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A Review of Parent Training Interventions for Children with Autism Spectrum Disorder and Proposed Guidelines for Choosing Best Practices

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A Review of Parent Training Interventions for Children with Autism Spectrum Disorder and Proposed Guidelines for Choosing Best Practices

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Dedication

I dedicate this to my mother, Souri Sisavath, for always believing in education, books, and her two children. Also, I want to dedicate this to my father, Ronald Jackson, who has always told me I was a bright and beautiful young lady since I was 11 years old. I love you both more than words can express. Let these 100 pages of writing serve as proof of how far your love and faith has taken me in life and know that I'd gladly write a 100 more just for you two.

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Abstract

A Review of Parent Training Interventions for Children with Autism Spectrum Disorder and Proposed Guidelines for Choosing Best Practices

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The purpose of this project is to critically analyze and review parent training interventions published between the years 2000 to 2013 focused on enhancing social and communicative behaviors in young children between 3 to 10 years old with autism spectrum disorder. All studies involved a form of parent training in combination with an intervention type such as pivotal response training, milieu approach and naturalistic approaches. Overall, each study yielded positive outcomes for children with ASD, but data collection strategies, target goals, and outcome measures were variable. This review included an in-depth analysis of 16 studies of parent intervention programs evaluated based on their goals, methodology, and effectiveness of parent training on the children with ASD's language skills. The review will present a set of guidelines for parents and professionals to use when deciding on the most effective and efficient parent training therapy for families who have children with ASD. Critically evaluating the available empirical research can help parents, therapists, and researchers more effectively consider viable options for parent training programs tailored to support the needs of children with ASD. Tables will summarize the findings to make the information more accessible. Implications for future research will follow the literature review.

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CHAPTER 1: INTRODUCTION

Over the last decade, there has been a dramatic rise in the number of children diagnosed with ASD. The current reported rates of ASD are estimated at approximately 1 in 88 children in the United States (Report, 2014). This sudden rise in diagnoses of autism over the last few decades, however, may in part be a result of increased recognition, understanding, and awareness of autism driven by the significant growth in autism research (Elsabbagh, Divan, Koh, Kim, Kauchali & Marcín, et al., 2012). Even so, with the mounting numbers of children being diagnosed with ASD, existing services are failing to sufficiently meet the demands for adequate emotional and financial support for families of children with ASD. Given this need, it becomes imperative to explore more non-traditional, cost-effective, long-term types of services. Direct parent involvement in the education process of their children with autism has been widely recognized in the literature (National Research Council, 2001), therefore it can be proposed that parent training intervention presents one possible option for extending the scope of intervention.

UNDERSTANDING AUTISM SPECTRUM DISORDER

Autism spectrum disorder (ASD) is a complex, multi-faceted, neurological disorder that exists on a spectrum, affecting individuals from every socioeconomic status, geographic background, and ethnicity (Fombonne, 2003). The term "spectrum" refers to the wide range of symptoms, skills, and levels of impairment, or disability, that children with ASD can exhibit (“What is Autism Spectrum Disorder?, n.d.). By age three, children

will show diverse combinations and severity levels of the characteristic deficits indicative of ASD (Meaden, Ostrosky, Zaghlawan, Yu, 2009; Seung, Ashwell, Elder & Valcante, 2006). Core characteristics are language delays or impairments, lack of social reciprocity, and repetitive and stereotyped interests and behaviors (American Psychiatric Association, 1994). Children with ASD may be verbal or nonverbal, show an inability to initiate and respond to joint attention with others, be socially withdrawn, and have difficulty understanding social cues and reading facial expressions and navigating through the nuances of daily social interactions. Moreover, in addition to stereotyped and repetitive behaviors, children with ASD also display disruptive behaviors such as tantrums, aggression, non-compliance with routine demands, self-injury, property destruction, recklessness, and hyperactivity (Bearrs, Johnson, Handen, Smith & Scahill, 2012).

IMPACT OF ASD ON PARENTS

Direct medical and nonmedical costs can add up to as much as $72,000 a year for someone with a severe level of autism, and even $67,000 a year for those at the milder end of the spectrum (Ganz, 2006). Additionally, caring for or treating a person with autism over his or her entire lifetime can costs up to $3.2 million (Ganz, 2006). Furthermore, in addition to managing the stress of finances, parents of young children with disabilities who exhibit challenging behavior have reported increased family stress and parental depression (Bailey, Golden, Roberts, & Ford, 2007). Compared to parents of typically developing children, parents of children with ASD report a greater sense of helplessness and are more likely to avoid conflict when facing challenges of parenting (Pisula &

Kossakowska 2010). Even more, decreased parenting efficacy, high rates of divorce and lower overall family well - being are also seen in families of children with ASD (Karst & Hecke, 2012). Raising a child with need unique to ASD can present challenges for parents that can alter their effectiveness to provide basic care and nurturing and inhibit their ability to establish satisfactory relationships with not only their child with ASD but also their entire family (Soresi, Nota, & Ferrari, 2007). ASD influences not only parent-child relationships, but also affects family, school, and community dynamics.

NEED FOR A REVIEW

There is promising evidence that highlights the potential of parent training interventions for children with autism. Nevertheless, available research lacks a cohesive consensus on the key elements that compose an effective parent training program for promoting functional communication. In addition, the plethora of parent training programs currently available makes choosing the best intervention a challenge for parents, speech-language pathologists (SLPs), and other professionals. This literature review was undertaken to describe and analyze communication-based parent training interventions for children 3-10 years old diagnosed with autism spectrum disorder. This age range was chosen to include early intervention studies and to ensure children were all in pre-school to elementary school. Behavioral focused interventions such as discrete trial training and applied behavior analysis therapy were excluded in the scope of this review due to a lack of specific communication and/or language goals. Within this review, a first goal is to offer parents and SLPs a set of guidelines and resources for choosing the most appropriate

and supportive form of parent training intervention for a given family. A second goal is educate parents on the different available interventions for enhancing speech and language abilities of children with autism spectrum disorder. The following sections will define parent training intervention and give an overview of current available interventions.

CHAPTER 2: OVERVIEW OF PARENT TRAINING INTERVENTIONS

WHAT IS PARENT TRAINING INTERVENTION?

Parent training intervention is referred to in the literature by many different terms: parent education programs (Schultz, Schmidt, and Stichter, 2011); parent-implemented interventions (Meaden, Ostrosky, Hasan, Zaghlawan, and Yu, 2009); in-home training (Seung, Ashwell, Elder, & Valcante, 2006); parent-assisted training (Frankel, Myatt, Sugar, Whitham, Goropse, et al., 2010) just to name a few. Nonetheless, all of the programs have a consistent set of basic goals. Parent training interventions are defined as programs that generally serve to inform parents, teach them new skills, and supplement professionally administered interventions (Brookman-Frazee, Stahmer, Baker- Ericzen, & Tsai, 2006). In respect to parent training intervention for children with ASD, intervention is designed to increase parents' education about autism spectrum disorders, increase their ability to support social and socio-communicative skills, and increase their behavior management skills with their own children who are diagnosed with ASD.

Teaching materials are mostly presented in group programs or combined individual and group programs, and are often taught by experienced professionals considered to be "experts" in their teachings (Symon, 2005). Some interventions aim to make parents the "experts" and have them train other significant intervention agents in how to best manage behavior and elicit language from children with ASD (Symon, 2005).

Parent training interventions use diverse methods to educate parents on ASD and teach them strategies for improving communicative and social behaviors in their children

with ASD. Such communication-focused intervention methods include pivotal response training (Symon, 2005), milieu teaching (Mancil, Conroy, & Haydon, 2008), natural language paradigm (Gillet, Linda, & LeBlanc, 2006), Hanen's 'More Than Word's Program (Girolametto, Sussman, & Weitzman, 2007; Venker, McDuffie, Weismer, &Abbeduto, 2012), and other specific parent training programs (Ingersoll & Wainer, 2011; Vismara, Young & Rogers, 2012). These programs are founded on behavioral or naturalistic approaches to intervention. Programs are primarily composed of naturalistic behavioral based or developmental approaches and mainly differ in terms of: 1.) intervention approach (e.g. applied behavior analysis, milieu training, Hanen), 2) mode of treatment delivery (e.g., manual, power point), 3.) amount of intervention (e.g. dosage and frequency), and 4.) target behaviors and goals (e.g. functional verbal utterances, MLU, vocabulary, parent training skills). These programs will be explored in detail relative to their specific type of support for families as well as related to dimensions mentioned above.

REVIEW OF PARENT TRAINING INTERVENTIONS

Existing parent training interventions use strategies that are either developmental socio-pragmatic or naturalistic behavioral based with a focus on enhancing communication or appropriate behaviors. Developmental socio-pragmatic strategies are focused on improving parent-child relationships or interactions. These programs are based on the perspective that there is a moderate relationship between caregivers' responsivity and their child's level of social-communication development (Ingersoll & Dvortcsak,

2006). Common strategies involve imitation, expectant waiting, dyadic engagement, joint attention, functional play, and symbolic play (Vismara, Young & Rogers, 2012).

Naturalistic behavioral strategies are focused on teaching novel language and play skills (Ingersoll & Dvortcsak, 2006). These types of behavioral programs are interventions based on learning theory and are founded on applied behavior analysis therapy, which uses prompting, shaping, and reinforcement within natural contexts to teach specific socio-communication skills (Ingersoll & Dvortcsak, 2006).

The following developmental socio-pragmatic and naturalistic behavioral interventions that typically involve parent training were included in this review: Pivotal Response Training (PRT), Hanen's More Than Words Program (HMTW), Milieu Teaching, Incident Teaching, Natural Language Paradigm (NLP), Project ImPACT, and Early Denver Start Model. For an overview of the included intervention types see Table 1.

As a background, Natural Language Paradigm (NLP; Koegel, O'Dell, & Koegel, 1987) is a naturalistic behavioral procedure that manipulates specific variables (i.e. toys and reinforcers) in a play environment to parallel natural language interactions in efforts to facilitate spontaneous language acquisition and generalization to the natural environment. NLP was developed as an alternative to highly structured discrete trial training for nonverbal children with autism.

Pivotal Response Training (PRT; Koegel, Bimbela, & Schreibman, 1996), which was once referred to as NLP, is a naturalistic behavioral intervention focused on increasing social and communication skills by using the principles of applied behavior analysis (Dixon, Vogel, and Tarbox, 2012) in play and natural daily-life routines.

Incidental teaching, another naturalistic behavioral approach (Hart & Risley, 1978), was developed as a child-initiated therapy that focused on arranging the environment to promote moments of self-initiation. Such moments are then used as opportunities for expanding functional language and teaching natural consequences.

Milieu Teaching, a naturalistic behavior approach that is more conversation-based, capitalizes on child interests and initiations as opportunities to model and prompt new language and behaviors in the context of a child's natural environments (Alpert & Kaiser, 1992). Milieu Teaching is a combination of incidental teaching, mand-model procedure, time delay technique, and model procedure to elicit communication in a natural setting (Alpert & Kaiser, 1992).

Two parent training interventions that merge naturalistic behavior and developmental behavioral approaches are Project ImPACT (Ingersoll & Wainer, 2011) and Early Start Denver Model (ESDM; Dawson, Rogers, Munson, Smith, Winter, Greenson, and et. al, 2010). Project ImPACT is a classroom-based, parent training program that blends both approaches to teach parents how to increase their child's social engagement, communicative behaviors, and play during daily routines and activities (Ingersoll & Dvortcsak, 2006). It was designed by Ingersoll & Wainer (2011) as a parent training program for teachers, specifically those in early intervention and early childhood special education settings, to use with their families of children with ASD.

Early Start Denver Model (ESDM; Dawson, Rogers, Munson, Smith, Winter, Greenson, and et. al, 2010) is a developmental behavioral based parent-implemented intervention that involves using a child-centered responsive interaction style and teachable

moments within play interactions to improve cognitive and adaptive behavior in toddlers. EDSM combines developmental and relationship-based approaches from the Denver Model with behavioral approaches of the Pivotal Response Training (Koegel, O'Dell, Koegel, 1987) into the parent-child interactions in the home and family routines of children with ASD (Vismara, Colombi, & Rogers, 2009).

Lastly, Hanen's More Than Words (MTW) program is a developmental socio-pragmatic based, group parent training program developed by the Hanen Centre. MTW provides support, education, and practical skills for enhancing communication in children with ASD (Sussman, 1995). Historically, Hanen programs have numerous studies backing the efficacy of their parent training programs for language. Table 1 below offers a brief summary of the included interventions.

Table 1. Overview of Intervention Types

Intervention Type	Definition
Pivotal Response Training (PRT)	PRT aims to increase a child's self-motivation, self-management and self-initiation. These pivotal areas are believed to impact a wider range of cognitive and communicative skills.
Milieu Teaching	Milieu Teaching is a child-directed approach that involves systematically arranging the learning environment to create teaching moments, which are then modeled, shaped and expanded on to improve a child's functional communication.
Hanen's More Than Words (MTW) program	A parent training program developed by Hanen to teach parents strategies for enhancing functional, social communication skills in their child in the context of daily activities and routines.
Incidental Teaching (IT)	Incidental Teaching is a child-directed approach that uses a stimulating environment to promote child initiations and teach functional communication skills.
Natural Language Paradigm (NLP)	NLP is a loosely structured procedure conducted in a play environment with a wide variety of toys to increase child's verbalizations; now referred to as PRT.
Early Start Denver Model (ESDM)	ESDM teaches parents naturalistic applied behavioral strategies to increase language, positive affect, and social engagement in their child.
Project ImPACT	Project ImPACT is a teacher-implemented, parent training program used in early intervention settings that teaches parents strategies for increasing social interactions with their child.

CHAPTER 3: LITERATURE REVIEW

Within this chapter, the methods used to acquire and analyze articles will be discussed first, followed by a general summary of overall patterns found in interventions, then a more detailed literature review of the 16 articles as subdivided by intervention categories: Pivotal Response Training, Hanen More Than Words, Milieu, and Other Relevant Programs, which include incidental teaching, natural language paradigm, Project ImPACT, and Early Denver Start Model. An extensive review of the articles by intervention category will provide a more cohesive understanding of the current parent training interventions for children with ASD between the ages of 3 and 10 years old.

With the surge in numbers of children diagnosed with ASD, resources and support for the family, school, and state alike are vastly limited. Consequently, this literature review proposes parent training interventions for children with ASD as an alternative or addendum to traditional therapy routes. Mounting evidence based on this critical review suggests that parent training interventions offer a more practical, time-efficient, cost-effective approach to providing language-related intervention treatment for children with ASD. The following information will serve as a resource to help SLPS, educators, parents, caregivers and other service providers make informed treatment decisions when selecting the most appropriate and effective parent training intervention for promoting and enhancing communication skills in their child with ASD.

Methods

ARTICLE SELECTION

A review of literature related to parent training interventions for children with autism was conducted by searching for articles in electronic databases PsycINFO, ERIC, Academic Search Complete, and Medline, databases covering educational, biomedical, and psychological literature. Articles were identified using keywords such as *autism, autism spectrum disorders, parent training, parent intervention, parent education programs* and various combinations of keywords related to significant caregivers such as *parent, mother, father, caregivers (i.e. caregiver intervention, mother implemented intervention)*. PsycINFO resulted in a total of approximately 134 articles with the keyword search combinations, ERIC resulted in approximately 96 articles, Academic Search Complete resulted in approximately 193 articles, and Medline resulted in approximately 93 articles. This number includes duplicate articles found within different combinations of keyword searches in each database and across all databases. Search results were then narrowed down to language or communication focused interventions only using keywords: *language, communication, utterances,* eliminating behavioral and social skill intervention studies as eligible articles.

STUDY SELECTION

After an examination of the current literature, all articles had to meet a set of inclusion and exclusion criteria to be included in the review.

The following are inclusion criteria:

- Participants included at least one child between the ages of 3-10 years old diagnosed with ASD. The criterion for age was determined as 3-10 so that early intervention studies could be included in the review and to ensure participants were all in elementary school.
- A parent, mother, father or both must be present during intervention to assess the efficacy of direct parent intervention on the effects of children's communication skills.
- The parent must be an intervention agent since this review is specifically intended for parents and increasing parent knowledge of intervention studies available.
- At least one of the children's target behaviors must be focused on verbal communication skills since increased language skills is the primary concern in the scope of this review.
- There is a direct, reliable and valid measure of language to ensure the reliability of the specific language outcome.
- Articles must include empirical evaluation (i.e. single-subject design, multiple-baseline design) of a parent training intervention to maintain the efficacy of different language interventions.
- The article must be published in a peer-reviewed journal between the years of 2000 to present. Peer-reviewed articles warrant that the source is credible and evaluated by multiple readers. The fourteen-year criterion for article selection ensures that the study is current since research is constantly evolving, replicating past research,

and new intervention methods merge together or are created from the foundation of past methods. Also, this time frame reflects changes in diagnostic criteria for autism spectrum disorder.

The following are exclusion criteria:

- The article could not be a systematic review of parent training interventions for children with ASD and had to be either evaluations or comparative studies of a single intervention type. This allows for a more feasible and true assessment of studies across similar measures.
- Studies with indirect measures of communication were excluded because language gains could not be operationally separated from other forms of increased skills for between study group comparisons.
- Studies without confirmed diagnosis of autism spectrum disorder from licensed professionals or agencies was excluded to ensure validity of the target population.
- Studies assessing other disorders such as attention deficit disorder, adverse behaviors either singularly or in combination with ASD were excluded since the main population for the purpose of this review is solely children with autism spectrum disorder.

STUDY SELECTION PROCESS

The study selection process was conducted in three different phases. The first phase consisted of collecting all relevant articles and screening them for inclusion in the review based on meeting the inclusion and exclusion criteria and discarding duplicate

articles. The second phase for locating articles consisted of searching through the first group of articles and following their linked references to find other relevant articles. The third phase consisted of grouping the remaining articles into different types of interventions and searching the same electronic databases used initially by using the keywords of intervention type (*i.e. Pivotal Response Training, Milieu and etc.)* and different combinations of *parents, parent training, caregiver, autism, and autism spectrum disorder*. Through these phases of study selection, the most significant articles were collected for review.

Data Analysis

Each article was analyzed for information that offered a more in-depth breakdown of the current studies and helped achieve the proposed review goals. Data analysis helps reveal common patterns and guides in the assessment of available current research, shedding light on areas for future investigations. Data regarding participants' demographics (i.e. children, parents, teachers), intervention components (i.e. behavioral intervention program, naturalistic intervention), study design (i.e. single case study, group comparison study), study purpose (i.e. to educate parents, to evaluate specific programs), parent training delivery method (i.e. manual, presentation), dependent variables for both children and parents (i.e. number of verbal utterances, fidelity of implementation of method) and outcome measures (i.e. increased knowledge, increased skills), and whether or not generalization and maintenance were measured and its results were the main points of analysis.

Results

The electronic, literature search strategy located over 400 relevant articles related to parent training interventions and autism spectrum disorder. From further inspection of the potential articles and after applying inclusion and exclusion criteria, a total of 16 articles remained matching eligibility for this review. Tables 2, 5, 8, and 11 describe all the relevant studies included in the review from the years 2000 to 2014 based on primary information: intervention type, participants, study design, dependent variables, assessment measures, and outcomes.

The first category, *intervention type*, describes which empirically supported, evidence-based intervention the study uses to assess its parent training program effects. The most identified intervention type was Pivotal Response Training (7 studies), followed by Hanen's More Than Words program (3 studies), milieu teaching (2 articles), incidental teaching (1 study), natural language paradigm (1 study), Project ImPACT (1 study), and Early Denver Start Model (1 study).

The second category, *research purpose*, summarizes the overall goals of each study in terms of what intervention they seek to explore, who they seek to help, and what skill they want to measure. The types of studies could be grouped into three main purposes: 1.) intervention evaluation study (75%), 2.) program evaluation (12.5 %), or 3.) comparative study (12.5 %). Intervention evaluation studies (i.e. pivotal response training, milieu teaching) consisted of studies that wanted to evaluate the effects of specific interventions. Program evaluations (i.e. Hanen More Than Words, Early Denver Start

Model) were studies that examined specific program effects. Comparative studies (i.e. Milieu vs. Functional Communication Training) compared the effects of two different intervention methods. The most noted purposes of these studies were to assess an intervention program, evaluate its efficacy, and compare it to similar interventions.

The third category, *participants*, describes the children and adults that participated in the study. If the study reported it, this category summarizes the children's ages, gender, severity of language deficit, and the adults' role in relation to the child. Children ranged in ages from 2 to 9 years old, but a majority of studies were concerned with preschool-age children and children in early intervention who were 2 to 5 years old. Of the 7 studies that reported their gender, a majority of child participants were males. There was only one reported female child participant in the entire review (Randolph, Stichter, Schmidt, & O'Connor, 2011). Mothers were more frequently present than fathers, but many studies did not distinguish between parent participants or used both parents. Adults' ages were not often reported, but marital status, education level, and relationship to child (i.e. mother or father) were among the most common characteristics used to describe caregivers.

The fourth category, *study design*, explains what type of study design was used to study and measure treatment outcomes. Overall, study designs were mostly multiple-baseline designs (69%), followed by pre-post designs (21%), and lastly, group comparison design (7%).

The fifth category, *child/parent variables*, describes the dependent variables researchers measured in child and adult participants. The majority of target language goals for children with ASD were concerned with spontaneous, unprompted, expressive, verbal

communication like commenting, refusals, requests, responses, initiations, and questions. Most popular measurements for parents were parent treatment fidelity and social validity questionnaires.

The sixth category, *child/parent outcomes*, describes the results of the study for the child and parent. Outcome measures were most frequently positive for significant language gains in children and increased knowledge and accuracy of techniques in parents. Parents successfully demonstrated abilities to learn and implement parent training techniques with their child in various settings. Moreover, parents often expressed overall high satisfaction with the program on their social validity and satisfaction questionnaires.

Tables 3, 6, 9, and 12 offer a summary breakdown of program delivery components, settings, frequency, duration, and generalization/maintenance for all 16 articles in this review.

The first category, *program delivery components,* details the teaching style of intervention information to parents in the parent training program and reports the main teaching agent. "Instruction" refers to verbal or presentations of instructions to parents and is present in 10 of 16 articles, or 62.5% of intervention articles. "Modeling" refers to anytime the trainer models intervention techniques with a child for parents to observe, whether it is through videos or real-life modeling. Fifty percent of the review articles used modeling as a teaching tool. Additionally, 50% of articles also utilized a manual as a teaching tool, specifically articles implementing Pivotal Response Training or 'Hanen' More Than Words programs. "Rehearsal" refers to any parent-child interaction within the presence of a trainer as he or she gave constant feedback. Rehearsal techniques were

present in 62.5% of articles. “Feedback” refers to any time a trainer gave advice and steps for improved use of techniques during parent-child interactions. Of all teaching styles, feedback was most prominent and occurred in 75% of articles. There was in vivo feedback, which is online feedback, and feedback given after reviewing videotaped home sessions. Most interventions followed an instruction, model, rehearsal, and feedback design. Group discussions, homework, role-playing, and handouts were less common teaching tactics, with each technique occurring less than 2-3 times in the given review articles.

The second category, *settings*, describes where parent training took place and where parent-child interactions took place. Parent training sessions generally occurred in the home (3 articles), clinic (8 articles), community (2 articles), and classroom (2 articles), or were not specified (2 articles). Parent-child interactions where the intervention techniques were applied occurred in the home (10 articles), clinic (6 articles), community (1 article), or were not specified (1 article). Overall, parent training sessions were mostly conducted in the clinic, whereas parent-child interaction sessions were conducted in the home.

The third category, *frequency*, reports the frequency and time with which parents were involved in training sessions weekly during the course of the parent training program. Training sessions were mostly held weekly, but at times, some interventions called for different meeting attendances (i.e. bi-weekly, 3-5 times a week, or 5 consecutive days a week). There was no discernible pattern for time commitment per week; sessions ranged anywhere from 45 minutes to sometimes 5 hours a day (2 articles). Total sessions

per intervention were comprised of combinations of overview sessions, individual one-to-one sessions, and group sessions.

The fourth category, *duration*, reports the overall amount of time the parent training program or intervention lasted. Interventions could be characterized as short-term (5 days to 2 weeks) or long-term (3 weeks to 12 weeks), but on average, they lasted approximately 6-7 weeks.

The fifth category, *generalization/maintenance*, tells whether or not children or parents generalized their learned skills into different settings and whether or not the skills were maintained long-term. Only 10 of 16 articles, or 62.5% of articles, took measures of generalization of learned skills and followed-up on the long-term effects of intervention. Of the articles probing for generalization, they were mostly concerned with the magnitude to which parents and children generalized their learned skills in the home setting. It was found that a majority of the parents and children maintained the gains made in intervention, and although results were variable, long-term effects were deemed plausible.

Intervention Results

In order to have a more comprehensive understanding of the parent interventions covered within this review, each intervention will be described based on the following components: 1) target populations, 2) assessment for intervention appropriateness, 3) empirical support, 4) practical requirements, 5) key components, 6) assessment methods and data collection, and 7) strengths and limitations. *Target populations* describes the primary parent and child population each intervention is designed to benefit. *Assessment*

for intervention appropriateness explains the assessment methods used to establish each child as appropriate for the intervention. *Empirical support* gives summaries of relevant studies that support the efficacy of the intervention. *Practical requirements* describes the trainers, the materials and equipment needed, the format of program delivery, and the dosage of intervention. *Key components* explains the goals of intervention and offers descriptions of activities and protocols. *Assessment methods and data collection* gives an account of assessment techniques, tests involved, and how data is collected and measured. *Strengths and limitations* describes the strengths and limitations of the intervention and proposes ways in which future research can learn and improve upon the existing literature.

PIVOTAL RESPONSE TRAINING

Pivotal Response Training (PRT; Koegel, O'Dell, Koegel, 1987), the most heavily studied intervention type in this review, is a naturalistic behavioral, child-centered intervention that evolved from applied behavior analysis (ABA; Baer, Wolf, and Risley, 1968) principles to target social skills, communication skills, and the reduction of disruptive behavior in a natural environment. PRT intervention is based on selecting pivotal areas of functioning that when developed, are proposed to have broad, overarching effects on numerous non-targeted behaviors in children with autism. Unlike its predecessor applied behavior analysis, which focused on using discrete trial training to teach specific target behaviors one at a time in an analog context, PRT uses a looser form of discrete trial training than applied behavior analysis to alter specific variables in the teaching paradigm. The authors propose that wider effects take shape; PRT reinforces and

shapes children's approximations towards target goals. There are four pivotal areas of primary focus in PRT: a) improving child motivation, b) increasing self-initiations, c) responding to multiple cues and stimuli and d) increasing self-management capacity to reduce disruptive behavior (Koegel, Koegel, Brookman, 2003). Motivation and self-initiations, in particular, are especially important in improving social interactions in children with autism.

Seven out of the 16 studies included in this review investigated the effects of parent training interventions utilizing Pivotal Response Training (PRT) with children with ASD (Coolican, Smith & Bryson, 2010; Koegel, Symon, & Koegel, 2002; Minjarez, Williams, Mercier, & Hardan, 2010; Randolph, Stitcher, Schmidt, & O'Connor, 2011; Stamer & Gist, 2001; Symon, 2005; Vernon, Koegel, Dauterman & Stolen, 2012). Pivotal Response Training was the most commonly used parent training intervention type in this review, accounting for a total of 43.7 % of included review articles.

Target Populations

Child Population.

PRT is intended for use with a diverse group of children, ranging in ages from infant to adulthood, from various severity levels and SES backgrounds (Koegel, Koegel, & Carter, 2003). Within this review of contemporary studies, however, PRT was frequently used as an early intervention for children ages 2-5 years old diagnosed with autism spectrum disorder. Most children had very limited language, were nonverbal (Koegel, Symon, & Koegel, 2002; Symon, 2005), producing approximately 1-50 single

verbalizations, words or short phases for requesting items (Koegel, Symon, & Koegel, 2002; Symon, 2005; Vernon, Koegel, Dauterman & Stolen, 2012), were echolalic (Koegel, Symon, & Koegel, 2002), and had documented various disruptive, aggressive, or stereotypic behaviors (Koegel, Symon, & Koegel, 2002; Symon, 2005). Coolican, Smith & Bryson (2010) excluded children who had concurrent ABA therapy, major sensory, motor or neurological impairment/disorder from their study, but their sample ranged in cognitive and language ability from mildly to severely impaired. Other studies (Koegel, Symon, & Koegel, 2002; Minjarez, Williams, Mercier, & Hardan, 2010; Symon, 2005) included children with concurrent therapies and did not specify exclusion criteria for major sensory, motor, or neurological impairments. At minimum, certain studies specified that children must exhibit the ability to make contingent vocalizations when prompted (Minjarez, Williams, Mercier, & Hardan, 2010) or have basic imitation skills (Vernon, Koegel, Dauterman & Stolen, 2012). To summarize, PRT intervention with children with autism is proposed by the studies reviewed as being suitable for children with ASD between the ages of 2-5 years old, with minimal to some verbalizations, and that display inappropriate or problematic behaviors.

Parent Population.

PRT intervention can be implemented by SLPs, teachers, psychologists, students, peers, and parents that interact with individuals with autism and other severe handicaps. Nevertheless, within the scope of this review, studies indicated that parents and other significant caregivers were the primary intervention agents. When studies reported mother

versus father presence, mothers were predominantly more involved in PRT intervention than fathers (Coolican, Smith & Bryson, 2010; Symon, 2005; Vernon, Koegel, Dauterman & Stolen, 2012), but studies including fathers still demonstrated positive results for PRT intervention (Coolican, Smith & Bryson, 2010; Koegel, Symon, & Koegel, 2002; Randolph, Stitcher, Schmidt, & O'Connor, 2011; Vernon, Koegel, Dauterman & Stolen, 2012). Interestingly, if marital status was reported, the parent population was typically "married," more frequently than "single" or "widowed" (Stamer & Gist, 2001; Symon, 2005; Vernon, Koegel, Dauterman & Stolen, 2012).

Only 3 studies, Coolican, Smith & Bryson (2010), Koegel, Symon, & Koegel (2002), and Stamer & Gist (2001) included SES levels, being all middle to upper class. Within all the studies, parent education levels showed a wide range: from general equivalency diploma to medical degrees. Parent ages were seldom reported. Randolph, Stitcher, Schmidt, & O'Connor (2011) examined the direct effects of education level on the treatment fidelity of PRT and found that all caregivers, regardless of education level, could be taught PRT techniques with their child with autism. In light of this evidence, one can infer that parents and caregivers, irrespective of gender and education level, can implement PRT interventions. However, these studies do not contain a balance of parent/caregiver genders and education levels.

Assessment for Intervention Appropriateness

Four studies (Coolican, Smith & Bryson, 2010; Koegel, Symon, & Koegel, 2002; Randolph, Stitcher, Schmidt, & O'Connor, 2011; Symon, 2005) accepted children's

diagnoses of autism from professionals such as pediatricians, psychologists, and psychiatrists using the criteria on the *Diagnostic and Statistical Manual or Mental Disorders* (DSM-IV; American Psychiatric Association, 1994). Two studies (Minjarez, Williams, Mercier, & Hardan, 2010; Vernon, Koegel, Dauterman & Stolen, 2012) included children with autism based on the *Diagnostic and Statistical Manual or Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR; American Psychiatric Association, 2000). One study, Stahmer & Gist (2001), accepted children with diagnoses of autism within 6-months prior to the study, with no mention of criteria for determining autism.

Moreover, additional tests like the *Autism Diagnostic Observation Schedule* (ADOS; Lord et. al., 1999) and the *Autism Diagnostic Interview-Revised* (ADI-R, Lord et. al., 1994) were often used as a supplement to the DSM-IV. Three studies included the ADOS as support (Coolican, Smith & Bryson, 2010; Minjarez, Williams, Mercier, & Hardan, 2010; Vernon, Koegel, Dauterman & Stolen, 2012) and the ADI-R was included with the DSM-IV and ADOS in two studies (Coolican, Smith & Bryson, 2010; Vernon, Koegel, Dauterman & Stolen, 2012).

Only one study (Minjarez, Williams, Mercier, & Hardan, 2010) confirmed previous diagnosis of autism with their own in-house clinical psychologist in a 2-hour comprehensive evaluation to establish clinical diagnosis according to the *Diagnostic and Statistical Manual or Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR; American Psychiatric Association, 2000), whereas all other studies trusted initial diagnosis of autism by outside agencies. In assessing this data, it can be stated that autism

is most frequently diagnosed based on either the DSM-IV or DSM-IV-TR criteria for autism and while the ADOS and ADI-R may serve as additional tests to support diagnoses, they are rarely used singularly as the primary assessment tool.

Empirical Support

Coolican, Smith & Bryson (2010) sought to evaluate the efficacy of a brief 6-hour PRT parent training program on the communication and behavioral skills of children with ASD to assess for the potential benefits of short-term training over more time-intensive programs. In a non-concurrent multiple baseline design study, eight parents received 2-hour training sessions over two weeks in the clinic and their homes, and with the aid of the standard PRT manual (How to Teach Pivotal Behaviors to Children with Autism: A Training Manual by Koegel et.al, 1989). A trainer modeled techniques with the child, and parents rehearsed techniques with their child with trainer feedback (i.e. coaching). All parents were able to learn and implement PRT techniques in the context of play. Four of eight parents continued to meet the fidelity criterion at follow-up measures after training. All 8 children demonstrated increases in functional verbal utterances and appropriate responses, specifically to indirect prompts. Post-training and group gains were also maintained at follow-up. Disruptive behavior, which only 2 of 8 children exhibited, did not change significantly pre- and post-training phases, but decreased by follow-up.

Overall, the authors found that parents were very satisfied with the training experience and improved parent PRT skills were positively correlated with increased child functional verbal utterances and responsivity, indicating that a brief 6-hour training in

PRT yields similar results to more extensive 20+ hour programs. Another point of interest is that authors discovered that one very young and cognitively delayed child with minimal gains from pre- to post-treatment went on to make substantial gains at follow-up, suggesting the possibility that very young and cognitively delayed children (under 36 months) may take longer to respond to PRT treatment than preschoolers or children with more advanced cognitive development.

Another short term parent training program by Koegel, Symon, & Koegel (2002) evaluated the effects of a week-long, individualized and intensive PRT intervention for families that were geographically distant from the research center that typically held PRT programs (Koegel, Symon, & Koegel, 2002). Five families participated in a non-concurrent multiple baseline study of PRT intervention for 5 hours per day for 5 consecutive days, for a total of 25 hours, in efforts to increase their children with ASD's communication abilities. Through the standard PRT manual, trainer-modeling, parent rehearsal with their child, and feedback in the context of everyday activities (i.e. playing with toys, meal time, visits to the park), parents learned to use PRT techniques on an ongoing basis throughout their child's daily routines. Researchers collected data on parent treatment fidelity, children's production of functional verbal responses, and composite affect ratings, which were parent ratings of happiness, interest, and stress during parent-child interactions. Measures of what counted as functional verbal responses were individualized per child depending on his or her current level of language functioning.

Results indicated that a week-long specialized parent education program was sufficient to increase and maintain at follow-up a) parents' use of PRT techniques

designed to increased motivation, b) children's expressive verbal productions, and c) positive affects during parent-child interactions. Given the PRT training, parents increased their teaching opportunities during everyday activities and successfully transferred learned techniques into their home settings, leading to overall higher levels of child communication. The positive generalized outcomes of this study highlight the effects of contextual fit for participant families and illustrates the necessity for intervention programs that consider the values, resources, and needs of each family dynamic.

Stamer & Gist (2001) assessed the effectiveness of an accelerated 12-week parent education program and examined the effects of offering disorder specific support and information to the parents participating in a parent training program. Twenty families with children under 5 years old with a recent diagnosis of ASD participated in the pre- and post-treatment design study and half of the parents, in addition to the 1-hour per week, 12-week course, were placed in a parent information support group. Following PRT training, authors found that in measures of skill mastery, parents who participated in the additional information support group performed significantly higher than parents who did not participate in that group. Also, the group of children whose parents met criteria for correct use of PRT techniques had learned significantly more words, understood more words, and were able to produce more words after the parent education program than children with parents who did not meet criteria. This study posits that soon after parents receive a diagnosis of autism for their child, participation in an accelerated parent education program using PRT techniques can greatly improve parents' abilities in PRT techniques and additional informational support groups encourage overall higher levels of technique

mastery. Furthermore, anecdotal reports revealed increases in play skills and reduction of difficult behavior in children with ASD.

Minjarez, Williams, Mercier, & Hardan (2010) sought to examine the effectiveness of training parents in a 10-week PRT program using a group treatment package to target language deficits in their children with ASD. Given the limited resources, time, and personnel involved in traditional one-on-one format training sessions, this study aimed to demonstrate that parents could learn PRT techniques in 10 weeks, meet treatment fidelity, and as a result, increase functional verbal utterances in their children with autism. Seventeen families and their children participated in 1 of 3 different 10-week groups in a pretest-posttest design study over a period of 18 months. Sixteen children were diagnosed with autism and 1 was diagnosed with PPD-NOS and their ages ranged from 2.5 to 6.7 years of age. Parents were taught in 90-minute weekly group sessions using the PRT manual without the presence of their children. Children only attended the 1 individual clinic-based session.

Group sessions were organized in such a way that the first few sessions dealt with familiarizing parents with the treatment model via lectures, video modeling, exercises and group discussion, then parents developed expressive language goals for their child during the next session. Soon after, videotaped recordings of parent-child home sessions were reviewed and given feedback in subsequent group meetings. The next sessions involved participating in one clinic-based individual therapy session with their child and receiving direct feedback on implementation of PRT and child's progress. The last sessions gave an overview of PRT and provided parents with referral information about additional services

in the clinic and their community.

Minjarez, Williams, Mercier, & Hardan (2010) found that parents benefited from a group training model to teach them techniques for targeting language deficits in their children with ASD and that measures of parent treatment fidelity revealed that the program was effective in teaching parents techniques for promoting language in their children. Furthermore, measures of children's verbalizations during 10-minute parent-child interactions showed that functional verbal utterances like requests, refusals, comments, responses, and initiations increased as parents improved in their use of PRT techniques. This study supports more short-term, cost-effective group training models of PRT parent training interventions.

Aside from group training vs. individual training, another variable researchers took interest in was the level of parent education and its effects on PRT implementation. Randolph, Stitcher, Schmidt, & O'Connor (2011) isolated parental education as a factor in successful PRT implementation by examining the fidelity and effectiveness of PRT implemented by 3 caregiver-child dyads without college degrees. All three children were diagnosed with autism by developmental pediatricians and ranged in ages from 3-7 years old. Caregivers consisted of an in-home care provider, a biological father, and a grandmother and ages ranged from 20-50 years old. Caregivers attended 10 training sessions, 1 overview session and 9 45-minute individual sessions. Training sessions were composed of three different 15-minute parts dedicated to first observation, then guided practice with immediate feedback, then independent practice with delayed feedback. Researchers used a concurrent multiple baseline design across participants and collected

data on caregivers' treatment fidelity of PRT and children's social communication and play behavior defined as verbal or nonverbal responses, initiations, appropriate or inappropriate play and varied play.

Of the 3 caregivers, 2 of 3 achieved 80% fidelity levels by the end of intervention and continued to maintain and increase fidelity at follow-up measures, showcasing that PRT techniques can be effectively learned and applied regardless of education level. As to whether or not caregivers' PRT treatment fidelity had an effect on language gains in children with ASD, the study demonstrated that there is a positive correlation between caregivers' increased level of treatment fidelity and children's increased communicative responses, communicative initiations and appropriate play behaviors.

Symon (2005) examined the spread of effects of an intensive short-term PRT parent training program on the social communication skills and behavior of children with autism, aged 2-5 years old. Symon (2005) enlisted three families consisting of a "primary caregiver" and a "significant caregiver," and provided parent training on PRT techniques to the "primary caregiver" only for 5 hours a day, 5 consecutive days a week. PRT training was given via manual, clinician modeling, and parent-child rehearsal practice with feedback, and each week, 30 minutes to 1 hour was spent discussing ways the primary caregivers could train other significant caregivers who work with the child. The parent educator did not provide specific information on how to transfer skills, rather caregivers individually determined methods and schedules they would use to train other caregivers. At the end of training, families were asked to send follow-up videos of their child interactions in typical activities 1) with the primary caregiver and 2) the significant

caregiver in order for researchers to evaluate their acquired PRT skills, assess children's progress and give feedback accordingly.

Results from a nonconcurrent, multiple baseline design showed that parents could learn PRT techniques in a week and maintain and generalize skills learned in the clinic to their home setting in follow-up measures. Moreover, the study gave evidence for the spread of effects of PRT skills from primary caregivers to significant caregivers and demonstrated that parents could successfully master PRT techniques, then independently train other caregivers who played pivotal roles in the child's life. Even more, children's gains in functional verbal language and appropriate behaviors were also transferred from interactions with their primary caregivers to significant caregivers and children's intervention hours were amplified as a result of exposure to more adult-child interactions and learning opportunities. Furthermore, in addition to a spread of effects in caregivers, the study discovered there was a spread of intervention from targeted areas of communication to other areas of functioning such as appropriate behaviors free of disruptive, self-injurious, or self-stimulatory behaviors. These findings suggest that by incorporating a "trainer-of trainers" model, as Symon (2005) refers to it, into parent training programs, there will be a ripple effect of extended benefits such as elevating parents' roles in their children's education programs, increasing children's social communication and behaviors, and more time-efficient, cost-effective training for all key figures in a child's life.

Vernon, Koegel, Dauterman & Stolen (2012) added an element of embedded social interventions within a parent-training PRT model to examine its effects on parent and

child behaviors. Three parents with three children diagnosed with autism ranging in ages 2-4 years old participated in the multiple-baseline design study. Parent education sessions lasted approximately 1 hour and occurred 3-5 times a week dependent on family availability. Training involved using the PRT manual in combination with independent practice and feedback. Parents were instructed to use PRT techniques during social-communicative opportunities as prescribed in the manual, however, as not described in the manual, they were taught to embed a social interaction into the reinforcing stimuli. This interaction went as followed: when usually a child says, "Jump," to mean they want to jump on a trampoline, instead of being given the opportunity to jump alone, parents jump on the trampoline with the child. So where *access* to preferred stimuli was once the immediate consequence of verbalizations, now parents move to delivering *access + motivating social interaction* as the consequence of verbalizations. Their primary focus was to transform children's current non-social interests (i.e. watching video about jungle animals) into interactive social activities (i.e. parents imitating sounds and actions of jungle animals when child responded to prompts for "lion" or "tiger.") Researchers measured for reinforcer strength, total language opportunities, child eye contact, child verbal initiations, child positive affect, parent positive affect, and synchronous engagement.

Results indicated that children increased in all measured areas of social functioning, specifically eye contact, verbal initiations, and positive affect, while parents showed increases in positive affect and synchronous engagement. Additionally, generalization probes showed these social behaviors were present during follow-up. In

efforts to ascribe increases in social engagement behaviors to the embedding of social components in learning opportunities, researchers charted total language opportunities to see if increased opportunities led to increased behaviors. It was noted that child social behavior changed by a magnitude greater than the change observed in total language opportunities, suggesting that changes in social behavior were less likely a result of just a bombardment of language opportunities. This study proposes that, "increasing the social value of a stimulus may be a more natural means to eliciting the desired social behavior," (p. 2714) thereby touching on the PRT belief that motivation plays a pivotal role in overall development. Vernon, Koegel, Dauterman & Stolen (2012) offer a different perspective to increasing social communication in children with autism, one of which may deliver worthwhile effects in the long-term scope of parent training intervention. A summary of these PRT studies is displayed below in Table 2.

Table 2. Summary of PRT Studies

MB-multiple baseline design; MLU- mean length utterance; PCR- percentage of communication responses; PRT-pivotal response training; PP- pre-post; PTF-parent treatment fidelity; SQ-satisfaction questionnaire; SVQ-Social Validity Questionnaire

Citation	Research Purpose	Participants	Study Design	Child/Parent Variables	Child/Parent Outcomes
Coolican, Smith & Bryson (2010)	to examine the efficacy of a brief 6-hour parent training program for children with ASD	- 8 children; 2-5 years old - 8 parents	non-concurrent MB line	*Child:* - functional communication, type of utterance, disruptive behavior *Parent:* -PTF, parent self-efficacy, parent satisfaction	*Child:* - increased functional verbal utterances, some increased language on standardized tests *Parent:* - increased skills, increased self-efficacy, high satisfaction
Koegel, Symon, & Koegel (2002)	to evaluate the effectiveness of a short-term, intensive parent education program for geographically distant families of children with ASD	- 5 children; 3-5 years old - 4 families with both parents and one family with only mother	non-concurrent MB across participants design	*Child:* - number of verbal target responses *Parent:* - PTF, parent composite affect ratings	*Child:* - increased functional responses *Parent:* - increased skills, increased positive affect
Minjarez, Williams, Mercier, & Hardan (2010)	to examine the effectiveness of PRT parent training using a group treatment package to target language goals in children with ASD	-17 males; 2-6 years old -17 families with either both parents or one parent	PP design	*Child*: -frequency of functional verbal utterances *Parent:* - PTF	*Child:* -increased functional communication *Parent:* - effective implementation of PRT
Randolph, Stichter, Schmidt, & O'Connor, (2011)	to examine the fidelity and effectiveness of PRT intervention implemented by caregivers without college degrees	-3 children; 2 males and 1 female; 3-7 years old -3 adults; 1 in-home provider, 1 father, 1 grandmother	Concurrent MB	*Child:* -communicative responses, nonverbal responses, communicative initiations, play behaviors *Parent:* -caregiver treatment fidelity of PRT	*Child:* -increased socio-communication and appropriate play behaviors *Parent:* -effective implementation of PRT

Table 2. (continued)					
Stamer & Gist (2001)	a) to assess the effectiveness of an accelerated parent education program, b) to examine the effects of a parent training program that provided disorder specific support and information to parents vs. parent training without information support	-22 children; 2-5 years old -22 families	PP group treatment design	*Child:* -number of words/gestures used *Parent:* -PTF	*Child:* -increased word use, anecdotal evidence of increased play skills and decreased behaviors *Parent:* -increased skills
Symon (2005)	to assess a parent training program's spread of effects from parents to other caregivers and its effect on the language of children with ASD	-3 males; 2-5 years old -3 parents	non-concurrent MB	*Child:* - functional verbal utterances and behaviors *Parent*: - PTF, spread of effect from primary caregivers to significant caregivers	*Child:* -increased utterances with both caregiver types *Parent:* - effective implementation of PRT techniques and successful transfer to other caregivers
Vernon, Koegel, Dauterman & Stolen (2012)	to examine how an embedded social intervention in the context of PRT might affect change in parents and children with ASD's interactions and behaviors	- 3 children; 2-4 years old - 3 parents; 2 mothers and 1 father	MB across participants design	*Child:* - eye contact, verbal initiations, overall social enjoyment *Parent:* - parent positive affect, synchronous engagement with child	*Child:* - increased eye contact, increased verbal initiations, increased positive affect *Parent:* - increased positive affect, increased synchronous engagement

Practical Requirements

PRT parent training often took place in a clinical setting (Randolph, Stitcher, Schmidt, & O'Connor, 2011; Stamer & Gist, 2001; Symon, 2005), families' homes, communities, or a fusion of any of the three previously mentioned settings (Koegel,

Symon, & Koegel, 2002; Coolican, Smith & Bryson, 2010; Vernon, Koegel, Dauterman & Stolen, 2012) to ensure parents were able to generalize their use of PRT techniques in multiple environments.

Parent teaching agents came from diverse educational and academic backgrounds. They included the researchers of the study themselves (Stamer & Gist, 2001; Vernon, Koegel, Dauterman & Stolen, 2012), speech pathologists (Coolican, Smith & Bryson, 2010), or different professionals or doctoral students with advanced training in pivotal response training, applied behavior analysis, or experience with working with families of children with autism (Koegel, Symon, & Koegel, 2002; Minjarez, Williams, Mercier, & Hardan, 2010; Symon 2005). These trainers often delivered PRT parent training via use of the standard PRT manual, *How to Teach Pivotal Behaviors to Children with Autism: A Training Manual* (Koegel et al., 1987) and an arrangement of instruction, modeling, and parent-child rehearsal sessions with trainer feedback. The main materials needed for intervention include the manual and a wide range of toys available to capture the child's interest.

PRT intervention lasted about 1-2 hours a session, for a total of 10-16 sessions, over a course of 5-12 weeks. Accelerated PRT programs (Koegel, Symon, & Koegel, 2002; Symon; 2005) lasted 5 hours a day for 5 consecutive days, while a less intense, but short-term program lasted 2 hours a session, for 6 hours total, over two weeks (Coolican, Smith & Bryson, 2010). Although there is no strict timeline for PRT intervention, both intensive and dispersed dosages of intervention have shown promising evidence for improved parent skills and language outcomes in children with autism (Coolican, Smith &

Bryson, 2010; Koegel, Symon, & Koegel, 2002; Symon, 2005, Stahmer & Gist, 2001). A summary of the PRT studies' practical requirements is shown in Table 3.

Table 3. Practical Requirements of PRT

PT-parent training; PC-parent-child

Citation	Program Delivery Components	Settings	Frequency	Duration	Generalization/Maintenance
Coolican, Smith & Bryson (2010)	Delivery: PRT manual, trainer modeling with child, rehearsal, feedback Parent Teaching Agent: speech pathologists	PT in clinic and home; PC interactions in home	2-hr individual sessions over 2 weeks; total of 6 hrs	2 weeks	overall, children maintained increased functional verbal utterances and parents maintained increased skills at 2- to 4- month follow-up
Koegel, Symon, & Koegel (2002)	Delivery: PRT manual, instruction, clinician modeling with child, rehearsal and feedback Parent Teaching Agent: doctoral student with training in ABA and experience with PT of families with children with autism	PT in clinic and community, PC interactions not specified	5-hrs a day for 5 consecutive days, 25 hrs total, 1 hour debriefing meeting	5 days	- children's use of functional responses were varied at 6- and 12- month follow up - follow- up probes within 3 months to a year showed parent skills and positive parent affect were maintained and generalized into home
Minjarez, Williams, Mercier, & Hardan (2010)	Delivery: manual, videos, modeling, handouts, group discussion, homework, feedback on videotaped home sessions Parent Teaching Agent: licensed clinical psychologist who specializes in PRT	PT in conference room in unknown location, PC sessions in home	90-minute weekly group sessions, plus 1 50-minute individual session	10 weeks	none

Table 3. (continued)					
Randolph, Stichter, Schmidt, & O'Connor, (2011)	Delivery: clinician modeling with child, rehearsal, feedback Parent Teaching Agent: not specified	PT and PC sessions in clinic	1 30-minute overview and 9 45-55 minute practice sessions	5 weeks	-communicative gains increased from baseline to follow-up in 2 of 3 children -1 of 3 children maintained gains in appropriate play
Stamer & Gist (2001)	Delivery: manual, parents in information group received various handouts and information about family issues and treatment programs Parent Teaching Agent: researcher	PT and PC interactions clinic	1 hr weekly sessions, only half parents in parent information support group	12 weeks	none
Symon (2005)	Delivery: manual, clinician modeling with child, rehearsal and feedback Parent Teaching Agent: doctoral candidates with experience working with children with autism and providing behavioral intervention to families	PT and PC sessions in clinic	5-hrs a day for 5 consecutive days	5 days	- 1-month follow-up showed maintained increased functional verbal language and appropriate behaviors in all children - children's learned skills generalized to different caregivers
Vernon, Koegel, Dauterman & Stolen (2012)	Delivery: manual, instruction, modeling, rehearsal and feedback Parent Teaching Agent: researcher	PT and PC sessions in home and community	1-hr for 3-5 x week; 16 intervention sessions total	8 weeks	-children maintained eye contact and verbal initiation skills at follow-up and generalization probes, although results were varied -children and parents maintained varied levels of positive affect at follow-up -increased synchronous engagement at follow-up

Key Components

The primary goals of PRT intervention is to increase children's motivation to enhance learning by teaching parents to implement specific motivational techniques when interacting with their children in the context of play. Table 4. outlines the key strategies of PRT parent training. The following PRT intervention components are composed from studies that described their components in detail (Minjarez, Williams, Mercier, & Hardan, 2010; Stamer & Gist, 2001; Symon, 2005; Vernon, Koegel, Dauterman & Stolen, 2012):

1. *Clear instructions/questions*. The parent provides clear, uninterrupted instructions to the child while maintaining the child's attention. Instructions must be relevant and appropriate to the task.

2. *Interspersing maintenance and acquisition tasks*. The parent intersperses maintenance tasks, which are previously mastered tasks, frequently among more difficult acquisition tasks, which are targeted skills not yet mastered, to enhance motivation by keeping overall success and reinforcement high.

3. *Incorporating child choice with shared control*. The child has significant input in choosing the specific stimuli/toys and nature of the interaction, but the parent maintains shared control over the stimuli so they may be used as natural reinforcers.

4. *Using direct/natural reinforcers*. The parent provides direct, immediate and contingent reinforcement of target language behaviors. Direct reinforcers are consequences that pertain directly to the response they follow. For instance, if a child says,

"ball," he or she is immediately rewarded with the ball as opposed to token or food reinforcement.

5. *Reinforcing attempts*. The child is rewarded for every reasonable attempt whether or not it is completely correct in order to increase the likelihood of the child's motivation to respond. For example, if a child says, "ba," instead of "ball," the child is still reinforced with access to the ball.

Table 4. Key Parent Training Strategies in PRT

Strategy	**Definition**
Clear Instructions/Questions	Parent provides clear, relevant instructions
Interspersing Maintenance and Acquisition Tasks	Switching between mastered and unmastered tasks to maintain motivation
Incorporating Child Choice with Shared Control	Child selects toy/activity, but parents control access to it
Using Direct/Natural Reinforcers	Parents provide immediate contingent reinforcement of language behaviors
Reinforcing Attempts	All reasonable, intentional communicative attempts are reinforced

Assessment Methods and Data Collection

Data was collected via 10-minute video probes of parent-child sessions in all studies except for Stamer & Gist's (2001), which utilized a 5-minute video recording.

In order to measure child outcomes (i.e. functional/ non-functional verbal utterances, appropriate behaviors, play behaviors), studies used interval-recording procedures to code

for the presence or absence of target child outcomes (Coolican, Smith, & Byrson, 2010; Vernon, Koegel, Dauterman & Stolen, 2012; Symon, 2005; Minjarez, Williams, Mercier, & Hardan, 2010; Koegel, Symon, Koegel, 2002; Randolph, Stitcher, Schmidt, & O'Connor, 2011). Interval recording procedures consisted of having child outcomes coded based on explicit operation definitions of the target behaviors (i.e. functional verbal utterances meant the verbalization appeared functional or related to task).

The same procedure was used to record parents' skills during their implementation of PRT intervention to attain parent treatment fidelity measures (Coolican, Smith, & Byrson, 2010; Vernon, Koegel, Dauterman & Stolen, 2012; Symon, 2005; Minjarez, Williams, Mercier, & Hardan, 2010; Koegel, Symon, Koegel, 2002; Randolph, Stitcher, Schmidt, & O'Connor, 2011; Stamer & Gist, 2001). Parents were observed during 10-minute parent-child interactions for their frequency of correct or incorrect use of PRT techniques (i.e. clear opportunities, natural rewards, contingent reinforcement) using 2-minute scoring intervals (total of five intervals). These measures were most constant throughout the studies.

Less common assessment methods and data collection protocols included: parental affect ratings (Koegel, Symon, Koegel, 2002), child affect ratings (Vernon, Koegel, Dauterman & Stolen, 2012), reinforcer strength (Vernon, Koegel, Dauterman & Stolen, 2012), *The Preschool Language Scale, 4th Edition* (PLS-4; Zimmerman, Steiner, & Pond, 2002; Coolican, Smith, & Byrson, 2010), the *Peabody Picture Vocabulary Test, 3rd Edition* (PPVT-III; Dunn & Dunn, 1997; Coolican, Smith, & Byrson, 2010), Bayley Scales of Infant Development (Bayley-II, Psychological Corp; Stahmer & Gist, 2012*),*

MacArthur Communicative Developmental Index (CDI; Fenson et.al, 1993; Stahmer & Gist, 2012), *Multi-Option Observation System for Experimental Studies* (MOOSES, Tapp, Wehby, & Ellis, 1995; Randolph, Stitcher, Schmidt, & O'Connor, 2011), and the *Vineland Adaptive Behavior Scales, 2nd Edition* (VABS-II, Sparrow, Cicchetti, & Balla, 2005; Randolph, Stitcher, Schmidt, & O'Connor, 2011), and satisfaction questionnaires assessing parent satisfaction with training developed by the researchers (Coolican, Smith, & Byrson, 2010).

All 6 studies, with the exception of Stahmer & Gist's (2001), required inter-observer reliability measures for at least 30-33% of recorded experimental phase video sessions. Reliability raters were given randomly selected videos and were trained to recognize and score target behaviors. At least 1-2 trained reliability raters were used in conjunction with the researcher's observations and studies varied as to whether or not raters were blind to the intervention.

Strengths & Limitations

The strengths of these PRT parent training intervention articles are plentiful. To start, PRT intervention can be flexible, adaptable, teachable, and generalizable. Coolican, Smith & Bryson's (2010) study was able to demonstrate the flexible nature of PRT intervention by showing that a brief 6-hour training in PRT strategies was relatively equivalent to the traditional 20+ hour programs; both resulting in increases of functional verbal utterances and appropriate responses. Koegel, Symon, & Koegel (2002) indicated the adaptability and generalizability of PRT intervention by showing its ability to

contextually fit within different families' daily activities and routines, removing its application from the clinic environment and transferring parent skills into interactions with their children in the larger community. Minjarez, Williams, Mercier, & Hardan (2010) showed that PRT was teachable as group training models, while Symon (2005) revealed that PRT intervention was teachable in two dynamics, creating "experts" in parents and allowing parents to teach other important caregivers. Randolph, Stitcher, Schmidt, & O'Connor (2011) isolated parent education as a factor in learning PRT strategies and determined that PRT intervention was indeed teachable to any motivated caregiver regardless of educational level. Results from these studies support that PRT parent training intervention is feasible, beneficial, and effective for improving children with ASD's expressive language and behaviors. Moreover, its effectiveness, in particular, is substantially well supported in the literature.

PRT intervention is an evidence-based practice (EBP) approach, meaning studies involving PRT intervention integrate clinical expertise, scientific evidence, and client/patient/caregiver values to provide high-quality services reflecting the interests, values, needs, and choices of the individuals they serve ("Introduction to Evidence-based Practice," n.d.). Six of seven studies enforced operationally defined measures for detecting change in the children's level of language functioning, cognitive abilities, and appropriate behaviors (e.g. communicative responses were any intelligible spoken or signed word within 5 seconds of the caregiver's direction, question, or comment; Randolph, Stitcher, Schmidt, & O'Connor, 2011), and used such measures to record parent skills and fidelity of treatment as well. Each intervention applied combinations of observational data on

operationally defined target behaviors, fidelity of implementation measures and standardized tests/assessments to capture language and behavior changes in subjects. Additionally, 6 of 7 studies imposed inter-observer reliability measures and fidelity of treatment measures, allowing for more reliable and valid interpretations of their findings. Furthermore, 5 of 7 studies showed positive outcomes for maintained and generalized parent and child skills at follow-up assessments, suggesting long-term effects for PRT.

While the findings of the studies are very encouraging, there are a number of limitations within PRT parent training interventions. Firstly, a fundamental determiner of intervention effectiveness is its ability to generalize effects to more naturalistic settings like the home, schools, or community. In the case of the PRT interventions, it can be ascertained from Table 3. that 4 of 7 studies were conducted exclusively in clinic settings, while 2 studies adhered to a clinic + *other* setting method, and only 1 study did not use the clinic at all. This implies that 85.7% of the included PRT articles were conducted either fully or partially in clinic settings. Future research needs to move towards integrating more of the child and family's natural environment so that child and parent skills are practiced and generalized in different settings, which, in turn, allow for greater long-term potential.

Another limitation of the studies is their small sample size, which ranges from 3-22 children and families. Without a larger sample size, findings should be interpreted with caution because the intervention effects may not be applicable to a larger population. In addition to this, the small sample size leads to a lack of a control group in all the studies. A lack of control groups makes it difficult to determine if PRT intervention was the main

cause of behavior changes or if an underlying variable at play like maturation effects causes behavior changes.

Other variables to consider for future PRT studies might include further investigating the effects of the PRT service delivery model (i.e. the standardized PRT manual), group training models, and accelerated PRT programs. In addition, given that PRT is known as a "pivotal" approach, researchers should examine the causal effects of PRT on untrained areas of communication and learning (i.e. child's academic success, reduced family stress, reduced aberrant behavior in children) to see if there is a positive correlation.

MORE THAN WORDS

More Than Words (MTW) is a program created by Hanen to teach parents strategies for supporting language development, vocabulary development and social skills in their children with ASD (1999, Sussman). It follows a social-interactionist model of language that asserts that promoting adult responsiveness, also known as the act of parents interpreting and responding to all their children's communicative attempts as meaningful. Essentially, MTW deals with enhancing the quality of reciprocal interactions. By establishing joint attention, using child-oriented strategies (i.e. follow the child's lead), waiting, and strategically arranging the environment, parents increase their child's motivation to initiate communication and seek out and maintain social interactions. In summary, according to MTW's website, MTW teaches parents practical strategies for improving their child's "engagement in back-to-forth-interactions, understanding of

language, and socials skills" in real-life context ("More Than Words," n.d.).

Within this review, MTW accounted for 3 of 16 total articles, or 18.75% of total articles, making MTW the second most frequent parent training intervention next to Pivotal Response Training intervention. Girolametto, Sussman, Weitzman (2007) used the manualized version of MTW, while Venker, McDuffie, Weismer, & Abbeduto (2012) modified MTW for their study, and Prelock, Calhoun, Morris & Platt (2011) compared MTW's effects to a secondary joint attention intervention.

Target Populations

Child Population.

The 3 MTW studies reviewed acknowledged and listed various child participant characteristics, but made little to no mention of parent characteristics. In terms of child characteristics, MTW's website advertises MTW as a program specifically designed for parents with children under 5 years old on the autism spectrum scale ("More Than Words," n.d.). Girolametto, Sussman, Weitzman (2007) consisted of 3 families with 3 children ages 2. 8 to 3.2 years old (2 males, 1 female), Prelock, Calhoun, Morris & Platt's (2011) four child participants ranged in ages from 3 to 5.7 years old, and Venker, McDuffie, Weismer, & Abbeduto (2012) had 14 parent-child dyads with children aged 2.3 to 5.6 years old at the start of the study.

In regards to concurrent therapy, Prelock, Calhoun, Morris & Platt's (2011) noted that their child participants attended early education programs and received concurrent speech language or occupational therapy during their time in the intervention, Venker,

McDuffie, Weismer, & Abbeduto (2012) informed the parents that MTW was not to replace any services the child was already receiving, and Girolametto, Sussman, Weitzman (2007) only used children who weren't actively participating in additional behavioral interventions.

Moreover, children's language development varied between limited verbalization to beginning conversational language (Prelock, Calhoun, Morris & Platt, 2011), intentional communication acts like gestures or single words (Girolametto, Sussman, Weitzman, 2007), or measures of 0-657 words as based on the MacArthur Communicative Development Inventory (CDI; Fenson et al., 1991) of vocabulary development (Venker, McDuffie, Weismer, & Abbeduto, 2012).

Parent Population.

Girolametto, Sussman, Weitzman's (2007) study was the sole article to include relevant parent characteristic information. All parent-child dyads were composed of mothers, 1 single, 2 married, aged 25 to 38 years old, with either postsecondary or university-based educations.

Assessment for Intervention Appropriateness

Girolametto, Sussman, Weitzman (2007) recruited families on waiting lists for parent training language interventions at the Hanen Centre. Children in this group had confirmed diagnoses of autism from developmental pediatricians or psychologists. Venker, McDuffie, Weismer, & Abbeduto (2012) recruited children from a longitudinal study of language development for autism, the community or referrals by early

interventionists. Thirteen child participants had community confirmed diagnosis of autism, while one child was referred by an early interventionist. This study also confirmed diagnoses of autism pre-intervention using the *Autism Diagnostic Observation Schedule* (ADOS; Lord et al., 2000) or the *Autism Diagnostic Observation Schedule – Toddler Version* (ADOS-T; Luyster et al., 2009) administered by a "trained and reliable examiner," (p.7) although the examiner's credentials are not explicitly stated. Children in the Prelock, Calhoun, Morris & Platt (2011) were recruited from the Summer Autism Institute sponsored by the Autism Society of Vermont, but there is no indication of how autism was diagnosed nor confirmed prior to intervention.

Empirical Support

In a pre-post multiple case study design, Girolametto, Sussman, Weitzman (2007) examined how MTW effected parent-child play interactions, specifically on measures of parental responsiveness and children's social interaction behaviors. It was hypothesized that parents would increase their rate of responsiveness and children would have increased vocabulary development and social interaction skills. Three mothers and three children with autism, aged 2-3 years old, participated in the study. This study followed the typical 11-week MTW program consisting of eight total sessions, 2.5 weekly group sessions that included presentations, group discussions, video analysis, and guided practice, and 3 home visits to mirror real-life context, monitor child and parent progress, review and revise children's goals, and discuss concerns. Parents learned different strategies for supporting their child's engagement in interactions and integrating predictable and structured routines

for increased duration of interaction sequences.

Following intervention, all mothers increased their rate of responsive comments during play interactions, but gains were variable since it was shown that only 1 mother increased responsiveness following both communicative and noncommunicative acts, while the other 2 mothers only improved in one or the other context of interactions. All three children made vocabulary gains and increased their rate of communicative acts (i.e. verbalizations with eye gaze, words, gestures), although only 2 of 3 children increased their number of social initiations. This study emphasizes the importance of reciprocal interactions in promoting vocabulary and social development in children with ASD and stresses that future studies should help parents distinguish between communicative and noncommunicative events so that parents can appropriately scaffold language to increase social engagement in both contexts.

Prelock, Calhoun, Morris & Platt (2011) were interested in fusing their approach of family-centered care into early interventions and thus, studied how two different pilot studies involving heavy parental commitment, MTW and Joint Attention Training (JAT), benefited the family and child with autism as a whole. For the purpose of this review, only the MTW pilot study will be assessed. Four parents with children aged 3-6 years old participated in 8 didactic and interactive group sessions of MTW parent training to learn strategies for increasing interactions and communication with their child. Parents were instructed to focus on their use of strategies for three to four months post-intervention and standardized cognitive and language tests were readministered to children and follow-up data was collected to measure child and parent progress.

Results of Prelock, Calhoun, Morris & Platt's (2011) MTW study indicated that 3 of 4 children (one child's language was not measureable) increased their use of social and symbolic communicative acts and number of words understood or produced. Additionally, parents expressed positive feelings towards the value of the program, their expectations being met, and their child's language development as a result of MTW training. To sum, MTW was perceived as effective by parents, and its effectiveness was supported by children's language gains on measures of parent reports and various standardized language and vocabulary tests In contrast to the JAT findings, MTW is more beneficial for children with deficits in spoken language, whereas JAT is more appropriate for children with profound deficits in social pragmatics and a lack of interest in engagement.

Venker, McDuffie, Weismer, & Abbeduto (2012) conducted a randomized group design study with 14 parents and children with autism ages 2-6 years old to investigate the effects of an adapted version of MTW on parental verbal responsiveness and children's spontaneous and prompted communication acts. This study was not strictly concerned with studying the direct effects of MTW intervention, but rather modified MTW to teach parents strategies for increasing their use of specific types of verbal responsiveness. They were interested in creating rich social language environments for children with ASD, environments that would increase children's exposure to a greater quantity of language input and increase parent's use of linguistic mapping and expansions in the context of play.

Families were randomly assigned to a treatment group or delayed treatment group

and participated in 5 2-hour parent education sessions, 2 45-minute individual coaching sessions, and additional small group sessions to learn techniques for increasing their verbal responsiveness, engaging their children in play and increasing communicative acts. Parental verbal responsiveness targets included: 1) follow-in commenting, 2) linguistic mapping, 3) expansions, and 4) prompts for communication acts. Children's communication acts included: 1) prompted communication, 2) spontaneous verbal communication, and 3) spontaneous nonverbal communication. Results revealed that parents in the treatment group made significantly more gains in verbal responsiveness than the delayed treatment group. Furthermore, children in the treatment group generated a greater gain in prompted communication acts than children in the delayed treatment group, but neither group displayed significant gains in spontaneous communication acts. Their modified MTW program was effective in teaching parents strategies for increased verbal responsiveness, which resulted in increased prompted communication in children with ASD. Table 5. offers a summary of MTW studies reviewed.

Table 5. Summary of More Than Words Studies

MB-multiple baseline design; MLU- mean length utterance; PCR- percentage of communication responses; PRT-pivotal response training; PP- pre-post; PTF-parent treatment fidelity; SQ-satisfaction questionnaire; SVQ-Social Validity Questionnaire

Citation and Intervention	Research Purpose	Participants	Study Design	Child/Parent Variables	Child/Parent Outcomes
Girolametto, Sussman, Weitzman (2007) More Than Words by Hanen (MTW)	to examine social interaction, social initiation, and rate of communicative acts of children with ASD and assess the skill level of parents' use of responsiveness interaction strategies following a More Than Words program	- 3 children; 2-3 years old - 3 families; 3 mothers and 2 fathers	PP multiple case study design	*Child:* - vocabulary size, lexical diversity and rate of communicative acts, number of social initiations, social-interaction sequences *Parent:* - parent responsiveness rate, parent interaction rating, parent opinion of program progress	*Child:* - increased vocabulary size, lexical diversity and rate of communicative acts, social interaction sequences, and significant increase in number of social initiations in 2 of 3 children *Parent:* - increased parent responsiveness rate, parent interaction rating
Prelock, Calhoun, Morris & Platt (2011) More Than Words/ joint attention training (JAT)	to describe two pilot studies that engaged interventionists in the planning and implementation of interventions for children with ASD	<u>MTW pilot study</u> -four children; 37 months to 69 months -four families including both parents <u>JAT pilot study</u> -3 parents and 3 professionals working with parents to help promote JAT	pilot study	<u>MTW pilot study</u> *Child:* -social, speech, and symbolic communicative acts *Parent:* -responsiveness to MTW and perceived value, challenges of satisfaction with MTW <u>JAT pilot study</u> *Parent:* -perceived value, challenges and satisfaction with MTW	<u>MTW pilot study</u> *Child:* -all increased use of social and symbolic communicative acts and increased number of words understood or produced *Parent*: high satisfaction of program, positive qualitative evidence of value of program <u>JAT pilot study</u> *Parent:* -highly satisfied with parent-training experience

Table 5. (continued)					
Venker, McDuffie, Weismer, & Abbeduto (2012) Modified More Than Words Program	a) to evaluate whether parents increased use of verbal responsiveness during play interactions, b) assess changes in child spontaneous and prompted communication acts	- 14 children; 28-68 months of age - 14 parents	randomized group design	*Child:* - child spontaneous and prompted communication acts *Parent:* - increased skills of verbal responsiveness in play interactions, PTF	*Child:* - increased communication acts *Parent:* - increased verbal responsiveness skills, high satisfaction with program

Practical Requirements

The MTW parent training sessions were conducted entirely in the clinic setting (Girolametto, Sussman, Weitzman, 2007; Venker, McDuffie, Weismer, & Abbeduto, 2012) or in classrooms (Prelock, Calhoun, Morris & Platt, 2011), while parent-child interactions occurred in the homes (Girolametto, Sussman, Weitzman, 2007; Prelock, Calhoun, Morris & Platt, 2011) or clinic (Venker, McDuffie, Weismer).

MTW parent training can only be led by Hanen certified professionals, those which have undergone an intensive, experiential workshop to learn the manualized protocol for teaching parents MTW strategies. Teaching agents of MTW parent training consisted of speech pathologists (Girolametto, Sussman, Weitzman, 2007; Prelock, Calhoun, Morris & Platt, 2011) or graduate students under the supervision of a Hanen certified SLP (Venker, McDuffie, Weismer, & Abbeduto, 2012). Moreover, Girolametto, Sussman, Weitzman (2007) was the only study which supported parent training with the guidebook entitled, *More Than Words: A Parent's Guide to Building Interaction and Language Skills for Children with Autism Spectrum Disorder or Social Communication*

*Difficulties (*Sussman, 1999).

Traditional MTW training is comprised of 8 small, personalized group sessions and 3 sessions with the leading speech pathologists where interactions are videotaped and reviewed for modifications of techniques. Girolametto, Sussman, Weitzman (2007) and Prelock, Calhoun, Morris & Platt (2011) upheld MTW's model of 8 group training sessions, while Venker, McDuffie, Weismer, & Abbeduto (2012), with their modified MTW program, divided parent training into 5 parent education sessions and 14 small group sessions where graduate clinicians helped support parents through modeling, feedback and coaching. Group training sessions typically lasted 2 to 2.5 hours, individual coaching sessions were 45-minutes, and small groups were approximately an hour in length. Duration of MTW interventions ranged from 6-11 weeks total. Table 6. below summarizes the practical requirements of included MTW studies.

Table 6. Practical Requirements of More Than Words

PT-parent training; PC-parent-child

Citation and Intervention	Program Delivery Components	Settings	Frequency	Duration	Generalization /Maintenance
Girolametto, Sussman, Weitzman (2007) MTW	Delivery: manual, instruction, group discussions, videotape analysis, and rehearsal Parent Teaching Agent: speech pathologists	PT in clinic; PC interactions during assessment session and home sessions	eight 2.5 hr group sessions weekly, 3 home visits	11 weeks	none
Prelock, Calhoun, Morris & Platt (2011) MTW/ JAT	Delivery: interactive instructional workshop, homework, feedback on videotaped home sessions Parent Teaching Agent: two Hanen certified SLPS	PT in classroom, PC interactions in home	1 orientation session, 8 2.5- hr training sessions	8 weeks	post-training home visits 3-4 months after last PT session showed increases in all 3 children's measurable social and symbolic communicative acts
Venker, McDuffie, Weismer, & Abbeduto (2012) Modified MTW	Delivery: manual, clinician modeling with child, rehearsal and feedback Parent Teaching Agent: graduate students under supervision of Hanen certified SLP	PT and PC interactions in clinic	5 2-hr parent education sessions, 2 45-minute individual sessions, 14 1-hr small group sessions biweekly	6 weeks	none

Key Components

MTW parent training programs are child-centered interventions grounded in the strong belief that language is typically learned in the contexts of play and positive interactions. Parents are taught a variety of different strategies for increasing their child's attention, positive affect, imitation skills, social skills, vocabulary, and overall reciprocal communication. Key strategies include:

1. *OWL* strategy, which means to *observe* the child's interest, provide *wait* time for the child to respond to engagement, and *listen* to the child's communication attempts.

2. *Four I's* strategy, which means to *include* the child's interest and share in those interests, *interpret* all communication attempts as meaningful, *imitate* what the child is doing or saying, and *intrude* in solitary play to engage with the child.

3. *ROCK* strategy, which means to *repeat* what one says and does, provide *opportunities* for the child to communicate, provide *cues* to help the child take a turn, and *keep* the interaction fun/going by being animated and continuing the routine.

4. *Four S's* strategy, which means to *say* less and use simple, short language, *slow* down to emphasize important words, *stress* words to maintain a slow rate and encourage comprehension, and *show* by using objects, actions, gestures, or pictures to increase comprehension. Table 7. summarizes MTW's key strategies.

Table 7. Key Parent Training Strategies in MTW (Sussman, 1999)

Strategy	Definition
OWL **O**bserve **W**ait **L**isten	 - Observe the child's interests - Wait for the child to respond to comments/questions - Listen to the child's communication attempts
Four I's **I**nclude **I**nterpret **I**mitate **I**ntrude	 - Include the child's interests and join in shared interests - Interpret communication attempts and provide a language model - Imitate child's verbalizations and actions - Intrude on child's solitary play to engage child
ROCK **R**epeat **O**pportunities **C**ue **K**eep it fun/going	 - Repeat what is said or done - Provide multiple opportunities for child to communicate - Provide cues to help child take a turn in conversation/play - Keep the interaction fun and keep it going to prolong interaction
Four S's **S**ay Less **S**low **S**tress **S**how	 - Keep language short and simple - Emphasize important words by saying them slowly with pausing - Speak at slow rate and stress words to increase comprehension - Incorporate objects, pictures, gestures, actions in communication

Assessment Methods and Data Collections

The three MTW parent training interventions used various assessment methods for collecting developmental information, monitoring progress, and assessing change. At pre-test, meaning before intervention began, studies administered the following standardized tests to assess children's language development: *MacArthur-Bates Communicative Development Inventories*: *Words and Gestures or Words and Sentences* (MCDI; Fenson et al., 2006; Girolametto, Sussman, Weitzman, 2007; Prelock, Calhoun, Morris & Platt, 2011), *Socialization and Communication Domains of the Vineland Adaptive Behavior*

Scales: Interview Edition (VABS; Sparrow, Balla, & Cicchetti, 1984; Girolametto, Sussman, Weitzman, 2007), *Communication Symbolic Behavior Scale- Developmental Profile* (CSBS-DP; Wetherby & Prizant, 2002; Prelock, Calhoun, Morris & Platt, 2011), *Mullen Scales of Early Learning* (MSEL; Mullen, 1995; Prelock, Calhoun, Morris & Platt, 2011; Venker, McDuffie, Weismer, & Abbeduto, 2012), *The Preschool Language Scale, Fourth Edition* (PLS-4; Zimmerman et al., 2004; Venker, McDuffie, Weismer, & Abbeduto, 2012) and the *MacArthur Communicative Development Inventory* (CDI; Fenson et al., 199; Venker, McDuffie, Weismer, & Abbeduto, 2012). The same tests were given post-test to assess changes in language following intervention. The CDI was the only test present in all 3 articles, indicating studies' heavy reliance on parent reports as measures of children's existing developmental language.

Only Venker, McDuffie, Weismer, & Abbeduto (2012) and Girolametto, Sussman, Weitzman (2007) recorded parent-child play sessions for analysis. Multiple raters, blind (Girolametto, Sussman, Weitzman, 2007) and non-blind (Venker, McDuffie, Weismer, & Abbeduto, 2012) coded sessions for target behaviors and tallied their frequency of occurrences during assessment sessions. Systematic Analysis of Language Transcripts (SALT) (Miller & Chapman, 2002) was used to transcribe parent and child utterances for lexical diversity, vocabulary, and assistance in coding utterance types. Furthermore, Girolametto, Sussman, Weitzman (2007) used *The Joy and Fun Assessment* (JAFA) (McConachie et al., 2005) to assesses parents' use of responsive interaction during play.

In contrast to these two studies, Prelock, Calhoun, Morris & Platt (2011) did not use video analysis, but instead solely administered the same standardized tests pre-

intervention and post-intervention at follow-up to measure change. They were mostly interested in changes in raw scores for social, speech, and symbolic communicative acts across their standardized tests.

Lastly, social validity measures were utilized in Girolametto, Sussman, Weitzman (2007) and Venker, McDuffie, Weismer, & Abbeduto's (2012) interventions to assess parents' perspective of change as a result of the study and assess their satisfaction with the program. Girolametto, Sussman, Weitzman (2007) gave a short subjective survey, whereas Venker, McDuffie, Weismer, & Abbeduto's (2012) administered a more extensive questionnaire with a Likert Scale. Venker, McDuffie, Weismer, & Abbeduto (2012) asked parents to give their opinions on the overall program, teaching format, and use of specific strategies. Social validity measures, although lacking in statistical evidence, are helpful in that they reflect on the usefulness and real-life potential of the parent training intervention. Overall, the positive results of these studies' social validity assessments suggest that parents believe MTW is an effective program for language support in their children with ASD.

Strengths & Limitations

The strengths of MTW parent training programs are plentiful. MTW can be individualized by child since activities and interests are chosen based on a child-led or child-centered approach. Parents can customize MTW to accommodate the current language level of their child. MTW parent training works for nonverbal children who need to increase joint attention and for children with limited language who need to increase

their communication skills.

Even more so, families are encouraged to use MTW strategies in the context of their child's daily routines and everyday life, allowing for MTW training to be ongoing and generalized in various settings. Another example of its generalizability can be found in the MTW curriculum itself where on the final sessions, parents learn how to prepare their child for interactions with peers, siblings, and relatives by rehearsing games and play routines for carryover into interactions with other children, practicing sharing toys and activities that may be shared with peers, and coaching peer interactions to encourage balanced turn-taking. Such generalizability suggests that MTW may have long-term effects, and although Prelock, Calhoun, Morris & Platt (2011) indicated maintained parent and child skills at their follow-up 3-4 months post-intervention, a formal longitudinal study of MTW is not yet available.

MTW also employs a variety of auditory, visual and contextual aids to help support language deficits. For instance, MTW teaches parents to modify their language to short, simple, stressed, slowed utterances to allow time for their child to process and comprehend their messages. Additionally, MTW instructs parents to use multiple modalities of supplemental cues like objects, actions, gestures and pictures to increase comprehension.

Furthermore, MTW is a standardized parent training intervention, resulting in more controlled and replicable parent training regardless of the location or teaching agent of the program. They require instructors to be Hanen certified in order to delivery MTW parent training and employ the use of their manual to enforce a specific procedure for

teaching group parent training. In addition, MTW uses parent-friendly language in the form of mnemonic acronyms to help parents remember the different strategies.

In terms of methodological quality, MTW studies utilized a variety of designs, outcome measures, and assessment methods. Each study administered different standardized tests to collect developmental information on subjects at baseline, or pre-intervention, and gathered data using the same test post-intervention. Moreover, they used at least two raters to code video recordings of parent-child interactions, increasing the reliability of their findings. All 3 MTW studies indicated positive outcomes for increasing children's communicative acts and vocabulary, although social skills results were variable.

Nevertheless, there are limitations to MTW parent training studies. Only Venker, McDuffie, Weismer, & Abbeduto (2012) took parent treatment fidelity measures to assess parents correct use of key MTW strategies. Since the other two studies lack treatment fidelity measures, their treatment effects cannot be fully substantiated. Another methodological issue is their small sample sizes, which number between 3 to 14 participants. Larger scale interventions would greatly reinforce the positive findings of these studies and allow for researchers to make more accurate and valid conclusions for the population of children with ASD as a whole.

Moreover, only Venker, McDuffie, Weismer, & Abbeduto (2012), confirmed diagnosis of autism in their sample base, while the other two studies relied on recruiting participants from centers specializing in treating children with ASD. Without assessing if children truly have ASD prior to intervention, there is no way of controlling the sample size for the target population, thus studies' findings become prone to questions of validity.

Lastly, 2.5 hours of group sessions adds up to a 20-hour total commitment. MTW may not be applicable for lower socioeconomic parents with work conflicts, limited time and energy, a single parent household, or additional children that require child care services during parent training.

Future studies of MTW should evaluate the effectiveness of MTW with lower SES families to ascertain if MTW can be taught to a broader parent population, not just those in middle-class households. An abbreviated, accelerated version of MTW might also show that MTW has the potential to be a more flexible, versatile intervention, one unhindered by the rules of its standard manual and protocol. Finally, a larger scale MTW intervention or longitudinal study of MTW intervention would greatly validate that its treatment effects have large-scale efficacy and lasting effects.

MILIEU TEACHING

Milieu Teaching (MT) is a behavioral intervention that focuses on teaching new communication and behavioral skills by manipulation of a child's natural environment. In MT, the environment is arranged to create opportunities for the child to initiate conversation. Such moments are then modeled and prompted for elaborated language consistent with the child's specific language targets and skill level. Enhanced milieu teaching (EMT) builds on the four milieu prompting procedures of 1) model, 2) mand-model, 3) time delay and 4) incidental teaching, but adds a social interactionist approach to language interventions (Kaiser, Hancock, Nietfeld, 2000). EMT is a hybrid of responsive interaction techniques and milieu teaching principles. In EMT, the

responsiveness of the caregiver to child's communication attempts creates a framework for the children to model new language forms (Kaiser, Hancock, Nietfeld, 2000). Milieu teaching interventions (Kaiser, Hancock, Nietfeld, 2000; Mancil, Conroy, & Haydon, 2008) accounted for 2 of 16, or 12.5% of the total included articles within this review.

Target Populations

Child Population.

Kaiser, Hancock, Nietfeld (2000) conducted their study on six preschool children with autism or pervasive developmental delay. They also had specific inclusion criteria in place dictating that the child had to be between the ages of 2 and 5 years old, have at least a 6 month-delay in expressive language as based on the *Sequenced Inventory of Communication Development* (SICD; Hedrick, 1975), be verbally imitative, have normal hearing, and an expressive vocabulary consisting of at minimum 10 spontaneous words. The children were all boys, ranging in age between 32-54 months, with expressive and receptive skills in the 20-28 month range according to the *SICD*, with mean length of utterances (MLU) averaging 1.48 words, and IQ scores ranging from *<50* to 85.

Mancil, Conroy, & Haydon (2008) evaluated three male preschool or elementary aged children with ASD, ranging in ages from 4 to 7 years old. Teachers and parents reported that the children all had the ability to initiate and respond through gestures and verbal language consisting of 2-3 utterances, but required prompting for a majority of their communication and had low rates of social initiations with peers or adults. Additionally, only children who displayed aberrant behaviors for tangible items were included. Based

on these two studies, milieu teaching is adequate for verbal children with initial imitative skills, low MLUs, and significant deficits in expressive language and social initiation skills.

Adult Population.

Kaiser, Hancock, Nietfeld (2000) and Mancil, Conroy, & Haydon (2008) both used mother participants. In Kaiser, Hancock, Nietfeld's (2000) study, it was reported that they ranged in age from 30 to 37 years old and had an average of 3.3 years of college, 3 with some college education, 2 with a Bachelor's and one with a Master's degree. Mancil, Conroy, & Haydon (2008) reported the mothers had various levels of education, 2 Bachelor's and 1 high school diploma, and varying levels of training and research study experience, 1 with ABA training and participation in other studies, 2 with neither prior training or exposure to other studies. In sum, all of the adult participants were mothers and a majority of them had some form of college education.

Assessment for Intervention Appropriateness

Kaiser, Hancock, Nietfeld (2000) included children who were diagnosed with autism or pervasive developmental delays by an independent child evaluation clinic before participation in the study. Conversely, Mancil, Conroy, & Haydon (2008) included children who had a diagnosis of ASD from an independent physician, licensed psychologist, or diagnostic center, then administered the *Social Communication Questionnaire* (SCQ; Rutter et al. 2003) and the *Autism Diagnostic Interview-Revised*

(ADI-R; Lord et al. 1999) to obtain additional standardizes scores confirming a diagnosis of autism.

Empirical Support

Kaiser, Hancock, Nietfeld (2000) employed the use of a single-subject, multiple baseline design to study the effectiveness of an EMT parent training program on the language performance of 6 preschool children with ASD. Their data was collected from a larger, longitudinal study comparing the effects of three different models of naturalistic communication interventions. Kaiser, Hancock, Nietfeld (2000) only used data for children randomly assigned to the EMT condition. Parents were taught strategies for environmental arrangement first, then responsive interactions strategies, and finally milieu teaching procedures. Researchers were concerned with parent treatment fidelity measures, frequency of spontaneous child utterances, children's total use of targets, frequency of targets used spontaneously, children's MLU, children's vocabulary and parent satisfaction. Targets were identified as broad classes of early semantic relationships (i.e. agent-action, agent-object-action) represented in 2,3, and 4 word utterances dependent on the child's ability.

Kaiser, Hancock, Nietfeld (2000) found that 5 of 6 parents learned the components of EMT to criterion levels and continued and generalized the use of EMT strategies in their homes at follow-up 6 months later, although results of frequency and correct use were variable. Parents reported high satisfaction ratings overall. In addition, all 6 children showed increases in their total use of targets, however, spontaneous use of targets were

variable per child, some reflecting increases in MLU, others showing changes in diversity of words. MLU and word diversity was also generalized to the home setting.

Mancil, Conroy, & Haydon (2008) used a concurrent multiple baseline design across 3 children with ASD, ages 3-7 years old, to evaluate the effectiveness of a parent training program that combined modified milieu teaching and functional communication training. To begin, functional communication training (FCT) consists of analyzing the function of a behavior and replacing aberrant behaviors with communicative responses that serve the same function. In this study, researchers taught parents how to implement milieu strategies by manual, video analysis, and role-playing parent-child interactions with the authors until parents performed the skills correctly in 10 consecutive trials. Researchers were most interested in children's percentage of communication responses (PCR) and their rate of aberrant behavior during parent-child sessions, as well as prompts used and spontaneous verbalizations. PCR was defined as prompted and unprompted instances where the child handed the picture card with the preferred tangible on it to a trainer. Data was collected by recording the frequency of target behaviors per session with 3 different conditions, with each condition being 1 of the 3 tangibles identified as most preferred in the preference assessment.

Results indicated that overall, children's PCR increased and was maintained at follow-up sessions two weeks later and communication skills generalized to the classroom setting. Furthermore, children became less dependent on prompts as sessions progressed and their rates of aberrant behaviors decreased. Also, parent treatment fidelity measures also indicated that intervention was performed with a high level of integrity. Social

validity questionnaires revealed that teachers, parents, and experts of ASD found the study to be beneficial for the participants. As a whole, both milieu teaching studies conducted by Mancil, Conroy, & Haydon (2008) and Kaiser, Hancock, Nietfeld (2000) establish milieu teaching as an effective parent training intervention for supporting the development of social communication in natural environments and play interactions with children who have ASD. Table 8. below provides a summary of the MT interventions.

Table 8. Summary of MT and EMT

PreS- preschool; MB-multiple baseline design; MLU- mean length utterance; PCR- percentage of communication responses; PRT-pivotal response training; PP- pre-post; PTF-parent treatment fidelity; SQ-satisfaction questionnaire; SVQ-Social Validity Questionnaire

Citation and Intervention	Research Purpose	Participants	Study Design	Child/Parent Variables	Child/Parent Outcomes
Kaiser, Hancock, Nietfeld, (2000) Enhanced Milieu Teaching (EMT)	to assess the effects of parent training of EMT on the language PreS children with autism or pervasive developmental disabilities	-6 preschool children; 2-5 years old; all males -6 mothers	Single Subject MB	*Child:* -social communication skills as defined by frequency of spontaneous child utterances, total use of targets, and frequency of targets used spontaneously, child language development *Parent:* -PTF, parent satisfaction	*Child*: -increased total use of targets and number of different target classes, although changes in spontaneous use of targets were more modest *Parent:* - increased in correct use of milieu teaching, but only 5 of 6 parents reached criterion levels of performance, positive ratings of satisfaction with training program
Mancil, Conroy, & Haydon (2008) Modified Milieu Therapy/ Functional Communication Training	to evaluate the effectiveness of modified MT with FCT to replace aberrant behavior with functional communicative skills in children with ASD	-3 males; 4- 7 years old -3 parents; all mothers, teachers	concurrent MB	*Child:* -percentage of communication responses (PCR), rate of aberrant behavior *Parent:* - PTF, teacher treatment fidelity	*Child:* -increased PCR, decreased aberrant behavior *Parent:* - positive outcomes on social validity questionnaire

Practical Requirements

Kaiser, Hancock, Nietfeld's (2000) implemented both parent training sessions and parent-child sessions in a playroom based in a clinic setting. In contrast, Mancil, Conroy, & Haydon (2008) conducted their parent training and parent-child sessions in the natural environments of the participants, the home of each respective participant, and

generalization probes were taken in the child's classroom. Also, these studies all required a variety of age appropriate toys of interest (i.e. blocks, bubbles, cars and trucks) in the natural environments to initiate child communication.

Furthermore, both studies employed a similar service delivery model composed of presenting new information to parents via handouts/manual and video analysis and teaching strategies through modeling, role-play, trainer coaching and feedback on online and videotaped parent-child sessions. Parent training was instructed by either the researchers (Mancil, Conroy, & Haydon, 2008) or well-qualified professionals with experience in parent training, holding a Ph.D. or Master's in fields related to special education or child psychology (Kaiser, Hancock, Nietfeld, 2000).

Lastly, in Kaiser, Hancock, Nietfeld's (2000) study, parent training lasted for 45-minutes, 2x a week, for a total of 24 sessions, while there was no mention of frequency or duration of parent training in Mancil, Conroy, & Haydon's (2008) study. Table 9. gives an overview of the practical requirements of MT and EMT parent training programs.

Table 9. Practical Requirements of MT and EMT

PT-parent training; PC-parent-child; PCR- percentage of communication responses; FCT-Functional Communication Training

Citation and Intervention	Program Delivery Components	Settings	Frequency	Duration	Generalization/ Maintenance
Kaiser, Hancock, Nietfeld, (2000) Enhanced Milieu Teaching (EMT)	Delivery: instruction, handouts, videotapes, role-play, feedback on previous videoed PC sessions, coaching and feedback on PC interactions Parent Teaching Agent: 1 trainer had Ph.D. in special education and 16 years experience in PT, 4 years experience with NLP; 1 trainer had Master's in Child Development, doctorate in Child Psychology in process, and experience with children with autism and 1 year experience with NLP	PT in clinic; PC interactions in clinic	24 45-minute training sessions bi-weekly	not specified	4 of 6 children maintained and generalized gains in number of spontaneous targets, diversity of vocabulary, and MLU at follow-up and there was evidence for change on developmental assessments of language in 5 of 6 children
Mancil, Conroy, & Haydon (2008) Modified MT/ FCT	Delivery: manual, video observations, role-play, and feedback Parent Teaching Agent: researchers	PT at home and PC interactions at home	not specified	intervention phase: 2-3 days per week, 3-4 weeks to complete	- maintained increased PCR in all children -generalization from home to classroom in all children

Key Components

EMT requires environmental arrangement, which is composed of selecting materials, arranging materials, and managing materials (Scherer & Kaiser, 2010). *Selecting materials* means that parents select toys/tasks that have high preference and interest to the child. These interests may have parts (i.e. Legos), require assistance (i.e. opening playdough, putting together toy), and require turn taking (i.e. throw and catch with ball). *Arranging materials* means that parents strategically limit the number of

toys/materials available to the child, place high preference toys within view of the child, but out of reach, and keep toys in containers that require parental assistance to open. *Managing materials* means parents act as the gatekeeper to the materials by controlling access to the toys. Also, parents provide incomplete toy sets to set up opportunities for the child to ask for pieces and parents provide opportunities for unexpected events so that the child corrects them.

EMT also requires *responsive interaction strategies*, which involve responding to all the child's communication attempts, following the child's lead in play interactions and conversation, promoting balanced turn-taking, and matching and expanding on the child's utterances while maintaining the child's meaning.

Lastly, there are four core milieu teaching procedures present in EMT: *modeling, mand-model procedure, time delay, and incidental teaching* (Kaiser, Hancock, Nietfeld, 2000). *Modeling* refers to using a verbal model of the target language and having the child repeat it. Correct productions are immediately reinforced with positive feedback and the desired object, while incorrect responses are recasted, or repeated with correct grammar or phonological forms. *Mand-model procedure* refers to the act of asking the child a question (i.e. What do you want?), giving the child a choice, or giving a mand for the child to verbalize his or her wants and desires. Correct and appropriate responses are rewarded with the requested object, whereas incorrect responses are shaped and the adult models the desired target response. *Time delay* refers to waiting for the child to initiate communication; it also decreases prompt dependency by allowing the child opportunities

to respond without prompts. *Incidental teaching* refers to arranging the environment to elicit child initiations and improve conversational skills in the context of play.

Table 10. Key Strategies of MT and EMT

Strategy	**Definition**
Environmental Arrangement	
Selecting Materials	select high preference toys that encourage self initiations
Arranging Materials	arrange materials in ways that promote child requests
Managing Materials	manage materials by limiting access and creating unexpected events
Responsive Interaction Strategies	increase responsiveness to child's communication attempts, follow child's lead in conversation and play, promote turn-taking, and expand on child's utterances
Milieu Teaching Procedures	
Modeling	model target language for the child to repeat
Mand-Model Procedure	determine what the child wants (mands) and either reinforce correct responses or model target responses
Time Delay	wait between conversational turns to let the child initiate
Incidental Teaching	arrange environment to increase child self-initiations and provide opportunities for expanding on functional language

Assessment Methods and Data Collections

Kaiser, Hancock, Nietfeld (2000) took measures on parent treatment fidelity, child social-communication skills, child language development, parent satisfaction and generalization. Treatment integrity was measured by 2 coders who watched 20% of the videotaped parent-child sessions and recorded the frequency of target skills. Child social-

communication skills were assessed by tracking the frequency of spontaneous child utterances, total use of targets, and frequency of targets used spontaneously. MLU and word diversity were calculated using the *Systematic Analysis of Language Transcript* program (SALT; Miller and Chapman, 1984). Child participants' receptive and expressive language development were assessed using various standardized tests: *SICD* (Hendrick, 1975), the *Peabody Picture Vocabulary Test-Revised* (PPVT-R; Dunn & Dunn, 1981) and *Expressive One Word Picture Vocabulary Test-Revised* (EOWPVT-R; Gardner, 1990). Social validity was assessed by having parents complete a satisfaction questionnaire at the end of intervention and at follow-up to measure their satisfaction with the program and note the changes in their child's language skills post-intervention. Lastly, generalization probes to assess parents' use of EMT strategies in the home.

Mancil, Conroy, & Haydon (2008) took measures on parent treatment fidelity, toy preferences, function of aberrant behavior, percentage of communication responses (PCR), the rate of aberrant behaviors, and generalization in the classroom setting. Treatment integrity was assessed by data collectors who viewed videotaped parent-child sessions and recorded all adult prompts. A preference assessment was conducted to establish three highly preferred items to use for mand training with the child. A functional analysis helped researchers determine the function of the child's aberrant behavior. To identify the primary function as a tangible function, researchers compared the effects of contingent reinforcement of aberrant behavior with other conditions like free play, escape, and tangible. PCR and rate of aberrant behavior were measured by coders who recorded the frequency of these operationally defined behaviors during parent-child interactions.

Generalization probes were gathered by viewing videotaped generalization sessions of the child in the classroom and recording frequency of which the child used picture cards to request objects. To sum, the milieu interventions described in this review measured treatment integrity, children's communication skills, either verbal or nonverbal, parent satisfaction, and generalization to other natural environments.

Strengths & Limitations

Based on the outcomes of these two studies, parent implemented milieu teaching has many potential benefits for children with ASD. To start, parents expressed overall high satisfaction with milieu teaching programs and were able to successfully learn and apply MT techniques with their children in their daily routines. Furthermore, these studies demonstrated that the natural learning environment was efficient for promoting the acquisition of new communication forms and behavior skills in children with ASD. Even more, learned skills were generalized to other settings beyond the clinic room such as the home (Kaiser, Hancock, Nietfeld, 2000) and classroom (Mancil, Conroy, & Haydon, 2008) and skills were maintained at follow-up assessments. Milieu teaching can also be individualized for each child as parents are able to set specific target language forms based on their child's current level of language functioning (Kaiser, Hancock, Nietfeld, 2000). Additionally, aberrant behavior was decreased as a result of replacing behavior with functional communication responses (Mancil, Conroy, & Haydon, 2008). Lastly, milieu teaching facilitated continuous increases in spontaneous language, MLU, and word diversity, which were generalized in the clinic and home environment (Kaiser, Hancock,

Nietfeld, 2000). Mancil, Conroy, & Haydon's (2008) study, however, only achieved modest to no changes in spontaneous language, but this may well be a result of their picture card approach to communication.

Limitations of the milieu teaching studies included an inadequate sample, lack of control group, prompt dependency tendencies, and unvaried training and parent-child interaction settings. For instance, both studies used male child participants and mother were the adult participants. The lack of diversity limits the external validity of their findings. Moreover, neither studies imposed a control group, so linguistic and behavioral changes may have resulted from maturation effects or other confounding variables, not necessarily milieu teaching itself. Moreover, MT approaches rely heavily on parents initially prompting children to perform a given task, then fading the prompt. Mancil, Conroy, & Haydon (2008) claimed their children participants became less prompt dependent by the last remaining sessions, while Kaiser, Hancock, Nietfeld (2000) took no measures of prompt dependency. Finally, Kaiser, Hancock, Nietfeld (2000) conducted both parent training and parent-child interaction sessions in the clinic setting, whereas Mancil, Conroy, & Haydon (2008) conducted both sessions in the home. In Kaiser, Hancock, Nietfeld's (2000) study, when parents were asked ways to improve the training, parents suggested training at home. In Mancil, Conroy, & Haydon's (2008) study, parent training in the home may have been distracting, and there was no data on the conditions (i.e. noise, multi-tasking home duties, other children present) of the home training setting.

Future studies should measure prompt dependency at follow-up sessions to ensure child skills are indeed spontaneous and generalized to other settings. Additionally, a larger

sample size, with children of diverse characteristics (i.e. language level) and parents of various genders and education levels would provide a more holistic overview of milieu training for families of children with ASD. This may help identify which ASD subgroup of children are most responsive to milieu programs. Moreover, a range of caregivers would show that milieu teaching is an effective intervention regardless of the trainer. This could even extend to peers and siblings to examine if milieu teaching effects can be generalized to non-adult groups. Overall, more studies would solidify the findings of these two studies more clearly.

OTHER RELEVANT PROGRAMS - INCIDENTAL TEACHING, NLP, PROJECT IMPACT, AND ESDM

Incidental teaching is a naturalistic behavioral approach (Risley & Risley, (1978). It was developed as a child-initiated therapy that focused on environmental arrangement to promote child interest and self-initiations. These moments are then used as opportunities for expanding functional language and teaching natural consequences in natural settings.

Natural Language Paradigm (NLP; Koegel, O'Dell, & Koegel, 1987) is another naturalistic behavioral procedure that manipulates specific variables (i.e. toys and reinforcers) in a play environment to parallel natural language interactions. NLP aims to facilitate spontaneous language acquisition and generalization to the natural environment.

Project Improving Parents as Communication Teachers (ImPACT) is a parent training intervention derived from blending both naturalistic and behavioral strategies. It was developed by Ingersoll and Dvortcsak (2010) to teach parents techniques for improving their child's social-communication, imitation, and play skills in daily routines

and activities. Project ImPACT stresses the use of both interactive teaching techniques (i.e. follow the child's lead, respond to all communication as meaningful) and direct teaching techniques (i.e. prompting, reinforcement) for accelerated learning and generalization.

Moreover, Early Start Denver Model (ESDM; Dawson, Rogers, Munson, Smith, Winter, Greenson, and et. al, 2010) is a developmental behavioral based parent-implemented intervention that involves using a child-centered responsive interaction style and teachable moments within play interactions to improve cognitive and adaptive behavior in toddlers. ESDM combines developmental and relationship-based approaches from the Denver Model with behavioral approaches of the Pivotal Response Training (Koegel, O'Dell, Koegel, 1987) into the parent-child interactions in the home and family routines of children with ASD (Vismara, Colombi, & Rogers, 2009).

Target Populations

Child Population.

Incidental Teaching. Charlop-Christy & Carpenter (2000) studied 3 boys with autism, ranging in ages from 6 to 9. The boys varied in ethnicity, being Caucasian, East Indian American, and Hispanic. The boys also had variable communication, behavior and play skills, which included: echolalia, imitations, little to no spontaneous speech, repetitive play or no interest in toys, self-injurious behaviors, and self-stimulatory behaviors.

Natural Language Paradigm. Gillet, Linda, & LeBlanc's (2006) study consisted of

3 children, ages 4-5 years old, with autism with little to no spontaneous speech and variable imitation skills. Additionally, they were from diverse cultural backgrounds of Caucasian, Asian American, or African descent.

Project ImPACT. Ingersoll & Wainer (2011) had 27 children from various Early Intervention (EI) or Early Childhood Special Education (ESCE) programs participate, but only 24 children complete the program. Children were either diagnosed with ASD or receiving services based on another eligibility, were mainly male and Caucasian, nonverbal, or limited verbal.

Early Start Denver Model. Vismara, Young & Rogers (2012) included 9 children, 6 with ASD and 3 with PPD-NOS, between the ages of 16 to 38 months. Eight were males and 1 was female. Moreover, the children were involved in less than 10 hours of in-home or center-based intervention during the time of ESDM intervention and lived in various states across America.

Adult Population.

Incidental Teaching. Charlop-Christy & Carpenter (2000) did not provide information on parents.

Natural Language Paradigm. Gillet, Linda, & LeBlanc (2006) used married mothers that were 34-38 years old with either a high school diploma, Ph.D., or graduate level education.

Project ImPACT. Ingersoll & Wainer (2011) used 13 teachers who provided services to children with ASD from 3 different intermediate school districts. Teachers then

invited 26 families with from their caseload to participate in parent training. Parent intervention agents were predominantly Caucasian, mothers, and married, with over 50% of the caregivers having less than a college degree.

Early Start Denver Model. Vismara, Young & Rogers (2012) included 9 self-referred, middle-class, predominantly married and Caucasian families. Another requirement was that they all had reliable Internet connections and web-cameras available for telehealth parent training.

Assessment for Intervention Appropriateness

Incidental Teaching. Charlop-Christy & Carpenter (2000) recruited their subjects from a behavior management program. All 3 children were diagnosed with autism by two independent agencies and were specifically chosen because they rarely or never displayed spontaneous speech.

Natural Language Paradigm. Gillet, Linda, & LeBlanc's (2006) children had diagnoses of autism from independent evaluators, which were confirmed by school systems. Furthermore, researchers acquired confirmatory support of diagnosis and language skills by having parents complete the *Gilliam Autism Rating Scale* (GARS; Gilliam, 1995) and giving the *Peabody Picture Vocabulary Test, Third Edition* (PPVT-III; Dunn & Dunn, 1997). Only one child was testable for both tests, while the remaining children only had *GARS* scores and no *PPVT-III* scores.

Project ImPACT. Children in Ingersoll & Wainer's (2011) study had received either an educational diagnosis of ASD or were receiving special services under a different

diagnosis. It was noted that teachers recruited participants that they strongly felt would meet criteria for an ASD eligibility, although no official evaluation had been conducted.

Early Start Denver Model. Vismara, Young & Rogers (2012) child participants each received a diagnosis of ASD by a licensed professional in the families' communities using the *ADOS* (Lord et all, 1999), *Mullen Scales of Early Learning* (MSEL; Mullen, 1995), and *Vineland Adaptive Behavior Scales 2nd Edition* (VABS-II; Sparrow, Balla & Cicchetti, 2005). ESDM can be used with children as early at 18 months, and is intended for early intervention with toddlers before the age of 3 (Vismara, Colombi, Rogers, 2009).

Empirical Support

Incidental Teaching. Using a multiple baseline design with an alternating 1-week treatment design, Charlop-Christy & Carpenter (2000) compared the effects of 3 different parent training inventions, modified incidental teaching sessions (MITS), traditional incidental teaching (IT), and discrete trial training (DTT), on the generalization of target phrases (i.e. Good morning, want out) in three 6-9 year old children with ASD. All three treatment interventions were composed of a 10-second time delay or wait time to promote spontaneous speech and involved reinforcing correct responses with praise and access to requested items. They differed in their training trials and setting type. MITS used 2 training trials, which were immediately followed by two practice trials, making 6 total trials in the natural environment, while incidental teaching was only one instance of trial training in a natural setting, and DTT was 10 trials in a parent-selected room in the home. Data was mainly collected by transcribing taped recordings of parent-child interactions for

children's spontaneous speech, imitation, or incorrect responses. Measures of parent treatment integrity and parent satisfaction were also collected.

Results indicated that MITS was the only condition where all three children reached criterion for spontaneous speech. Also, only phrases taught during MITS were generalized within the 5 weeks of treatment. This study sheds light on the positive outcomes of MITS in that blending incidental teaching to reinforce natural learning with discrete trial training to achieve rapid learning results in increased generalized, spontaneous language.

Natural Language Paradigm. Gillet, Linda, & LeBlanc (2006) were interested in using a multiple baseline design to understand the effects of parent implemented NLP on language and play skills of three, 4-5 year old children with ASD. Parents were trained to use NLP strategies to produce opportunities for unprompted, spontaneous vocalizations in their children during play interactions with toys. Researchers collected data on the children's frequency of vocalizations or approximations, MLU, and intervals of appropriate and inappropriate play. Parent behaviors were examined by coding parent treatment fidelity for procedural integrity and giving them a social validity questionnaire.

Findings suggest that parents were able to accurately perform NLP procedures and increase their children's vocalizations and appropriate play behaviors, although language gains were variable across children depending on their initial levels of language and play skills. Children with limited play skills showed more substantial increases in appropriate play, while children with the most language during baseline showed greater increases in spontaneous vocalizations and MLU.

Project ImPACT. Ingersoll & Wainer (2011) investigated the preliminary effectiveness of a pilot study of a school-based parent training program, Project ImPACT, on the social-communication skills of 24 children with ASD. First, thirteen teachers were trained on intervention techniques and parent training procedures, then parents were trained by these ESCE/EI teachers on intervention techniques in group and individual sessions. A pre-post design experiment of Project ImPACT was used to examine changes in children's social communication, social impairment, and rate of language in parent-child interactions of free play and home-based routines. Parent treatment fidelity measures, stress levels, and parent and teacher satisfaction with the training program were also assessed.

Results showed that teachers were able to implement Project ImPACT in their EI/ECSE settings as a support for parents of children with ASD, and that these parents could be effectively trained on intervention techniques for improving language and social interactions with their child. Children showed increases in their rate of expressive language with their parents in both free play interactions and home-based routines (i.e. dressing, dinner) and increased social-communication on measures of parent and teacher reports. Moreover, teachers, but not parents, reported significant decreases in children's social impairment. Lastly, parents reported decreased child-related stress. In total, this study highlights the positive potentials of a feasible parent training program in school settings.

Early Start Denver Model. Vismara, Young & Rogers (2012) investigated the effects of a single-subject multiple baseline design of a telehealth approach to ESDM

parent training on 9 toddler-age children and their parents. Through a 1 hour, 12-week computer-based, video conference delivered parent training program parents were taught ESDM strategies for enhancing their children's social communicative development, engagement, and expressive language development. Following video conferencing, parents practiced newly discussed techniques with their child in at least two play or caretaking activities in the home to teach their target child behaviors. Parents were very invested in the treatment plans of their children, helping to identify goals and formulate action plans for integrating techniques into daily activities. Researchers were mainly concerned with parent treatment fidelity measures, child social communication behavior changes, parent and child engagement ratings, and results of feasibility and acceptability questionnaires.

Results demonstrated that a telehealth version of ESDM parent training was substantial for teaching parents ESDM techniques and increasing children's social communication, joint engagement, positive affect and language development. Parents achieved high fidelity scores within 6 weeks of intervention and continuously increased in fidelity measures at follow-up. Parents also would recommend the approach to other parents and reported the distance coaching program as informative and helpful, but reported they became frustrated when technical difficulties hindered the flow of training. Furthermore, children began initiating novel, meaningful, and pragmatically appropriate language throughout parent-child activities at home, and evidence shows language, imitative play actions, and gestures became more spontaneous and independent over time in context-dependent interactions with parents at home. This study serves as preliminary

evidence for the effectiveness of an ESDM telehealth program for helping to improve parent-child engagement and children's language skills. A summary of the relevant programs mentioned above can be found in Table 11.

Table 11. Summary of Other Relevant Programs

MB-multiple baseline design; MLU- mean length utterance; PCR- percentage of communication responses; PRT-pivotal response training; PP- pre-post; PTF-parent treatment fidelity; SQ-satisfaction questionnaire; SVQ-Social Validity Questionnaire

Citation and Intervention	Research Purpose	Participants	Study Design	Child/Parent Variables	Child/Parent Outcomes
Charlop-Christy & Carpenter (2000) Modified Incidental Teaching Sessions (MITS), Incidental Teaching (IT), Discrete Trial Training (DTT	to evaluate the effectiveness of MITS vs. IT vs. DTT on increasing and generalizing language skills in children with ASD	-3 males; 6-9 years old; all with rare to limited spontaneous language -3 parents	MB across participants and alternating treatments design	*Child:* -number of verbalizations *Parent:* - parent satisfaction	*Child:* -increased speech with MITS for all 3 children, generalized target behaviors with MITS for all 3 children, only 1 child reached criterion for spontaneous language with IT, and 2 children reached criterion for spontaneous language with DTT *Parent:* - positive feelings about all three intervention types on SQ
Gillet, Linda, & LeBlanc (2006) Natural Language Paradigm	to investigate parent implementation of NLP and its effects on language development and appropriate play in children with ASD	-3 children; 4-5 years old; all males -3 parents; all mothers	non-concurrent MB	*Child:* -frequency of vocalizations, intervals of inappropriate play *Parent* - PTF	*Child:* -increased vocalizations, spontaneous vocalizations, and 2 of 3 children had increased MLU; more significant gains found in children with more limited language prior to study *Parent:* -positive outcomes on SVQ

Table 11. (continued)					
Ingersoll & Wainer (2011) Project ImPACT - a blend of developmental and naturalistic behavior interventions	to assess the feasibility and preliminary effectiveness of parent training programs in public early intervention and early childhood special education programs	-27 children in elementary school -13 teachers and 27 families	PP design	*Child* -social communication, social impairment *Parent* - PTF, stress level	*Child* -rate of language in parent-child interactions, increased social communication skills, no significant decrease in social impairment as reported by parents *Parent* - increased accuracy of implementation of intervention, decreased stress
Vismara, Young & Rogers (2012) Early Start Denver Model by Telehealth (ESDM)	to evaluate the feasibility of a telehealth approach to parent training intervention	-9 children; no older than 36 months -9 parents	single subject MB	Child: -number of verbalizations Parent: -PTF, parent-child interaction	Child: -increased language development, social communication Parent: -high satisfaction with program, effective implementation of techniques

Practical Requirements

Incidental Teaching. Charlop-Christy & Carpenter (2000) conducted their MITS and incidental teaching sessions in several locations within the home where the target behavior was likely to occur. DTT was in a parent-selected room in the home where face-to-face sit down sessions could occur daily. Parent training was taught by the researchers and consisted of instruction, modeling, role-play, and feedback. Parents were taught to provide 10-second delays between comments to facilitate spontaneous speech. Allotted time for parent training sessions were not specified.

Natural Language Paradigm. Gillet, Linda, & LeBlanc (2006) did not specify where parent training sessions were held, but conducted parent-child sessions at the home or clinic, depending on the child. Multiple reinforcing toys were used in both settings.

Parent training was taught using presentations, instructional videos, role-play and feedback until parents achieved 90% accuracy on every NLP component. There was no mention of frequency or duration of parent training sessions, but parent-child sessions lasted 3-10 minutes each visit and occurred 1-2 times a week over 3 weeks.

Project ImPACT. Ingersoll & Wainer's (2011) parent trainers were teachers who attended a 2-day workshop to learn the intervention techniques and learn methods for training parents. Teachers conducted parent training sessions in a classroom at the teacher's school using a standardized manual, slide presentation, video modeling, group discussions, coaching of parent-child practice sessions, feedback and homework. Parents attended six group and six 45-minute individual coaching sessions over the course of 3-4 months to learn strategies for promoting their child's social engagement, language, imitation, and play during daily routines and activities.

Early Start Denver Model. Vismara, Young & Rogers (2012) conducted parent training sessions on an internet-based, password protected video conferencing program with computers/laptops and web cameras in real time. The parent trainer was the first author of the study who had undergone extensive training in ESDM techniques and parent training protocols. In fact, ESDM can only be provided by ESDM certified professionals who attend a training workshop and submit videotapes of them giving ESDM intervention. Parent training sessions consisted of instruction by computer, video modeling on DVD, video conferencing, rehearsal and feedback. Trainers also adopted adult learning principles into parent training sessions, focusing on joint planning, observation, active listening, and reflective questioning to encourage parents to self-evaluate their use of

strategies and plan next steps. Prior to each week's session, parents and therapists discussed where parents would set the laptop to allow for unobstructed views of parent-child interactions in different rooms of the home setting. Video conferencing parent training lasted for one hour per week for 12 weeks total. A summary of practical requirements of the four mentioned parent training programs is represented in Table 12.

Table 12. Practical Requirements of Other Relevant Programs

PT-parent training; PC-parent-child

Citation and Intervention	Program Delivery Components	Settings	Frequency	Duration	Generalization/ Maintenance
Charlop-Christy & Carpenter (2000) MITS, IT, and DTT	Delivery: instruction, modeling, role play, feedback Parent Teaching Agent: researcher	PT not specified; PC interactions at home	not specified	5 weeks	- follow-up data available on only 1 of 3 children in MITS training - target phrases generalized in all children in MITS training
Gillet, Linda, & LeBlanc (2006) NLP	Delivery: presentation and videotaped models, rehearsal, and feedback Parent Teaching Agent: researchers	PT not specified; PC sessions in home or clinic	not specified	3 weeks	generalization for only one child in home
Ingersoll & Wainer (2011) Project ImPACT	Delivery: manual, presentation, videos, modeling, group discussions, rehearsal feedback, and homework Parent Teaching Agent: teachers trained by researchers	PT in classroom of teachers; PC sessions in home	six 2-hr group session bi-weekly, six 45-minute one-on-one coaching sessions	12 weeks	none
Vismara, Young & Rogers (2012) ESDM	Delivery: instruction by computer, video modeling DVD, video conferencing, rehearsal and feedback Parent Teaching Agent: researcher trained in ESDM	internet-based, video conferencing in home	1-hr weekly sessions	12 weeks	parents maintained treatment skills and children maintained spontaneous language gains at follow-up

Key Components

Incidental Teaching. The key components of incidental teaching are environmental arrangement, time delay procedure, verbal praise and appropriate responses/access to requested object. In terms of MITS, however, every training trial is directly followed by two practice trials to increase total trial amounts (Charlop-Christy & Carpenter, 2000).

Natural Language Paradigm. Gillet, Linda, & LeBlanc's version of NLP (2006) involved toy selection, restricted access to toys, modeling appropriate play, wait time, verbal models, and contingent reinforcement with requested toys. Parents sat on the floor facing their child with an assortment of toys and books and asked the child to select an item. They, then, removed the item and prevented access to it, while at the same time modeled appropriate play behavior with the toy for 5 seconds to allow the child time to vocalize for the toy. If there was no spontaneous vocalization, a verbal model (i.e. ball) was provided up to three times for the child to imitate. Appropriate vocalizations were rewarded with immediate access to the toy, whereas no vocalization required parents to select different toys for the child to pick again. Correct vocalizations were also expanded on in a second turn, where the parent said, "my turn," and repeated the procedure using a different vocalization such as "red ball."

Project ImPACT. Ingersoll & Wainer's (2011) parent training program is composed of two types of techniques: *interactive* and *direct*. *Interactive techniques* are used to increase the child's ability to engage and socially interact, while *direct techniques* are used for direct teaching of new language, imitation and play skills (Ingersoll & Dvortcsak, 2010). Interactive techniques include:

1. Follow the child's lead, meaning the child chooses the toy or activity.

2. Create opportunities for child to engage and communicate, meaning the parent joins the child's play and does so by imitating the child, being animated, modeling and expanding language, playful obstruction (playfully interrupting or blocking child's play), balanced turns (taking turns with toy or activity), or communicative temptations (setting up situations where the child must communicate to acquire their desired item or activity).

3. Waiting for child to engage or communicate, meaning parents wait for the child to acknowledge or communicate with them in a meaningful way (i.e., eye contact, words).

4. Respond to child's behavior as intentional and meaningful, comply with it, and model a more complex behavior as an alternative. This means the parent attributes meaning to all the child's behaviors and shows the child a more appropriate and effective way of communicating to achieve the same desired effect.

Direct techniques include:

1. Prompting, meaning parents use cues (prompts) to help children produce a certain behavior. Prompts vary in terms of extent of support and type (i.e. hand-over-hand, verbal).

2. Reinforcement, meaning that when a child produces the target behavior or response, the behavior is directly reinforced with giving the child the desired object/activity.

Early Start Denver Model. Vismara, Young & Rogers (2012) ESDM program consists of 10 therapy strategies, which stress the social function of language and emphasize nonverbal communication and imitation as precursors to verbal language.

These 10 techniques are related to: 1) increasing the child's attention and motivation, 2) using sensory social routines, 3) dyadic engagement (social reciprocity and engagement), 4) nonverbal communication, 5) imitation, 6) antecedent-behavior-consequence relationships (antecedent-stimulus that occurs before behavior, consequence-what follows after behavior), 7) joint attention, 8) functional play, 9) symbolic play, and 10) speech development. Key components are summarized below in Table 13.

Table 13. Key Parent Training Strategies in Other Relevant Programs

Intervention	Key Strategies
IT	environmental arrangement, time-delay, verbal praise with access to requested object
NLP	toy selection, restricted access to toys, modeling appropriate play, wait time, verbal models, and contingent reinforcement with requested toys
Project ImPACT	<u>Interactive Techniques</u>: 1. Follow the child's lead for child-choice of activity or toy 2. Create communication opportunities using various techniques 3. Wait for child initiated communication 4. Respond to all communication attempts as intentional and verbally model more appropriate and meaningful language <u>Direct Techniques</u>: 1. Prompting- using cues to support the production of target behavior 2. Reinforcement- direct reinforcement of target behaviors
ESDM	1. Increasing the child's attention and motivation 2. Using sensory social routines 3. Promoting dyadic engagement 4. Enhancing nonverbal communication 5. Increasing imitation and observation 6. Using antecedent-behavior-consequence relationships 7. Facilitating joint attention 8. Functional assessment of behavior 9. Employing prompting, shaping, and fading techniques 10. Encouraging speech development

Assessment Methods and Data Collection

Incidental Teaching. Charlop-Christy & Carpenter (2000) assessed change in behaviors by transcribing parent-child interactions in all three conditions and recording the frequency of responses as spontaneous, imitation, or incorrect. Scoring reliability was acquired by two independently trained raters (the experimenter and a second rater). Generalization probes were also taken at the end of every 1-week treatment period and carryover effects were controlled by instructing parents to use baseline procedures for 1 day between treatment periods. Parent treatment fidelity was measured by having raters track parent's procedural errors. Finally, parents completed a parent satisfaction questionnaire to rate the effectiveness and usefulness of each procedure.

Natural Language Paradigm. Gillet, Linda, & LeBlanc (2006) used the experimenter and a second observer to score parent and child behaviors. Child behaviors were scored for frequency of vocalizations (prompted and unprompted), MLU (Leonard, Miller, & Brown, 1984), and percentage of intervals with appropriate and inappropriate play. Parent behaviors were also coded and scored for their accuracy of treatment procedures by the same observers. A six-item social validity questionnaire using a likert type scale assessed parents' opinions of the program and effects of NLP on their child's play and language skills. Generalization probes were only collected for the child with the most language and play skills prior to intervention.

Project ImPACT. Ingersoll & Wainer (2011) employed the use of multiple objective and standardized measures to evaluate their effects. Children's social communication skills were assessed using parent and teacher reports on the *Social-*

Communication Checklist (SCC; Ingersoll & Dvortscak, 2010). Social impairment was measured by parent and teacher reports on the *Social Responsiveness Scale* (SRS; Constantino, 2002). Parent-child interactions (38% of total sessions) were observed and scored by two independent raters for target behaviors. Parent treatment fidelity was measured using the *ImPACT Fidelity Rating Scale*, a scale developed specifically for use with this parent training program. Parent stress was assessed with the *Parenting Stress Index, 3rd Edition* (PSI; Abidin, 1995). Lastly, parents and teachers completed the *Behavioral Intervention Rating Scale* (BIRS; Elliott and Treuting, 1991) to assess the acceptability and usefulness of Project ImPACT curriculum.

Early Start Denver Model. In Vismara, Young & Rogers's (2012) study, videotaped sessions of the first 10-minute of parent-child interaction activities were scored by raters for operationally defined child (spontaneous verbal utterances) and parent responses. The *ESDM Fidelity Scale* measured parents' use of 13 interactive behaviors on a likert scale. *The Maternal Behavior Rating Scale* (MRBS; Mahoney et.al., 1998) and *Child Behavior Rating Scale* (CBRS; Mahoney & Wheeden, 1998) were used to assess parents' interaction styles (i.e. responsivity, sensitivity, warmth, enjoyment) and children's level of engagement, affect, and interest in activities and parents. Lastly, parents completed questionnaires post-intervention to assess their opinions about the feasibility and challenges of ESDM training via telehealth.

Strengths & Limitations

Incidental Teaching. Charlop-Christy & Carpenter's (2000) study demonstrated that there was better acquisition and generalization of spontaneous speech in all three children with the MITS condition. This suggests that combining IT with DTT procedures to create MITS may result in more immediate improved benefits for children with ASD. Additionally, children also generalized their target behaviors in the MITS condition within the set timeframe, whereas no similar generalization occurred with IT or DTT.

Limitations of this study include a limited amount of trial opportunities, very small sample size, and no control for which training opportunities parents recorded. For instance, treatment conditions only required 1-2 trials per day for IT and MITS and 10 trials for DTT, although increased trials of DTT did not show better outcomes than 6 trials of MITS. Moreover, there were only 3 children involved in the study, making findings difficult to generalize to the general population. Lastly, parents were asked to record training trials at home, without the supervision of researchers, so the validity of the presented recordings must be interpreted with caution given that there was no control for practiced trials by parents before recording.

Natural Language Paradigm. The strengths of Gillet, Linda, & LeBlanc's (2006) NLP program lie in its ability to teach parents NLP strategies which increased spontaneous vocalizations and appropriate play skills in their children with ASD. Researchers also assert that parents were able to acquire these skills at a rate of 90% accuracy after only 3 brief rehearsal sessions. Even more, one child showed increases in his diversity of topics. Nevertheless, this study is limited by its lack of long-term follow-

up data, thus, there is no evidence for the maintenance or increase of parent and child skills after NLP intervention. Future research would benefit from a more substantial sample size, follow-up assessments, and evidence for NLP effects with other relevant communication partners like fathers, siblings, or peers.

Project ImPACT. Ingersoll & Wainer (2011) showed a multitude of positive outcomes for the use of Project ImPACT parent training in EI/ESCE settings. For one, the advent of the parent support program led to increased parent intervention skills, increased child rate of language and social communication skills, and decreased parental stress. Additionally, parents and teachers rated the program highly in acceptability, usefulness, and effectiveness. Moreover, Project ImPACT is *more* accessible to *more* parents than university-based parent training programs because it stems from children's education services. It also suggests that group training models coupled with individual coaching sessions are effective for reaching large groups of parents at one time. Still, this study has limitations to its findings. For instance, there were no measures of teacher training fidelity in place to measure if teachers learned techniques correctly and if parents were then being trained correctly. Moreover, children were not formally assessed for diagnoses of autism or functional language ability pre-intervention, so the sample population may not accurately represent children with ASD with limited language skills. Lastly, there were no long-term measures of longitudinal effects of intervention with either adult parties, parents or teachers, in classrooms or the home setting. Future studies could extend on this research by calculating teacher treatment fidelity measures, collecting long-term data on parent and

child skills, and further examining the effects of parent-teacher relationships in acquisition of parent and child skills.

Early Start Denver Model. Vismara, Young & Rogers (2012) demonstrated that a DVD learning module and 12 weeks of one-hour live streaming video conferencing sessions to teach parents ESDM intervention strategies was effective for increasing parent treatment skills, children's language development, and parent-child social engagement. This study supports the use of telehealth for distance learning and shows that parent training effects are comparable to center-based programs, but more accessible to distantly located families. As a preliminary study, however, it is not without limitations. Given the mode of service delivery, it is not readily accessible for more socioecomically-disadvantaged families who are without the necessary technological equipment. Furthermore, the sample size was small and composed of mostly Caucasian, middle-class families, all highly motivated to learn ESDM, so treatment effects cannot be generalized to ethnically diverse or lower SES families. Future research should investigate the effects of ESDM telehealth parent training in community settings like early intervention programs, hospitals, libraries and other possible training settings to explore the feasibility of training beyond the home. Also, a larger, heterogeneous sample size would strengthen the efficacy of ESDM findings.

CHAPTER 4: DISCUSSION

The first goal of this literature review was to consider available research on parent training programs for children with ASD. The importance of parent training intervention was a focus to further emphasize the significant roles parents play in the lives of their children with ASD and the many benefits resulting from parents who take on the secondary role of interventionists. Overall, results of this review indicate that parent training interventions have shown promising evidence for enhancing parent-child relationships and parent responsiveness and increasing language development, social communication, and appropriate behaviors in varying levels of children with ASD in a myriad of learning contexts.

This chapter will reflect on the literature review in order to propose guidelines for choosing the most effective and efficacious parent training intervention, discuss limitations of the reviewed studies and identify future research ideas to extend and improve on these findings.

IMPORTANCE OF PARENT TRAINING INTERVENTION

Parent training in early intervention is considered an essential component of quality intervention programs (National Research Council, 2001). Evidence suggests that, as is the case with typically developing peers, language and social development in children with ASD is influenced by both the amount and type of parent interactions they experience (Siller & Sigman, 2002). Before the age of 5, children spend a majority of their waking hours interacting at home with their parents. Consequently, parents may be experts

in their children's deficits. Therefore, having their insight is invaluable when developing goals and strategies for a comprehensive and effective intervention.

Additionally, since parents spend more time with their child throughout the day, evenings, and weekends than any other service provider, they may be able to provide "around the clock" intervention for their child (Koegel et al., 1995). Generalization of the children's learned skills are increased since parents can implement learning opportunities for their child in the home and other natural settings beyond the scope of the clinic or educational classroom setting (Charlop-Christy & Carpenter, 2000; Kaiser, Hancock, Nietfeld, 2000; Mancil, Conroy, & Haydon, 2008, Symon, 2005; Vernon, Koegel, Dauterman & Stolen, 2012). Parent interventionists increase the quantity and availability of intervention and allow the child to have increased learning moments, which, in turn, may result in increasing the child's rate of progress (Ingersoll & Wainer, 2011). Also, by making parents a main provider of intervention, overall costs for support services can be reduced and parents can develop a sense of empowerment and control in their child's upbringing allowing them to further individualize intervention based on what they feel is their child's highest priorities and needs. To summarize, parent training interventions has an effect on 1) children with ASD's language development, 2) individualized goal development, 3) quantity and availability of intervention, and 4) costs for support services for children with ASD. To help parents assess which parent training intervention is the most appropriate choice for their child with ASD, guidelines for deciding on best approaches are proposed.

PROPOSED GUIDELINES FOR PARENTS AND RELATED PROFESSIONAL TO DECIDE ON BEST PRACTICES FOR PARENT TRAINING INTERVENTIONS

As a result of research on the following parent training programs, this review presents the following questions as proposed guidelines to help parents and professionals decide on best practices for parent training interventions:

1. What are my child's most pressing needs and concerns? From this question, one should identify the child's needs and identify goals they wish to accomplish as a result of parent training intervention. Does the child lack expressive language, receptive language, spontaneous language, social initiation, social communication, play skills, nonverbal communication (i.e. joint attention, gestures), vocabulary, or appropriate behaviors?

First, parents should assess their child's existing language abilities and needs. If the child is verbal, has the ability to imitate, has limited social communication, and displays inappropriate or problematic behaviors, Pivotal Response Training may be a promising option for parent training intervention since it encompasses a wide range of target skills. PRT studies have been linked to producing more functional verbal language (Coolican, Smith & Bryson, 2010; Koegel, Symon, & Koegel, 2002; Minjarez, Williams, Mercier, & Hardan, 2010), increased verbal initiations (Vernon, Koegel, Dauterman & Stolen, 2012), increased social-communication (Randolph, Stichter, Schmidt, & O'Connor, 2011), and decreased behaviors (Randolph, Stichter, Schmidt, & O'Connor, 2011; Stamer & Gist, 2000).

If the child has a lack of eye contact and joint attention skills, makes little to no

attempts to initiate social interactions, and limited vocabulary, Hanen's More Than Words may be the best intervention choice since it can accommodate both nonverbal and verbal children with ASD (Girolametto, Sussman, Weitzman, 2007; Prelock, Calhoun, Morris & Platt, 2011; Vernon, Koegel, Dauterman & Stolen, 2012). MTW programs have been shown effective for increasing vocabulary size (Girolametto, Sussman, Weitzman, 2007; Prelock, Calhoun, Morris & Platt, 2011), social initiations (Girolametto, Sussman, Weitzman, 2007), receptive language (Prelock, Calhoun, Morris & Platt, 2011), and social and symbolic communicative acts (Girolametto, Sussman, Weitzman, 2007; Prelock, Calhoun, Morris & Platt, 2011; Vernon, Koegel, Dauterman & Stolen, 2012).

Moreover, if the child is verbal with initial imitative skills, low MLUs, and significant deficits in expressive language and social initiation skills, Milieu Teaching is a viable option for parent training intervention (Kaiser, Hancock, Nietfeld, 2000; Mancil, Conroy, & Haydon, 2008). Milieu Teaching and Enhanced Milieu Teaching resulted in increased use of target language (Kaiser, Hancock, Nietfeld, 2000), increased MLUs (Kaiser, Hancock, Nietfeld, 2000), increased communication responses (Mancil, Conroy, & Haydon, 2008), and decreased aberrant behaviors (Mancil, Conroy, & Haydon, 2008). MT and EMT's nature of creating target language goals allows for specific skills to be taught to children in a natural setting. For instance, maybe the goal is to learn greetings, certain vocabulary words, or appropriate play skills with a certain toy, MT and EMT can arrange the child's environment to elicit the practice of these skills.

If the child is has little to no spontaneous speech but has imitative skills, Modified Incidental Teaching Sessions (Charlop-Christy & Carpenter, 2000), Natural Language

Paradigm (Gillet, Linda, & LeBlanc, 2006), or Project ImPACT (Ingersoll & Wainer, 2011) are appropriate choices for intervention. Early Denver Start Model (Vismara, Young & Rogers, 2012) is appropriate for children infant to toddler-aged. MITS has been shown to increase generalized spontaneous language (Charlop-Christy & Carpenter, 2000). NLP interventions increased children's vocalizations and appropriate play behaviors (Gillet, Linda, & LeBlanc, 2006). Project ImPACT revealed increased rates of expressive language and social communication (Ingersoll & Wainer, 2011). ESDM intervention produced increased social communication, joint engagement, positive affect and language development in children with ASD (Vismara, Young & Rogers, 2012).

Second, parents should consult with professionals (i.e. doctors, speech therapists, teachers, social workers) knowledgeable in developmental language and cognitive norms for their child's age to collaborate on developing goals. Considering both parents' desires and professional opinions together will generate the most effective and meaningful intervention program for the parent and child. Without properly identifying attainable and worthwhile goals, there is no way to assess progress and change in a child's language, behavior, or play skills in the context of their everyday lives.

2. What is the cost, time, and energy commitment? This is to say, what are the financial considerations, time commitments, and energy requirements involved with this parent training intervention, and can the parent realistically make the necessary commitment? Is the intervention cost reasonable? Are there sliding scales or scholarships for reducing costs? Does the intervention require 6 1-hour total parent training sessions or 20 1-hour parent training sessions? For instance, PRT interventions had positive results

with an accelerated 6-hour program (Coolican, Smith & Bryson, 2010, Koegel, Symon, & Koegel, 2002), while MTW requires a strict 11-week commitment and may not be feasible for parents with a busier lifestyle. ESDM Telehealth (Vismara, Young & Rogers (2012) programs are appropriate for stay-at home parents who are self-motivated and independent and able to commit to weekly instructional videos, videoconference meetings with trainers, and live streaming parent-child sessions.

Furthermore, what is the amount of homework and at-home commitment needed to complete intervention protocols? For example, Symon (2005) required parents to send follow-up videos of their parent-child interactions post-intervention, while Kaiser, Hancock, Nietfeld (2000) required parents to record all their parent-child interactions and bring them for review during feedback sessions.

3. What parent training interventions are available in schools and communities nearby? There are a number of programs readily accessible in these settings and reaching out to them is key to cutting down costs and gaining insight into possible intervention programs in the area. For instance, Project ImPACT (Ingersoll & Wainer, 2011) is a school-based intervention made accessible to parents of children with ASD who were already attending various special education programs in elementary schools. Furthermore, many studies recruited families from centers specializing in autism support services (Prelock, Calhoun, Morris & Plattl, 2011; Venker, McDuffie, Weismer, & Abbeduto, 2012), and Vismara, Young & Rogers (2012) recruited families who directly contacted them and expressed interest in ESDM prior to intervention.

4. Has research verified the parent training program as effective? Is it an evidence-based practice approach? The more evidence-based research available on the intervention, the higher its level of efficacy, reliability, and validity. When evaluating a program, parents should assess its research design, assessment tools, identification of ASD, treatment fidelity, long-term data, and generalizability to other settings and communication partners. While all of the studies reviewed were data based studies, PRT intervention accounted for a large percentage (43%) of the evidence-based studies. After reading this review, parents and professionals should have more knowledge about the different components of parent training interventions and better understand how to compare them for their variable strengths and weaknesses.

5. What are the values and preferences of parents, care providers and individuals with ASD? When deciding on an intervention, it is important to take into account cultural values and preferences of all those impacted by the intervention to ensure the program is the best contextual fit for the family. "Contextual fit" refers to the compatibility of an intervention with the values, needs, and resources of the family. Koegel, Symon, & Koegel (2002) was the only study to note contextual fit as an indicator of successful intervention for their families. Effective parent training programs should consider the entire family system, not only the child with disabilities, since the family would be the main intervention agents and variables which affect them, would consequently affect the implementation of the intervention. Furthermore, families are a constant in the child's life, whereas therapists, teachers, and other non-familial interventionists change periodically. Additionally, ensuring contextual fit gives the

program more staying power and increases the likelihood of parents continuing the use of strategies after intervention ends, thus producing long-term effects.

Answering and understanding these questions will support parents and professionals in finding the most suitable parent training intervention program for their child with ASD and improve the probability of achieving positive outcomes as a result of parent training intervention.

LIMITATIONS

While there are numerous benefits of parent training intervention research, there are also a multitude of limitations. To start, different assessment and data collection methods makes it difficult to compare treatment effects across intervention studies since all interventions either impose their own self-made assessment methods or use various standardized tests to measure changes in behavior and language skills. This includes studies lacking confirmatory support for assessment of diagnoses of autism in their sample population prior to intervention. Only four studies (Gillet, Linda, & LeBlanc, 2006; Mancil, Conroy, & Haydon, 2008; Minjarez, Williams, Mercier, & Hardan, 2010; Venker, McDuffie, Weismer, & Abbeduto, 2012) confirmed diagnoses of autism with their own additional standardized testing.

Moreover, sample sizes are often small and inadequately represent ASD populations with homogenous subgroups of the general population, which lack cultural diversity, varying parent education levels, and varying SES levels. Thus, the external validity of the intervention is absent in many parent training programs. The smallest

sample size consisted of 3 families, whereas the largest sample size was only 27 families. Only 2 studies (Charlop-Christy & Carpenter, 2000; Gillet, Linda, & LeBlanc, 2006) used an ethnically diverse sample, and if ethnic information was provided at all, studies mostly reported Caucasian participants. The majority of studies consisted of middle to upper class families and no studies reported inclusion of families with varying SES levels. Lastly, only Randolph, Stichter, Schmidt, & O'Connor (2011) investigated education level effects on parent training intervention.

Another limitation is that specific parent training procedures are sometimes minimally described, ambiguous, or altogether nonexistent. It is not always clear how much parent training sessions occurred with the child present in guided practice, which particular strategies from the intervention package as a whole were most effective for improving language skills, how frequently and accurately parents identified teachable moments in daily life activities, how accurately relevant adults implemented treatment, or how parent training delivery was best accomplished. Only 2 studies (Girolametto, Sussman, Weitzman, 2007; Minjarez, Williams, Mercier, & Hardan, 2010) outlined the curriculum of group and individual parent training programs in detail using tables.

Moreover, a lack of longitudinal studies in the literature detailing the long-term effects of parent training interventions limits the magnitude of generalizability of each intervention. Long-term data is only available for 10 of 16 studies, and this data only represents long-term information for, on average, 1-3 months or less, not years. Koegel, Symon, & Koegel (2002) was the only study to have a 12-month follow-up assessment. Frequently, maintenance and follow-up assessment are neglected due to time constraints,

costs, or other underlying variables that limit parent training data on parent and children's long-term gains. Additionally, generalization probes are not always conducted to assess the effectiveness of parent training strategies in multiple contexts. Also, measures of children's skills with other communication partners outside the scope of the parent/caregiver is rarely assessed. Only Symon (2005) examined children's communication with primary and secondary caregivers, while Ingersoll & Wainer (2011) studied children's interactions with both parents and teachers.

FUTURE RESEARCH

Future research should assess specific parent training interventions with larger, more heterogeneous sample sizes of parent-child dyads involving children ranging from infant to adolescent-aged for a more accurate representation of the entire ASD population. Moreover, studies that standardize assessment and data collection methods across multiple parent training interventions would more accurately depict the different treatment effects associated with each training program. It may also be of interest to investigate the effects of manipulating various parent training service delivery variables such as group vs. individual models, accelerated vs. lengthier programs, manuals vs. no manuals, role-play with trainers vs. guided practice with the child, and clinic training vs. home training, as well as exploring the details of the above mentioned "ambiguous" descriptions of parent training protocol. Moreover, parental outcomes such as decreased stress, parent empowerment, and support groups as a result of group programs should be further investigated in the context of parent training programs. Lastly, future studies should

involve more longitudinal studies of parent training programs and possibly explore the effects of teacher, sibling or peer implemented interventions with children with autism to assess an interventions' value across time and other significant people in the child's life.

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