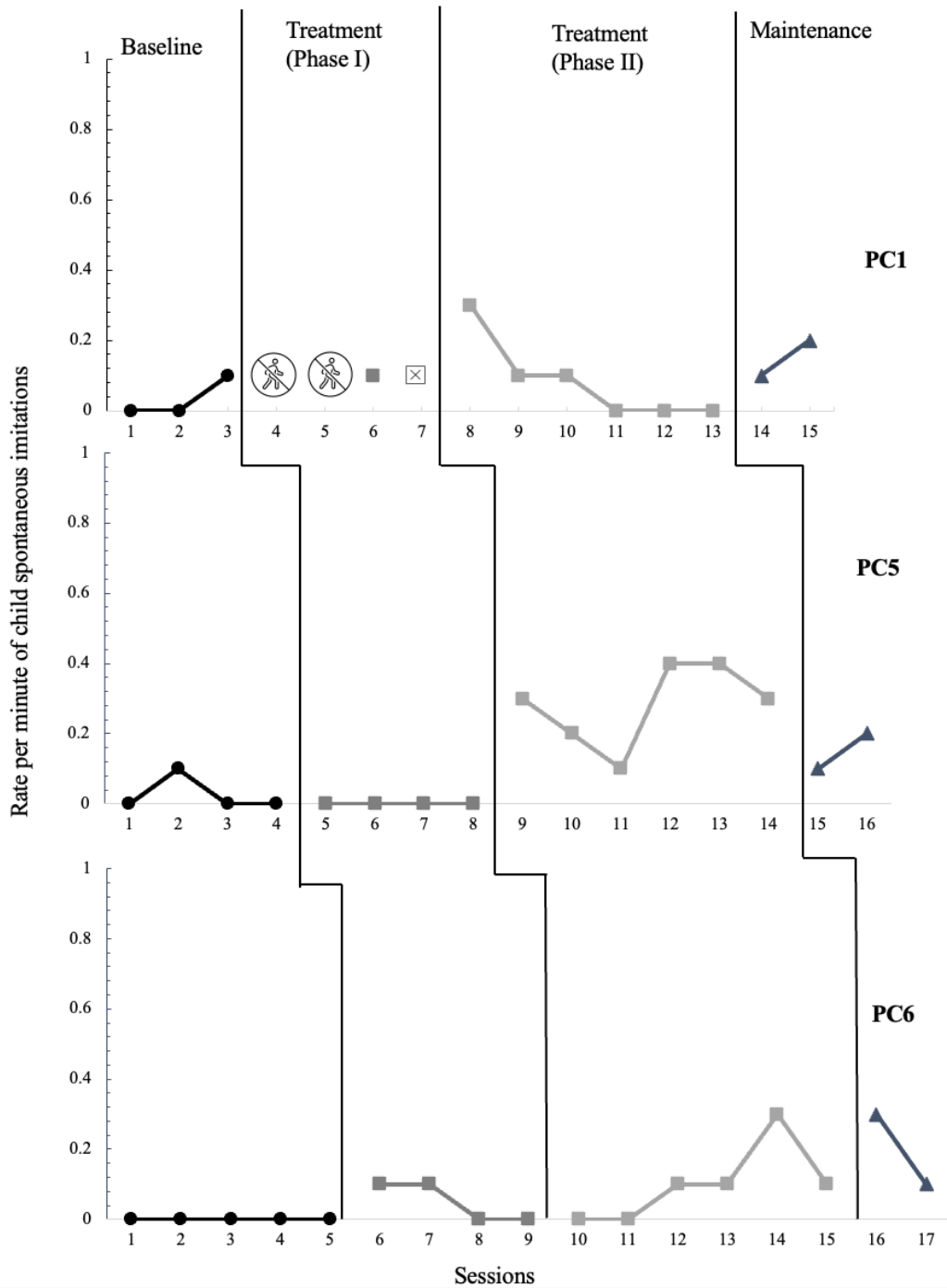
1 – completely disagree; 6- completely agree

### **Explore changes in child spontaneous imitation in play routines while parents participate in the parent-mediated program.**

The results of child spontaneous imitation changes are described in this section. It is important to note that data not displayed in the graph means the parent did not provide a model for the child to imitate (represented as  $\otimes$ ), or it was a missing data probe (defined as  $\boxtimes$ ). At baseline, all children showed stable data at lower levels (as would be anticipated in ASD). PC1 showed a slight increase in spontaneous imitation in the third baseline data point. There was no level change in the data of one child when the child in the previous tier transitioned into treatment phase I. Four children demonstrated an immediate change in imitation skills during the transition between phase I and phase II of treatment. PC5 and PC6 did not show an immediate change in their data (*immediacy* is defined as the change in level in session four of the treatment phase I, at which point parents have learned and have been coached on all RIT strategies). All children demonstrated an upward trend during treatment phase II as sessions progressed within each participant, except for PC1. PC1 showed decreasing trends across phase II of the treatment. Data maintained the level of data on treatment phase II for all children. PC1 showed a slightly increasing trend during the maintenance phase, which overlapped with prior phases indicating no effect.

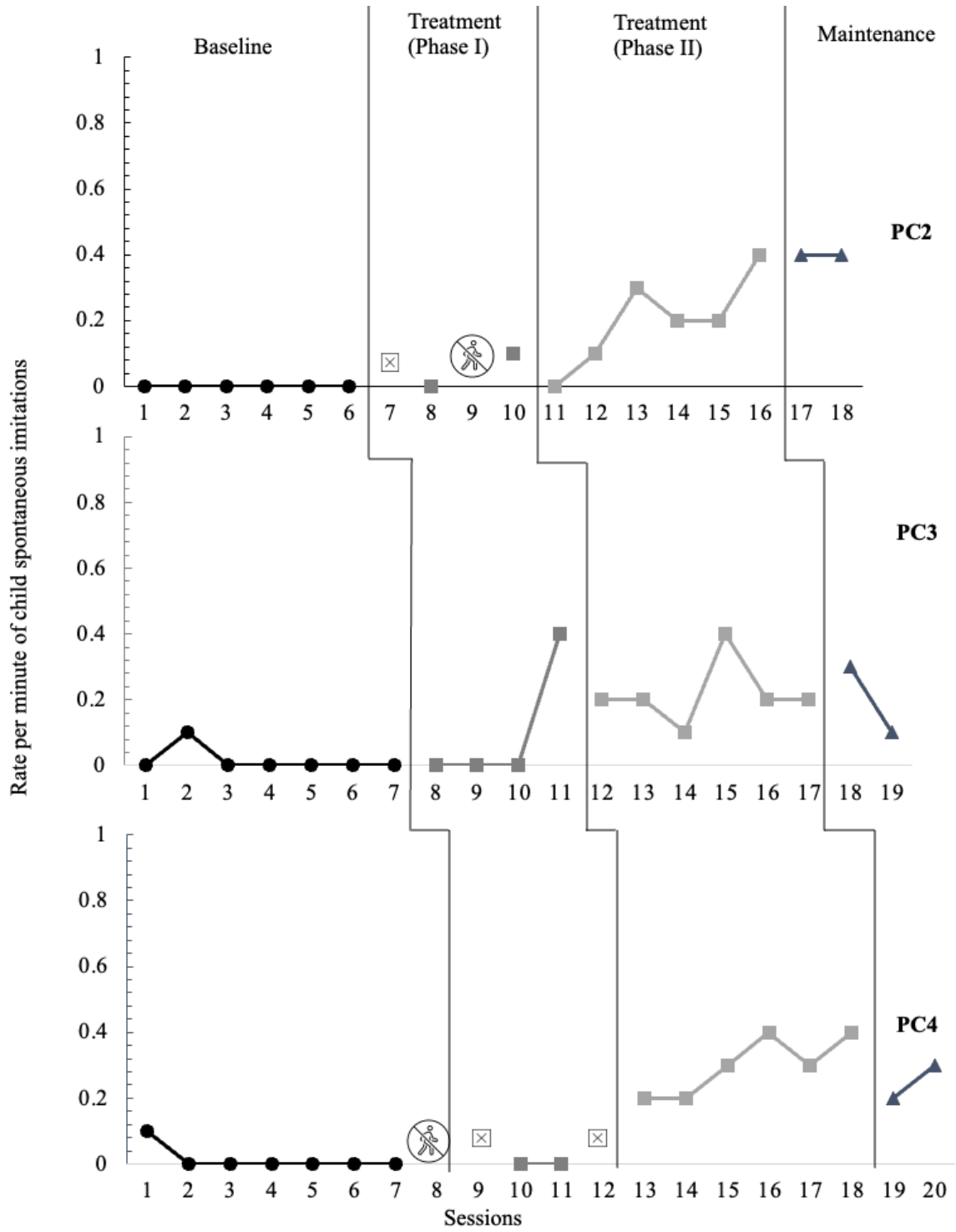
The between-case standard mean difference indicated a large effect size,  $BC-SMD = 1.1392$ , 95% CI = [0.4717, 1.8068]. This effect size is consistent with our visual analysis results, showing that all participating children except PC1 significantly increased spontaneous imitations. The BC-SMD analysis supports the statistical significance of the observed effect size for child imitation changes. A functional relation is evident in the data presented with at least three demonstrations of the effect of the treatment. Functional independence and equivalence are evident in the data because there was no change in the level of the data for one tier when another tier was introduced across all participants.

**Figure 5**  
*Child Spontaneous Imitations*



*Note:* Note that participants were randomly assigned to baseline length so that designations are not serial.

Figure 5 (continued)



Note: See previous note (p. 34).

## CHAPTER IV

### Discussion

This study aimed to assess the feasibility and perceptions of the *RIT CORE Method* when taught through the synchronous teletherapy parent-mediated program with a Puerto Rican parent sample of children with ASD (ages three to five years). In addition, I explored changes in child spontaneous imitation skills when parents independently implemented the *RIT CORE Method* in play interactions. The results of this study are the first examination of a parent-mediated teletherapy intervention with Puerto Rican parents of children with ASD. Because this study focused on Puerto Rican parents, the results and perceptions of specific characteristics of the Puerto Rican parenting culture could be evaluated. In addition to yielding insights on the *feasibility* and acceptability of RIT ingredients, the results can inform modification to future studies and clinical-translational applications in Puerto Rico, both as a specific package such as RIT and, more generally, for parent-mediated supports.

Overall, the results of the study showed it is *feasible* for Puerto Rican parents of young children with ASD participating in the synchronous teletherapy coaching program to learn to independently implement the *RIT CORE Method* to criterion (i.e., the *fidelity* of implementation), complete the ten-week program (i.e., attendance), and to practice outside the context of direct teaching and coaching sessions (i.e., daily practice logs). Additionally, children improved their spontaneous imitation skills in play routines with their parents. This chapter will discuss the overall implications and how these relate to the current RIT research literature. I will also highlight the unique findings of this study relative to the unique features of Puerto Rico. Then, I will discuss limitations, offer recommendations, and suggest future directions for clinicians and researchers.

#### 4.1 Similarities and Differences to the RIT Literature

The results of this study extend the RIT research literature completed in the US to under-represented Puerto Rican families and contribute to the overall growing research on Latinx-specific parent-mediated intervention studies (DuBay, 2022; Martinez-Torres et al., 2021; Matos et al., 2009; Peredo et al., 2022). The results of this study align with Ingersoll and Gergan's (2007) and Wainer and Ingersoll's (2014) findings on the application of RIT methods with English-speaking families (these articles were used to develop the RIT program framework used in this study for Puerto Rican families).

Ingersoll and Gergans (2007) and Wainer and Ingersoll (2014) studied parent-mediated RIT. Their findings concur with the results of this study in the following ways: (1) improved fidelity of implementation of the *RIT CORE Method*, (2) variable improvement on child spontaneous imitations, and (3) positive perceptions of the intervention and implementation procedures. Previous authors found similar fidelity of implementation outcomes by parents and increased child spontaneous imitation outcomes, even though settings were different (e.g., in-person versus hybrid) and implementation procedures of the study varied (e.g., in-person guided versus online self-guided instruction). Across studies, including herein all parents improved their application of the *RIT CORE Method*. Like Ingersoll and Gergans (2007) and Wainer and Ingersoll (2014), data herein also showed variability in the immediacy of the change when compared to baseline conditions (specifically in the hybrid Wainer & Ingersoll, 2014 study and the study in this manuscript). Based on the results of Wainer and Ingersoll (2014) and the present study, the variability observed herein may be due to individual parental differences.

In the present study, I found that the two parents showing high variability and delayed learning (PC1 and PC2; see Figure 4) also had the most interrupted attendance (a total of five sessions; see Appendix B) relative to the other participating parents. Interrupted attendance meant rescheduling sessions (resulting in meetings every two weeks on several occasions) or missed direct coaching sessions (where parents decided to continue with the lessons regardless of the missed coaching session). Lack of consistency in parent-mediated intervention training can potentially affect parent responsiveness to treatment, cascading into a delayed effect on the child (Ros et al., 2016). Therefore, parents' inconsistency could be a potential reason for the delay and variability in immediately reaching the expected levels of the *RIT CORE Method*.

However, unlike Ingersoll and Gergans (2007) and Wainer and Ingersoll (2014), in this study, I gathered daily practice reports from parents throughout their participation in the ten-week program. Collecting this type of information supplements the *feasibility* of the *RIT CORE Method* when learned through the teletherapy approach. For example, it was evident that parents continued independent practice outside of direct interactions with the interventionist, which can only be captured when utilizing daily practice reports. According to the practice reports, more than half of the time, parents were practicing two-five days a week for ten-twenty minutes each session. Also, even those parents who showed inconsistent attendance were still practicing, as reported by their logs. These daily practice logs demonstrate continued practice regardless of rescheduling or canceling a session.

This could be an important finding because it is common to confront difficulties accessing and receiving consistent healthcare services in Puerto Rico because of relatively frequent natural disasters (e.g., hurricanes; Chandra et al., 2021). Indeed, a hurricane hit Puerto Rico during this study. More recently, the COVID-19 pandemic has exacerbated barriers to in-person care and further contributed to the attenuation of support for children with ASD (Perez Semanaz, 2020). Because of this, the healthcare system in Puerto Rico may significantly benefit from teletherapy programs such as the one implemented in this study because it may attenuate the impacts of limited or inconsistency of care for the child (e.g., direct therapies such as speech therapy), especially during crucial early childhood development arising from evidence-based family-centered services (see Camarata et al., 2022).

The results of this study show that Puerto Rican parents may indeed learn and continue child stimulation at home regardless of interrupted interactions with the interventionist, even when natural disasters or service delivery limitations preclude continuous in-person support. Continued practice, as reported in the parent practice logs of this study, shows that parents who learn to engage and apply evidence-based strategies can promote continuity of care at home regardless of pauses or discontinuity of direct therapy services due to environmental or accessibility factors (Ingersoll et al., 2020; National ASD Center, 2015; National Research Council, 2001; Wong et al., 2015). This supports one of the main reasons for studying the *feasibility* of learning the *RIT CORE Method* through this synchronous teletherapy parent program.

A second similarity across studies was the parent-mediation's positive (although variable) effect on improved child spontaneous imitations. I observed significant growth in child spontaneous imitations that was readily noticeable in the visual analysis (and BC-SMD in the present study). However, I found no effect in one participating child and a delayed change in two children (but not the immediacy of change). Based on these results, I can offer several potential factors that may affect change in child spontaneous imitations. These include the child's spontaneous imitation's dependency on (1) the parents reaching expected levels of *RIT CORE Method* implementation (Ingersoll & Gergans, 2007; Wainer & Ingersoll, 2014), (2) the parents providing the child an opportunity to spontaneously imitate (Ingersoll & Gergans, 2007), (3) the child's motivation to imitate (Ingersoll et al., 2003; Rogers et al., 2010), (4) child's object and play interest at baseline (Ingersoll, 2010).

Regarding point (1), the visual inspection in this study shows a significant increase in child spontaneous imitation. This increase was unexpected, regardless of the parent's implementation variability and delayed effects (e.g., PC1 showed no change; PC2 change). Although true for PC1 (no effect), a noticeable increase in PC2 was evident before the parent reached expected *RIT CORE Method* implementation levels. Therefore, this dependency might not be consistent across all parents for this sample.

Regarding point (2), the parent-mediated program impacts parent behavior changes in that parents can be taught how to offer their children more imitation opportunities. In the *RIT CORE Method*, parents are explicitly trained to offer opportunities in a ten-minute play session following the prompting hierarchy (see Figure 1). After parents learn to offer the child more opportunities to imitate, this potentially impacts change in child behavior relative to baseline when fewer opportunities are provided (Ingersoll & Gergans, 2007). This could mean that the child outcome measure needs to be modified in future studies. For example, child measures (if one wants to capture actual child imitation skills following a parent-mediated teletherapy approach) might include systematic probes after parents have learned to systematically offer imitation opportunities. Nevertheless, it is essential to study the effect on child imitation and explore how it could, directly and indirectly, relate to parent opportunity. Moreover, it reveals that teaching parents to elicit imitation opportunities results in better child responsiveness to the parent's interactions.



Regarding point (3), children may exhibit different motivation levels to spontaneously imitate actions in play with their parents. Ingersoll and colleagues (2003) argued that children with ASD respond better to imitation when sensory cues (e.g., touching a child to gain their attention) are provided. Based on this argument, it could be that some children in this study could have benefited from other types of natural reinforcers associated with individual variations in motivation to learn to imitate and maintain the skill over time. Therefore, in future studies, the researchers and interventions should consider how to ensure that the parents are being coached to modify positive reinforcers unique to their children. Another possible factor is presented by Rogers and colleagues, who report that child attentional skills may influence child imitation outcomes (Rogers et al., 2010; see also Camarata & Gibson, 1999). Rogers and colleagues argue that children may imitate more if the adult has correctly gained their attention during an interaction. Consistency and higher levels of imitations in children with ASD of this sample might have depended on the extent to which parents had their child's attention when providing a model. If this assumption were correct, parents might need additional time to effectively elicit attention from their children to obtain a more spontaneous response. However, conclusions regarding this factor should be considered in future studies that include data that were not gathered in this study.

Regarding point (4), children with a lower object and play interest may exhibit fewer treatment effects simply due to reduced learning opportunities. Ingersoll (2010), in a brief report, indicated that child outcomes in imitation might directly relate to the child's level of object interest and play interest at baseline. Other studies have found that children not responding to treatment may be impacted by their baseline interest levels (Sherer et al., 2001). An assumption regarding the results of this study could be that children displaying lower treatment effects, or no effect, could relate to lower levels of play interest or toy selection interests within a session. However, the data are not available to address this question herein.

Third, parents reported positive perceptions of the program across all studies, with limited exceptions on some survey items. These perceptions are essential to note and consider for informing clinicians and for future research questions. Clinically, it can inform providers which elements are acceptable and beneficial for parents related to or regardless of cultural background. For research interested in expanding or replicating the results of the current project, it can inform on which elements should be part of the program implementation procedures. Puerto Rican

parents in this sample reported different perceptions of specific program implementation procedures and the *RIT CORE Method*. These should be considered for future modifications: (1) the reported difficulty of applying the strategies of “describing the child’s play” and “prompting hierarchy,” (2) the need for additional self-monitoring tools for parents to know how they are progressing in their application of the RIT strategies, and (3) changes of their children’s behavior to the point of being compared to other children.

The mixed perceptions of the complexity of strategies (i.e., “describing the child’s play” and “prompting hierarchy”) may be related to **cultural parenting characteristics** and overall **child behavior expectations**. Within the *RIT CORE Method*, “describing the child’s play” means “talking” about what the child and the parent are actively engaged in while the parent contingently imitates the child. The parent is trained to use simple vocabulary appropriate for the child’s language level and to avoid commands and questions. Although contingent imitation was perceived as a simple strategy, mixed perceptions of “describing the child’s play” may be attributed to the cultural characteristic of *respeto* and *authority*.

Ramos et al. (2018) and Peredo et al. (2022) found similar behaviors during the implementation of PCIT with a Puerto Rican sample (Matos et al., 2006; Ramos et al., 2018) and EMT en Español with a Latinx sample (Peredo et al., 2022). Both articles highlight that difficulty describing play is common across Puerto Rican (Ramos et al., 2018) and Latinx cultures compared to non-Latinx populations (Peredo et al., 2022). These parents tend to teach children **respect** for elders (e.g., the evoking **authority** of adults over children) using relatively high-frequency delivery of commands and questioning. With three consistent findings across different studies of this connection between strategies and cultural characteristics, more substantial evidence exists that the influence of **respect** and **authoritative parenting** may be an essential parameter to consider when adapting parent-mediated programs for Puerto Rican families. The next step in research, as recommended by Ramos et al. (2018), should consist of further analysis to determine if the use of commands and questions has or does not have a countertherapeutic effect in Latinx families as they affect other non-Latinx cultures (Ramos et al., 2018) and to what extent these procedures could be modified.

Similar assumptions may relate to using the “prompting hierarchy” in the *RIT CORE Method*. When using this strategy, parents are asked to model a new action during play at least three times before providing physical and verbal support. Difficulty implementing multi-level

strategies such as the “prompting hierarchy” has been minimally studied and reported in the research literature. A single study by Halbur and colleagues (2020) evaluated parental preferences and perceptions of different prompting complexity levels based on different intervention approaches (not RIT). The authors reported that parents in this study (non-Latinx) preferred simpler prompting strategies (Halbur et al., 2020). So, it is possible that difficulties with prompt hierarchies are not culturally specific. However, one can assume that for this Puerto Rican sample, the mixed perceptions of this strategy could potentially also be linked to the Puerto Rican cultural influences of *pampering*. The parent might believe that the child cannot perform models independently and therefore needs to immediately offer support (e.g., “nurture” in Torres et al., 2014). However, the data in the present study cannot test this assumption so additional research is needed.

Another mixed perception was the need for additional self-monitoring tools for parents to support the application of strategies (e.g., tables and graphs). A growing literature suggests that **self-monitoring tools** in parent training programs help support the improvement and maintenance of skills over time (Ivory & Kerns, 2022; Lee et al., 2012; Pinkelman & Horner, 2017; Rispoli et al., 2017). Including this element in the parent-mediated program may increase the immediacy of training effects. It was unclear whether this mixed perception could be linked to Puerto Rican culture. Instead, this is likely motivated by a broader interest in receiving more frequent and specific feedback during training. Parents could also present this need because of their *respeto* over authority or consideration of providers as experts (Calzada et al., 2010). Latinx parents are known to rely on the provider's knowledge and consider feedback and education from them to be meaningful. Certain groups of Puerto Rican parents may favor additional feedback, which can be significant and reflect official documentation of their progress throughout the program.

The last item rated differently related to observing changes in their children’s behavior (e.g., imitation) to the point of being comparable to other typically developing children. This is perhaps a feature that transcends cultural differences as most parents look at their children relative to peer performance. Although all parents agreed with this comment, two parents rated it as a four (somewhat agreed). The data obtained in this study do not show a pattern that could correlate with cultural influences or parent demographics. It could be that additional information regarding parental characteristics needs to be gathered to test a direct correlation to this

perception. An example could be adding a measure of **parental stress**. Several studies have found the potential of parental stress correlating with parental perceptions of their children's overall abilities (Hattangadi et al., 2020; Unternaehrer et al., 2019; Webster-Stratton, 1990). Therefore, adding a parental stress measure might add additional parent information that can be used to examine the relationship between the variables.

#### 4.2 Recommendation for Clinicians

The *RIT CORE Method* can be taught to Puerto Rican parents to improve child imitation skills. With all the effects of the pandemic on the decrease or cancellation of services on the island and the increase in ASD within Puerto Rico, further training services using parent-mediated approaches can be resourceful for clinicians. Puerto Rican agencies should support **additional training** for clinicians in programs such as the *RIT CORE Method* through parent-mediated approaches and provide resources to support teletherapy. This might warrant funding through policy and further research to support the significant impact of parent mediation on the island.

If a clinician decides to teach a parent the *RIT CORE Method* or use the current program with a group of parents, the clinician should consider the following. This study showed that parents could implement many key RIT strategies, which can be learned quickly using remote learning. However, two strategies within the *RIT CORE Method* might take longer for parents to buy into or apply correctly: **describing the child's play** and following the **prompting hierarchy** before providing physical support. A suggestion could be to **spend more time** coaching the parent in these strategies (e.g., Martinez-Torres et al., 2021; Matos et al., 2006, 2009) and use criterion-based data collection to monitor when the parent is ready to move on to the next *RIT CORE Method* ingredient. For example, the clinician can monitor the parent's progress in implementing one strategy of the *RIT CORE Method* to mastery. After the parent reaches the implementation criterion, the clinician can transition and add another strategy to the method.

Based on parental perceptions, employing **self-monitoring tools** could be helpful for parents to understand and use these strategies at an acceptable level. For example, parents could be given their own rating scale and self-analyze their performance on the strategies. This would warrant training on how to rate themselves using the scale but can be embedded within the

teaching and coaching lessons. Other factors, such as **coaching** sessions and **video** examples, were consistently reported as helpful. The literature supports these suggestions (e.g., Martinez-Torres et al., 2021) and should be considered when implementing the program with Puerto Rican parents. For example, Martinez-Torres and colleagues (2021) explain how incorporating audiovisual models into the program can “provide opportunities for active discussion with parents” (Martinez-Torres et al., 2021; p.5). Also, direct coaching and feedback have been found to increase clinician-parent positive interactions and help inform parents of their progress as mediators for the development of their children (Martinez-Torres et al., 2021). Finally, to improve child spontaneous imitations more broadly, clinicians may need to **extend the program** by adding additional coaching sessions after the parent shows expected levels of the *RIT CORE Method* implementation. Criterion-based data collection may also be helpful for this recommendation, as defined previously.

#### **4.3 Limitations and Future Directions**

The primary limitation of this study is the small sample size and the limited scope of the sampling (e.g., only families with internet availability and dedicated time to participate in coaching sessions). The single case design is helpful for *feasibility* studies and evaluating the training impact on individual families, but a small sample makes it inherently difficult to determine whether these results will replicate in a larger Puerto Rican sample. Also, the sample in this study is considered highly educated because per the United States Census Bureau (2022), 24.7% of people living in Puerto Rico have an education higher of a bachelor’s or higher. I would recommend conducting a replication of the study with a much larger number of participants with variable educational backgrounds to confirm if the effects are replicable to other Puerto Rican parents. This could then inform policy in Puerto Rico, especially with the evident needs within the ASD population and a pressing need to offer more extensive support within the context of personnel shortages and future natural disasters such as hurricanes. Subsequently, a Randomized Control Trial can be conducted with a more culturally driven program that has been modified based on this and future pilot and *feasibility* studies.

Another limitation is the short maintenance data obtained (1-week and one month after completing the program). A short maintenance phase was planned to complete the study within

an established timeline. I would recommend extending the maintenance phase (three months and six months after the completion of the treatment) to determine if parents' skills continue over a more extended period and if child behavior changes continue to increase. This could inform if parents learned the method to the point of not needing direct coaching from the interventionist. It may also tell if parents perceived the method to be worth using over time. If these data are collected, I would also recommend gathering additional qualitative data about their perceptions of using the intervention over time.

A third limitation is the absence of a blind primary coder for the outcome measures in this study. A primary blind coder was not used in this study due to a lack of access to fluent Spanish-speaking researchers or research students in the institution. Another reason was that if a Spanish-speaking blind coder was identified, I did not have sufficient resources to support their work. Future studies should include a blind primary coder as part of the study protocols to increase study validity.

A fourth limitation was the observable variability and delayed onset of the treatment effect on the application of RIT for several parents. As recommended by Wainer and Ingersoll (2014), a stepped-care approach could be beneficial to add to the protocols of an intervention for this population wherein additional supports are differentially provided when some parents struggle to learn the procedures. This, in turn, can extend the program for parents who need more time to consistently implement the RIT method or other evidence-based parent-mediated intervention methods and become more comfortable with the approach.

A fifth limitation was the child outcome measurement system needing further augmentation. Researchers will need to explore how to better capture baseline data for children when using parent-mediated approaches across multiple behaviors and naturalistic settings. I recommend dedicating a study to more thoroughly examining child outcomes in Puerto Rico and conducting a criterion-based design to assess if a specific period is needed to see considerably more significant changes in child imitation skills and broader social communication skills. This could help understand the required dosage in parent-mediated interventions to reach broader child behavior changes. Similarly, broad transfer and generalization measures should be included in future studies.

For example, researchers should investigate to what extent parents can generalize the *RIT CORE Method* to other daily routines. RIT is a focus and semi-structured method that is *feasible*,

well-perceived, and effective when implemented by the parent within a play routine at home as evidenced by the outcomes of this study. In future studies, I plan to systematically explore and evaluate the applicability of the method to different routines at home, informing its generalizability and applicability in Puerto Rican households.

#### **4.4 Conclusion**

The results of this study indicate that it is *feasible* for Puerto Rican parents to learn and implement the *RIT CORE Method* to support their children with ASD using a parent-mediated teletherapy approach. This parent learning program provides a foundation for a better understanding of the relative acceptability of key components of the *RIT CORE Method* in Puerto Rican parents and the potential applicability of parent-mediated approaches that offer continuity of care to children with ASD. This study supports the hypothesis that RIT can be taught to Puerto Rican parents and carry over to improve child imitation changes (with limitations expressed above). With this study, clinicians and researchers have a basic understanding of possible cultural influences on the learning and application of the *RIT CORE Method* but also understand program implementation procedures to support parent learning and child continuity of care at home.

# APPENDIX A

## RIT CORE Method Rating Scale

### Fidelity of Implementation

		Fidelity of Implementation				
		Observer:				
		Contingent Imitation:				
		Linguistic Mapping:				
		Model:				
		Prompt:				
		Praise:				
		Pacing:				
		Average Fidelity:				
		High Fidelity				
		5				
		4				
		3				
		2				
		1				
		Low Fidelity				
		1				
<b>RIT COMPONENT</b>						
<b>IMITATE THE CHILD</b> Imitate child's toy play, gestures, and vocalizations.	Therapist does not imitate the child's gestures, vocalizations, and toy play	Therapist imitates a few of the child's gestures, vocalizations, and toy play, but misses the majority of opportunities	Therapist imitates the child's gestures, vocalizations, and toy play up to 50% of the time, but misses many opportunities	Therapist imitates more than 50% of the child's gestures, vocalizations, and toy play when the child is appropriately engaged, but misses opportunities	Therapist imitates almost all of the child's gestures, vocalizations, and toy play throughout the session when the child is appropriately engaged.	
<b>DESCRIBE THE PLAY</b> Use simplified, repetitive language around child's attentional focus.	Therapist does not use simplified language around the child's attentional focus, language is too complex, or therapist does not use any language.	Therapist uses simplified language around the child's attentional focus during some of the session, but misses the majority of opportunities or majority of language is too complex.	Therapist uses simplified language around the child's attentional focus up to 50% of the time, but misses many opportunities.	Therapist uses simplified language around the child's attentional focus for more than 50% of the session, but misses opportunities or language is not appropriate for child's level of language.	Therapist uses simplified language around the child's attentional focus throughout the session. Almost all of the therapist's language is appropriate for child's language level.	
<b>MODEL ACTION</b> Model actions around child's focus of interest.	Therapist models actions that are inappropriate for child's level/interest or does not recruit child's attention.	Therapist models some actions that are appropriate for child's level/interest but also many that are not or often fails to recruit the child's attention.	Therapist models some actions that are appropriate for child's level/interest and recruits child's attention some of the time.	Therapist models actions that are appropriate for child's level/interest more than 50% of the time and recruits child's attention the majority of the time.	Therapist models actions that are very appropriate for child's level/interest and recruits child's attention.	
<b>PACING</b> Model an action every 1-2 minutes. Adjust rate when necessary to keep child engaged.	Therapist models actions at a significantly lower or higher rate throughout session. Pacing significantly disrupts child's engagement or learning.	Therapist models actions at a significantly lower or higher rate throughout session. Pacing somewhat disrupts child's engagement or learning.	Therapist models actions at a somewhat lower or higher rate throughout session. Pacing does not significantly disrupt child's engagement or learning.	Therapist models at an appropriate rate for some, but not all of the session. Pacing does not significantly disrupt child's engagement or learning.	Therapist models actions at an appropriate rate throughout session. Pacing is appropriate for keeping child engaged and learning. Therapist models at least 10 trials, and no more than 20.	
<b>PROMPT IMITATION</b> Physically prompt child to imitate after 3 presentations of action.	Therapist does not physically prompt child to imitate action after presenting the action 3 times.	Therapist prompts child to complete action after third trial a minority of the time, but misses many opportunities or prompting often does not result in imitation (e.g., child switches activities without imitating).	Therapist prompts child to complete action after third trial up to 50% of the time, but misses many opportunities or prompting does not result in imitation (e.g., child switches activities without imitating).	Therapist prompts child to complete action after third trial the majority of the time, but misses opportunities or prompting occasionally does not result in imitation (e.g., child switches activities without imitating).	Therapist consistently prompts child to complete action after third trial if child has not spontaneously imitated. Once therapist begins a trial, therapist follows through such that the trial ends in imitation.	
<b>PRASE</b> Animate/praise child's spontaneous or prompted imitation.	Therapist does not praise child's spontaneous or consistently praises incorrect responses.	Therapist praises a minority of the child's spontaneous and prompted imitations, but misses the majority of opportunities or praises multiple responses.	Therapist praises some of the child's spontaneous and prompted imitations, but misses many opportunities or praises incorrect responses.	Therapist praises the majority of the child's spontaneous and prompted imitation, but misses some opportunities or praise is provide for an incorrect response.	Therapist praises all of the child's spontaneous and prompted imitation throughout the session. Praise is withheld for incorrect responding.	



**APPENDIX B**  
Program Attendance

Participant	Total attended	Total missed or rescheduled
PC1	18	5
PC2	19	5
PC3	20	2
PC4	20	3
PC5	20	0
PC6	20	0

*Note:* Parents were expected to attend a total of twenty sessions.

## APPENDIX C

### Interventionist Procedural Fidelity Checklist

#### Spanish RIT coaching fidelity form

\*\*Adapted from Ingersoll and colleagues, and meRIT teletherapy coaching fidelity form\*\*

Fidelity coder: \_\_\_\_\_

Coach: \_\_\_\_\_

Participant ID: \_\_\_\_\_

Video ID: \_\_\_\_\_

Fidelity coding date: \_\_\_\_\_

Lesson: \_\_\_\_\_

Notes (if applicable): \_\_\_\_\_

Procedure	Yes	No	n/a	Notes
1. For the initial session, the interventionist introduced herself/himself to the parent.				
2. For the initial session, the interventionist summarized the purpose of the intervention and the procedures of the program.				
3. The interventionist has started recording and talks through all set up steps as described in FOP.				

<p>4. The interventionist greets the parent warmly (e.g., good morning; how are <u>you?</u>; how is ____?)</p>			
<p>5. The coach helps the parent go through any difficulties regarding manual information or video access.</p>			
<p>6. If the parent informs any difficulties from the above, the coach provides an appropriate response and/or feedback.</p>			
<p>7. The coach reviews the homework and reflection questions. (5 minutes; If more, indicate why in the notes section)</p>			
<p>8. The coach teaches the new skills/concept using the powerpoint for up to 15 minutes without the child present.</p>			
<p>9. If the child is present during the teaching portion, the coach provides alternatives to maintain the child occupied while teaching the parent or provides breaks as needed.</p>			
<p>10. The coach models the skill using a didactic video, by role-playing, and/or by presenting “what if” situations for up to 10 minutes.</p>			

<p>11. The coach encourages the parent to practice the skill taught in the session with the child (reference to a slide that indicates "Let's practice").</p>			
<p>12. The coach provides coaching with at least 4 events of positive and corrective feedback while the parent practices the strategies.</p> <p>Example of strategy and feedback provided:</p> <p>_____</p> <p>_____</p> <p>Example of strategy and feedback provided:</p> <p>_____</p> <p>_____</p> <p>Example of strategy and feedback provided:</p> <p>_____</p> <p>_____</p> <p>Example of strategy and feedback provided:</p> <p>_____</p> <p>_____</p>			
<p>13. Throughout the session, the coach is actively providing opportunities for comments, questions, or concerns to the parent.</p>			

<p>14. If any questions or concerns are reported by the parent, the coach works through them with the parent, providing possible solutions or answers.</p>					
<p>15. The interventionist reviews the session's skill(s) practiced and homework/reflection for the following week.</p>					
<p>16. The coach references at least 1 example of the parent using the target strategies during the review portion.</p> <p>Strategy and reference:</p> <p>_____</p> <p>_____</p>					
<p>17. The interventionist addresses any unrelated concerns that the parent raises. (if applicable)</p>					
<p>18. The coach conducted the entire session in Spanish.</p>					

## References

- Agazzi, H., Salinas, A., Williams, J., Chiriboga, C.O., & Armstrong, K. (2010). Adaptation of a behavioral parent-training curriculum for Hispanic caregivers. *Infant Mental Health Journal, 31*(2), 182-201. <https://doi.org/10.1002/imhj.20251>
- Bauermeister, J.J. (2016). Parental behavior training and Latino/Hispanic children with ADHD and disruptive behaviors. *The ADHD Report, 24*(8). <https://doi.org/10.1521/adhd.2016.24.8.9>
- Bal, V. H., Katz, T., Bishop, S. L., & Krasileva, K. (2016). Understanding definitions of minimally verbal across instruments: Evidence for subgroups within minimally verbal children and adolescents with ASD spectrum disorder. *Journal of Child Psychology and Psychiatry, 57*(12), 1424-1433. <https://doi.org/10.1111/jcpp.12609>
- Barrera, M. & Castro, F. (2006). A heuristic framework for the cultural adaptation of interventions. *Clinical Psychology: Science and Practice, 13*, 311-316. <https://doi.org/10.1111/j.1468-2850.2006.00043.x>.
- Beresford, P. (2018). Public participation in health and social care: Exploring the co-production of knowledge. *Frontiers, 3*, 1-12. <https://www.frontiersin.org/article/10.3389/fsoc.2018.00041>
- Bernal, G. & Bonilla, J., & Bellido, C. (1995). Ecological validity and cultural sensitivity for outcome research: Issues for the cultural adaptation and development of psychosocial treatments with Hispanics. *Journal of Abnormal Child Psychology, 23*, 67-82. <https://doi.org/10.1007/BF01447045>.
- Beauchamp, M. L. H., Amorim, K., Wunderlich, S. N., Lai, J., Scolah, J., & Elsabbagh, M. (2022). Barriers to access and utilization of healthcare services for minority-language speakers with neurodevelopmental disorders: A scoping review. *Frontiers in Psychiatry, 13*, 915-999. <https://doi.org/10.3389/fpsy.2022.915999>
- Buzhardt, J., Rusinko, L., Heitzman-Powell, L., Trevino-Maack, S., & McGrath, A. (2016). Exploratory evaluation and initial adaptation of a parent training program for Hispanic families of children with ASD. *Family Process, 55*(1), 107-122. <https://doi.org/10.1111/famp.12146>
- Calzada, E. J., Fernandez, Y., & Cortes, D. E. (2010). Incorporating the cultural value of respeto into a framework of Latino parenting. *Cultural Diversity & Ethnic Minority Psychology, 16*(1), 77-86. <https://doi.org/10.1037/a0016071>
- Calzada, E. J., Huang, K. Y., Anicama, C., Fernandez, Y., & Brotman, L. M. (2012). Test of a cultural framework of parenting with Latino families of young children. *Cultural Diversity & Ethnic Minority Psychology, 18*(3), 285-296. <https://doi.org/10.1037/a0028694>
- Camarata, S. M., & Gibson, T. (1999). Pragmatic language deficits in attention-deficit hyperactivity disorder (ADHD). *Mental Retardation and Developmental Disabilities Research Reviews, 5*(3), 207-214. [https://doi.org/10.1002/\(SICI\)1098-2779\(1999\)5:3<207::AID-MRDD7>3.0.CO;2-O](https://doi.org/10.1002/(SICI)1098-2779(1999)5:3<207::AID-MRDD7>3.0.CO;2-O)
- Camarata, S., Liu, X. L., Lee, W., Li, T., Jiang, F., & Simms, M. (2022). Adapting the UNICEF/WHO Nurturing Care Framework for speech-language pathologists to support Sustainable Development Goal 4. *International Journal of Speech-Language Pathology, 1-5*. Advance online publication. <https://doi.org/10.1080/17549507.2022.2141327>
- Chambers, D. A., & Norton, W. E. (2016). *The Adaptome: Advancing the Science of*

- Intervention Adaptation. *American Journal of Preventive Medicine*, 51(4 Suppl 2), S124–S131. <https://doi.org/10.1016/j.amepre.2016.05.011>
- Chandra, A., Marsh, T., Madrigano, J., Simmons, M. M., Abir, M., Chan, E. W., Ryan, J., Nanda, N., Ziegler, M. D., & Nelson, C. (2021). Health and social services in Puerto Rico before and after hurricane Maria: Predisaster conditions, hurricane damage, and themes for recovery. *Rand Health Quarterly*, 9(2), 10.
- Cheng, W. M., Smith, T. B., Butler, M., Taylor, T. M., & Clayton, D. (2022). Effects of parent-implemented interventions on outcomes of children with ASD: A meta-analysis. *Journal of ASD and Developmental Disorders*, 1-17. <https://doi.org/10.1007/s10803-022-05688-8>
- Chlebowski, C., Magaña, S., Wright, B., & Brookman-Fraze, L. (2018). Implementing an intervention to address challenging behaviors for ASD spectrum disorder in publicly funded mental health services: Therapist and parent perceptions of delivery with Latinx families. *Cultural Diversity & Ethnic Minority Psychology*, 24(4), 552– 563. <https://doi.org/10.1037/cdp0000215>
- Collazo, S.G. (2010). *Profile of the Puerto Rican Population in United States and Puerto Rico: 2008*. <https://www.census.gov/library/working-papers/2010/demo/collazo-01.html>
- Crónicas. (2022, November 22). *Aumentan exponencialmente los estudiantes con ASD en el programa de educación especial*. <https://www.revistacronicas.com/2022/11/aumentan-exponencialmente-los-estudiantes-con-ASDo-en-el-programa-de-educacion-especial/>
- Dadgar, H., Alaghband Rad, J., Soleymani, Z., Khorammi, A., McCleery, J., & Maroufizadeh, S. (2017). The relationship between motor, imitation, and early social communication skills in children with ASD. *Iranian Journal of Psychiatry*, 12(4), 236–240. PMID: PMC5816912
- Davis, R. E., Lee, S., Johnson, T. P., & Rothschild, S. K. (2019). Measuring the elusive construct of personalismo among Mexican American, Puerto Rican, and Cuban American adults. *Hispanic Journal of Behavioral Sciences*, 41(1), 103-121. <https://doi.org/10.1177/0739986318822535>
- DuBay M. (2022). Cultural adaptations to parent-mediated autism spectrum disorder interventions for Latin American families: A scoping review. *American Journal of Speech-Language Pathology*, 31(3), 1517–1534. [https://doi.org/10.1044/2022\\_AJSLP-21-00239](https://doi.org/10.1044/2022_AJSLP-21-00239)
- DuBay, M., Watson, L. R., & Zhang, W. (2018). In search of culturally appropriate ASD interventions: Perspectives of Latino caregivers. *Journal of ASD and Developmental Disorders*, 48(5), 1623–1639. <https://doi.org/10.1007/s10803-017-3394-8>
- Edmunds, S. R., Frost, K. M., Sheldrick, R. C., Bravo, A., Straiton, D., Pickard, K., Grim, V., Drahota, A., Kuhn, J., Azad, G., Pomales Ramos, A., Ingersoll, B., Wainer, A., Ibanez, L. V., Stone, W. L., Carter, A., & Broder-Fingert, S. (2022). A method for defining the CORE of a psychosocial intervention to guide adaptation in practice: Reciprocal imitation teaching as a case example. *ASD: The International Journal of Research and Practice*, 26(3), 1-14. <https://doi.org/10.1177/13623613211064431>
- Edwards, L.A. (2014). A meta-analysis of imitation abilities in individuals with ASD spectrum disorders. *ASD Research*, 7, 363–380. <https://doi.org/10.1002/aur.1379>
- El Nuevo Día. (2022, November 21). *Alianza de ASD de Puerto Rico advierte sobre incremento de ASD en la isla*. <https://www.elnuevodia.com/estilos-de-vida/familia/notas/alianza-de-ASDo-de-puerto-rico-advierte-sobre-incremento-de-ASDo-en-la-isla/>

- Elliott, S. N., & Treuting, M. V. (1991). The Behavior Intervention Rating Scale: Development and validation of a pretreatment acceptability and effectiveness measure. *Journal of School Psychology, 29*(1), 43–51. [https://doi.org/10.1016/0022-4405\(91\)90014-I](https://doi.org/10.1016/0022-4405(91)90014-I)
- French, L., & Kennedy, E. (2018). Annual research review: Early intervention for infants and young children with, or at-risk of, ASD Spectrum Disorder: A systematic review. *Journal of Child Psychology and Psychiatry, and Applied Disciplines, 59*(4), 444–456. <https://doi.org/10.1111/jcpp.12828>
- Gannotti, M. E., Handwerker, W. P., Groce, N. E., & Crux, C. (2001). Sociocultural influences on disability status in Puerto Rican children. *Physical Therapy, 81*(9), 1512–1523.
- Halbur, M. E., Kodak, T., Wood, R., & Corrigan, E. (2020). An evaluation of parent preference for prompting procedures. *Journal of Applied Behavior Analysis, 53*(2), 707–726. <https://doi.org/10.1002/jaba.616>
- Harris, R., & Brunson, C. (2021). Measuring the exposure of Black, Asian, and other ethnic groups to COVID-infected neighborhoods in English towns and cities. *Applied Spatial Analysis and Policy, 3*, 1–26. <https://doi.org/10.1007/s12061-021-09400-8>
- Harris, P. A., Taylor, R., Minor, B. L., Elliott, V., Fernandez, M., O'Neal, L., McLeod, L., Delacqua, G., Delacqua, F., Kirby, J., Duda, S. N., & REDCap Consortium (2019). The REDCap consortium: Building an international community of software platform partners. *Journal of Biomedical Informatics, 95*, 103-208. <https://doi.org/10.1016/j.jbi.2019.103208>
- Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap) a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics, 42*(2), 377–381. <https://doi.org/10.1016/j.jbi.2008.08.010>
- Hattangadi, N., Cost, K.T., Birken, C.S., Borkhoff, C.M., Maguire, J.L., Szatmari, P., Charach, A. (2020). Parenting stress during infancy is a risk factor for mental health problems in 3-year-old children. *BMC Public Health 20*, 17-26. <https://doi.org/10.1186/s12889-020-09861-5>
- Hedges, L. V., Pustejovsky, J. E., & Shadish, W. R. (2013). A standardized mean difference effect size for multiple baseline designs across individuals. *Research Synthesis Methods, 4*(4), 324- 341. <https://doi.org/10.1002/jrsm.1086>
- Hersen M. (1982) Single-Case Experimental Designs. In: Bellack A.S., Hersen M., Kazdin A.E. (eds) International Handbook of Behavior Modification and Therapy. Springer, Boston, MA. [https://doi.org/10.1007/978-1-4615-7275-6\\_7](https://doi.org/10.1007/978-1-4615-7275-6_7)
- Holtrop, K., Durtschi, J. A., & Forgatch, M. S. (2022). Investigating active ingredients of the Generation PMTO intervention: Predictors of postintervention change trajectories in parenting practices. *Journal of the Division of Family Psychology of the American Psychological Association (Division 43), 36*(2), 212–224. <https://doi.org/10.1037/fam0000925>
- Ingersoll, B. (n.d.) Reciprocal Imitation Training [PDF manual]. IECC Conference: [https://ieccwa.org/uploads/IECC2014/HANDOUTS/KEY\\_2720064/RITManual.pdf](https://ieccwa.org/uploads/IECC2014/HANDOUTS/KEY_2720064/RITManual.pdf)
- Ingersoll B. (2010). Pilot randomized controlled trial of Reciprocal Imitation Training for teaching elicited and spontaneous imitation to children with ASD. *Journal of ASD and Developmental Disorders, 40*(9), 1154–1160. <https://doi.org/10.1007/s10803-010-0966-2>
- Ingersoll, B. (2012). Brief report: Effect of a focused imitation intervention on social



- functioning in children with ASD. *Journal for ASD and Developmental Disorders*, 42(8), 1768-1773. <https://doi.org/10.1007/s10803-011-1423-6>
- Ingersoll, B. & Lalonde, K. (2010). The impact of object and gesture imitation training on language use in children with ASD spectrum disorder. *Journal of Speech, Language and Hearing Research*, 53(4), 1040-1051. [https://doi.org/10.1044/1092-4388\(2009/09-0043\)](https://doi.org/10.1044/1092-4388(2009/09-0043))
- Ingersoll, B. & Schreibman, L. (2006). Teaching reciprocal imitation skills to young children with ASD using naturalistic behavioral approach: Effects on language, pretend play, and joint attention. *Journal for ASD and Developmental Disorders*, 36(4), 487. <https://doi.org/10.1007/s10803-006-0089-y>
- Ingersoll, B., Schreibman, L., & Tran, Q. H. (2003). Effect of sensory feedback on immediate object imitation in children with autism. *Journal of Autism and Developmental Disorders*, 33(6), 673–683. <https://doi.org/10.1023/b:jadd.0000006003.26667.f8>
- Ingersoll, B., Straiton, D., & Caquias, N. R. (2020). The role of professional training experiences and manualized programs in ABA providers' use of parent training with children with ASD. *Behavior Therapy*, 51(4), 588-600. <https://doi.org/10.1016/j.beth.2019.09.004>
- Ingersoll, B., Wainer, A. L., Berger, N. I., Pickard, K. E., & Bonter, N. (2016). Comparison of a self-directed and therapist-assisted telehealth parent-mediated intervention for children with ASD: A pilot RCT. *Journal of ASD and Developmental Disorders*, 46(7), 2275-2284. <https://doi.org/10.1007/s10803-016-2755-z>
- Ishizuka, Y. & Yamamoto, J. (2021). The effect of contingent imitation intervention on children with ASD spectrum disorder and co-occurring intellectual disabilities. *Research in ASD Spectrum Disorders*, 85, 101-783. <https://doi.org/10.1016/j.rasd.2021.101783>
- Ivory, K. P., & Kern, L. (2022). Assessing parent implementation of behavior support strategies and self-Monitoring to enhance maintenance. *Journal of Positive Behavior Interventions*, 24(1), 58-68. <https://doi.org/10.1177/10983007211042106>
- Jones, D. R., & Mandell, D. S. (2020). To address racial disparities in ASD research, we must think globally, act locally. *ASD*, 24(7), 1587-1589. <https://doi.org/10.1177/1362361320948313>
- Ledford, J. R., Barton, E. E., Severini, K. E., & Zimmerman, K. N. (2019). A primer on single-case research designs: Contemporary use and analysis. *American Journal on Intellectual and Developmental Disabilities*, 124(1), 35-56. <https://doi.org/10.1352/1944-7558-124.1.35>
- Ledford, J. R., & Gast, D. L. (Eds.). (2018). *Single case research methodology*. Routledge.
- Lee P., Niew W., Yang H., Chen V. C., Lin K. (2012). A meta-analysis of behavioral parent training for children with attention deficit hyperactivity disorder. *Research in Developmental Disabilities: A Multidisciplinary Journal*, 33(6), 2040-2049.
- Maenner, M. J., Shaw, K. A., Bakian, A. V., Bilder, D. A., Durkin, M. S., Esler, A., Furnier, S. M., Hallas, L., Hall-Lande, J., Hudson, A., Hughes, M. M., Patrick, M., Pierce, K., Poynter, J. N., Salinas, A., Shenouda, J., Vehorn, A., Warren, Z., Constantino, J. N., DiRienzo, M., ... Cogswell, M. E. (2021). Prevalence and characteristics of autism spectrum disorder among children aged 8 Years - autism and developmental disabilities monitoring network, 11 Sites, United States, 2018. *Morbidity and Mortality Weekly Report. Surveillance Summaries*, 70(11), 1-16. <https://doi.org/10.15585/mmwr.ss7011a1>
- Magaña, S., Lopez, K., & Machalicek, W. (2017). Parents taking action: A psycho

- educational intervention for Latino parents of children with ASD spectrum disorder. *Family Process*, 56(1), 59-74. <https://doi.org/10.1111/famp.12169>
- Mandell, D. S., Ittenbach, R. F., Levy, S. E., & Pinto-Martin, J. A. (2007). Disparities in diagnoses received prior to a diagnosis of autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 37(9), 1795-1802. <https://doi.org/10.1007/s10803-006-0314-8>
- Mandell, D. S., Wiggins, L. D., Carpenter, L. A., Daniels, J., DiGuseppi, C., Durkin, M. S., Giarelli, E., Morrier, M. J., Nicholas, J. S., Pinto-Martin, J. A., Shattuck, P. T., Thomas, K. C., Yeargin-Allsopp, M., & Kirby, R. S. (2009). Racial/ethnic disparities in the identification of children with autism spectrum disorders. *American Journal of Public Health*, 99(3), 493-498. <https://doi.org/10.2105/AJPH.2007.131243>
- Martinez-Torres, K., Boorum, O., Peredo, T., Lense, M., & Camarata, S. (2021). Parent involvement in interventions for children with ASD Spectrum Disorder in the Latinx community. *Research in Developmental Disabilities*, 116, 104012. <https://doi.org/10.1016/j.ridd.2021.104012>
- Martinez-Torres, K., & Camarata, S. (2022). Disability eligibility patterns in head start programs: A comparison of Puerto Rico and the United States. *Inclusión*, 10(2), 134-146. <https://doi.org/10.1352/2326-6988-10.2.134>
- Martinuzzi, S., Gould, W.A., & Ramos Gonzalez, O.M. (2006). Lande development, land use, and urban sprawl in Puerto Rico integrating remote sensing and population census data. *Landscape and Urban Planning*, 79(2007), 288-297. doi:10.1016/j.landurbplan.2006.02.014
- Matos, M., Torres, R., Santiago, R., Jurado, M., & Rodríguez, I. (2006). Adaptation of parent-child interaction therapy for Puerto Rican families: A preliminary study. *Family Process*, 45(2), 205-22. <https://doi.org/10.1111/j.1545-5300.2006.00091.x>
- McGoldrick, M., Giordano, J., & Garcia-Preto, N. (Eds.). (2005). *Ethnicity and Family Therapy* (3rd ed.). The Guilford Press.
- Miniscalco, C., Rudling, M., Råstam, M., Gillberg, C., & Johnels, J. Å. (2014). Imitation (rather than core language) predicts pragmatic development in young children with ASD: A preliminary longitudinal study using CDI parental reports. *International Journal of Language & Communication Disorders*, 49(3), 369–375. <https://doi.org/10.1111/1460-6984.12085>
- National ASD Center. (2015). *Findings and conclusions: National standards project, phase 2*. Randolph, MA.
- National Research Council (2001). *Educating children with ASD*. Washington, DC: National Academies Press.
- National Institute on Deafness and Other Communication Disorders. (2022, April 13). *ASD spectrum disorder: Communication Problems in Children*. <https://www.nidcd.nih.gov/health/ASD-spectrum-disorder-communication-problems-children>
- Núñez, G. & Tejero Hughes, M. (2018). Latina mothers' perceptions and experiences of home-based speech and language therapy. *Perspectives of the ASHA Special Interest Groups*, 3(14), 40-56. <https://doi.org/10.1044/persp3.SIG14.40>
- Peredo, T. N., Mancilla-Martínez, J., Durkin, K., & Kaiser, A. (2022). Teaching Spanish-speaking caregivers to implement *EMT en Español*: A small randomized trial. *Early Childhood Research Quarterly*, 58, 208-219. <https://doi.org/10.1016/j.ecresq.2021.08.004>

- Peredo, T. N., Zelaya, M. I., & Kaiser, A. P. (2018). Teaching low-income spanish-speaking caregivers to implement EMT en Español with their young children with language impairment: A pilot study. *American Journal of Speech-Language Pathology*, 27(1), 136-153. [https://doi.org/10.1044/2017\\_AJSLP-16-0228](https://doi.org/10.1044/2017_AJSLP-16-0228)
- Perez Semanaz, S. (2020, November 1). *The impact of the Covid-19 pandemic in Puerto Rico*. <https://www.american.edu/cas/news/catalyst/covid-19-in-puerto-rico.cfm>
- Pinkelman S. E., Horner R. H. (2017). Improving implementation of function-based interventions: Self-monitoring, data collection, and data review. *Journal of Positive Behavior Interventions*, 19(4), 228–238. <https://doi.org/10.1177/1098300716683634>
- Puerto Rico Health Department. (2007, September 13). *ASD spectrum disorders (ASDs) a needs assessment study in Puerto Rico*. [https://estadisticas.pr/files/BibliotecaVirtual/estadisticas/biblioteca/DS/DS\\_Estudio\\_ASDo.pdf](https://estadisticas.pr/files/BibliotecaVirtual/estadisticas/biblioteca/DS/DS_Estudio_ASDo.pdf)
- Pustejovsky, J. E., Hedges, L. V., & Shadish, W. R. (2014). Design-comparable effect sizes in multiple baseline designs: A general modeling framework. *Journal of Educational and Behavioral Statistics*, 39(5), 368–393. <http://doi.org/10.3102/1076998614547577>
- Ramos, G., Blizzard, A. M., Barroso, N. E., & Bagner, D. M. (2018). Parent training and skill acquisition and utilization among Spanish- and English-Speaking Latino families. *Journal of Child and Family Studies*, 27(1), 268-279. <https://doi.org/10.1007/s10826-017-0881-7>
- Real Academia Española. (2023). *Respeto*. <https://dle.rae.es/respeto>
- Rispoli M., Zaini S., Mason R., Brodhead M., Burke M. D., Gregori E. (2017). A systematic review of teacher self-monitoring on implementation of behavioral practices. *Teaching and Teacher Education*, 63, 58–72. <https://doi.org/10.1016/j.tate.2016.12.007>
- Robertson, R. E., Sobock, E. E., Wynkoop, K., & Schwartz, R. (2017). Participant diversity in special education research: Parent-implemented behavior interventions for children with ASD. *Remedial and Special Education*, 38(5), 259-271. <https://doi.org/10.1177/0741932516685407>
- Rogers, S. J., Bennetto, L., McEvoy, R., & Pennington, B. F. (1996). Imitation and pantomime in high-functioning adolescents with ASD spectrum disorders. *Child Development*, 67(5), 2060-2073. PMID: 9022229
- Rogers, S. J., Young, G. S., Cook, I., Giolzetti, A., & Ozonoff, S. (2010). Imitating actions on objects in early-onset and regressive autism: effects and implications of task characteristics on performance. *Development and Psychopathology*, 22(1), 71–85. <https://doi.org/10.1017/S0954579409990277>
- Ros, R., Hernandez, J., Graziano, P. A., & Bagner, D. M. (2016). Parent training for children with or at risk for developmental delay: The role of parental homework completion. *Behavior Therapy*, 47(1), 1-13. <https://doi.org/10.1016/j.beth.2015.08.004>
- Rosario Colón, J., Domenech Rodríguez, M., & Galliher. (2019). Parenting styles and child outcomes in Puerto Rican families. 30, 12-28.
- Schreibman, L., Dawson, G., Stahmer, A. C., Landa, R., Rogers, S. J., McGee, G. G., Kasari, C., Ingersoll, B., Kaiser, A. P., Bruinsma, Y., McNerney, E., Wetherby, A., & Halladay, A. (2015). Naturalistic developmental behavioral interventions: Empirically validated treatments for ASD spectrum disorder. *Journal of ASD and Developmental Disorders*, 45(8), 2411-2428. <https://doi.org/10.1007/s10803-015-2407-8>
- Sherer, M., Pierce, K. L., Paredes, S., Kisacky, K. L., Ingersoll, B., & Schreibman, L. (2001).

- Enhancing conversation skills in children with autism via video technology. Which is better, "self" or "other" as a model? *Behavior Modification*, 25(1), 140-158.  
<https://doi.org/10.1177/0145445501251008>
- Stone, W. L., Ousley, O. Y., & Littleford, C. D. (1997). Motor imitation in young children with ASD: what's the object? *Journal of Abnormal Child Psychology*, 25(6), 475-485.  
<https://doi.org/10.1023/a:1022685731726>
- Stone, W. L., Ousley, O. Y., Yoder, P. J., Hogan, K. L., & Hepburn, S. L. (1997b). Nonverbal communication in two- and three-year-old children with ASD. *Journal of ASD and Developmental Disorders*, 27(6), 677-696. <https://doi.org/10.1023/a:1025854816091>
- Tager-Flusberg, H., & Kasari, C. (2013). Minimally verbal school-aged children with ASD spectrum disorder: The neglected end of the spectrum. *ASD Research*, 6(6), 468-478.  
<https://doi.org/10.1002/aur.1329>
- Torres, I., Alonso, A., & Alicea, M. (2014, November 15). *A profile of the children in the Puerto Rico ASD center* [Paper presentation]. 142nd American Public Health Association Annual Meeting and Exposition 2014, New Orleans, LA.
- United States Census Bureau. (2022). *Quick Facts: Puerto Rico*.  
<https://www.census.gov/quickfacts/PR>
- Unternaehrer, E., Cost, K. T., Bouvette-Turcot, A., Gaudreau, H., Massicotte, R., Dhir, S. K., Hari Dass, S. A., O'Donnell, K. J., Gordon-Green, C., Atkinson, L., Levitan, R. D., Wazana, A., Steiner, M., Lydon, J. E., Clark, R., Fleming, A. S., & Meaney, M. J. (2019). Dissecting maternal care: Patterns of maternal parenting in a prospective cohort study. *Journal of Neuroendocrinology*, 31(9), e12784. <https://doi.org/10.1111/jne.12784>
- Wainer, A., Arnold, Z., Leonczyk, C., & Soorya, L. (2021). Examining a stepped-care telehealth program for parents of young children with ASD: Proof-of-concept trial. *Molecular ASD*, 12. <https://doi.org/10.1186/s13229-021-00443-9>.
- Wainer, A.L., & Ingersoll, B. (2012). Disseminating ASD interventions: A pilot study of a distance learning program for parents and professionals. *Journal of ASD and Developmental Disorders*, 43, 11-24. <https://doi.org/10.1007/s10803-012-1538-4>
- Wainer, A. & Ingersoll, B. (2014). Increasing access to an ASD imitation intervention via a telehealth parent training program. *Journal of ASD and Developmental Disorders*, 45(12), 3877-3890. <https://doi.org/10.1007/s10803-014-2186-7>.
- Webster-Stratton, C. (1990). Stress: A potential disruptor of parent perceptions and family interactions. *Journal of Clinical Child Psychology*, 19(4), 302-312. DOI:10.1207/s15374424jccp1904\_2
- West, E. A., Travers, J. C., Kemper, T. D., Liberty, L. M., Cote, D. L., McCollow, M. M., & Stansberry Brusnahan, L. L. (2016). Racial and ethnic diversity of participants in research supporting evidence-based practices for learners with ASD spectrum disorder. *The Journal of Special Education*, 50(3), 151-163. <https://doi.org/10.1177/0022466916632495>
- Wolery, M., & Harris, S. R. (1982). Interpreting results of single-subject research designs. *Physical Therapy*, 62(4), 445-452. <https://doi.org/10.1093/ptj/62.4.445>
- Wong, C., Odom, S. L., Hume, K. A., Cox, A. W., Fettig, A., Kucharczyk, S., Brock, M. E., Plavnick, J. B., Fleury, V. P., & Schultz, T. R. (2015). Evidence-based practices for children, youth, and young adults with autism spectrum disorder: A comprehensive review. *Journal of Autism and Developmental Disorders*, 45(7), 1951-1966.  
<https://doi.org/10.1007/s10803-014-2351-z>

- Valentine, J., Tanner-Smith, E., Pustejovsky, J., & Lau, T. (2016). Between-case standardized mean difference effect sizes for single-case designs: A primer and tutorial using the scdhlms web application. *Campbell Systematic Reviews, 12*, 1-31  
<https://doi.org/10.4073/cmdp.2016.1>.
- Zuckerman, K. E., Lindly, O. J., Reyes, N. M., Chavez, A. E., Macias, K., Smith, K. N., & Reynolds, A. (2017). Disparities in diagnosis and treatment of autism in Latino and non-Latino white families. *Pediatrics, 139*(5), 2016-3010.  
<https://doi.org/10.1542/peds.2016-3010>