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PARENT-IMPLEMENTED LANGUAGE INTERVENTION WITH YOUNG CHILDREN FROM LOW-SES ENVIRONMENTS WHO HAVE LANGUAGE IMPAIRMENT

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PARENT-IMPLEMENTED LANGUAGE INTERVENTION
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LANGUAGE IMPAIRMENT

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DISSERTATION
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A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Health Sciences at the University of Kentucky

By
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Lexington, Kentucky

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Lexington, Kentucky

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ABSTRACT OF DISSERTATION

PARENT-IMPLEMENTED LANGUAGE INTERVENTION
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In this study, the author examined the effects of training four parents from low-socioeconomic environments to use Enhanced Milieu Teaching (EMT) with their young children with language impairment. The investigator used a modified Teach-Model-Coach-Review method to teach parents to use the following EMT strategies during 8-10 individualized, home-based sessions: matched turns, expansions, time delays and milieu teaching prompts. A single-case multiple-baseline design across-behaviors replicated across four parent/child dyads was used to evaluate the parents' use of the EMT strategies. Child language outcomes were also assessed using pre- and post-intervention language samples. All parents learned and demonstrated use of each language support strategy to set criterion levels. Results from this study indicated a functional relationship between the brief parent-implemented language intervention training and parents' use of language support strategies. Additionally, all four children demonstrated gains in expressive language. Additional research is needed to assess fidelity and dosage of parents' use of strategies on specific child language outcomes and to determine how to facilitate maintenance of parents' use of strategies over time.

KEYWORDS: enhanced milieu teaching, early intervention, language impairment, parent-implemented, language intervention, children

Courtney Allison Hatcher, M.S., CCC-SLP
December 15, 2017

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To the parents and children who made this research possible

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Chapter One: Introduction

This chapter includes the background, theoretical underpinnings, problem statement, study purpose and research questions, as well as the nature of the study and limitations. These features provide direction for outlining the research project. There is a brief literature review here followed by a more extensive literature review in Chapter Two.

Background

Developmental language disorder, also known as language impairment (LI), is the most common disability in the United States among young children. LI affects as many as 7% of young children in the United States and is the most frequent cause for early intervention and special education services in the country (Justice & Redle, 2013; Tomblin et al., 1997). Young children with LI are at increased risk for disparities involving school readiness, literacy, academics and socio-emotional development (Prior, Bavin, & Ong, 2011; Snowling, 2005). Children from families identified as low-socioeconomic status (SES) are at an even greater risk for ongoing language deficits (Hart & Risley, 1995; Hoff, 2013; Neuman, Kaefer, & Pinkham, 2017). Cultural issues in addition to low-SES risk factors may delay or prevent referral and delivery of early intervention (EI) services to families with children who have disabilities in states with more restricted eligibility guidelines (McManus, McCormick, Acevedo-Garcia, Ganz, & Hauser-Cram, 2009). Therefore, it is crucial to investigate EI programs that focus on improving language development, especially in children from low-income backgrounds.

Policy and practice emphasize the involvement of parents and/or caregivers in the EI of young children with disabilities (IDEA, 2004; Odom & Wolery, 2003). Early

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intervention services are supported and delivered in the United States through the Individuals with Disabilities Education Act (IDEA) Part C state programs. EI programs provide support and deliver a variety of allied health services to families and their young children, using a family-centered philosophy (Adams et al., 2013). Researchers and early childhood professionals have long recognized that parents of children with disabilities can be primary agents of change in the advancement of their child's development. This has been shown to be especially true for language development, primarily because of the interactive nature of communication (Koegel, 2000). In fact, parent-implemented language interventions have been well-studied in the literature and results generally reveal positive effects on both parent behaviors and a variety of child language outcomes (Roberts & Kaiser, 2011).

The most commonly studied parent-implemented language intervention is enhanced milieu teaching (EMT), a naturalistic approach to enhancing language skills in children using both behavioral and social-interactionist strategies for teaching language (Hancock et al., 2016). The most current framework of EMT includes four major components: environmental arrangement, responsive interaction techniques, language modeling and milieu teaching procedures (Roberts & Kaiser, 2012; Roberts et al., 2015). EMT uses a variety of language support strategies included in each component, which are taught to parents in a sequential manner over the course of a somewhat lengthy intervention (average 20-36 sessions) using a training method referred to as Teach-Model-Coach-Review (TMCR) (Roberts et al, 2014). The effects of EMT have been studied on a variety of populations including children with primary LI, developmental delay, Autism Spectrum Disorder and Down syndrome (Hancock & Kaiser, 2002;

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Hemmeter & Kaiser, 1994; Kasari et al., 2014; Wright & Kaiser, 2017). While most EMT studies have used parents as the primary deliverer of treatment, other studies have investigated the effects of training therapists and teachers to deliver the intervention (Hancock & Kaiser, 2002; Kaiser & Hester, 1994). Parent-implemented EMT has been studied in home-based settings (Mobayed, Collins, Strangis, Schuster, and Hemmeter, 2000; Peterson, Carta & Greenwood, 2005), clinical settings (Hemmeter & Kaiser, 1994; Roberts et al., 2014), or a combination of both within the same study (Alpert & Kaiser, 1992; Kaiser & Roberts, 2013; Roberts & Kaiser, 2015), all yielding positive results. Unfortunately, most research on parent-implemented EMT has studied English speaking, Caucasian families from middle to high-SES groups in either clinical settings or a combination of both clinical and home-based settings.

Statement of the Problem

This study extends previous research on parent-implemented language interventions by investigating the effects of a parent-implemented language intervention training using enhanced milieu teaching (EMT) with parents from low-SES environments. The majority of studies on parent-implemented language interventions, including those using EMT, have been limited to families in the subgroups of middle to high-SES with English speaking, Caucasian parents who are highly educated. There is only one study to date that has delivered EMT exclusively to low-SES parents and children with multiple risk factors, including language delay and minority status (Peterson et al., 2005). Another EMT study investigated the effects of training families from low-SES environments; however, EMT was blended with a positive behavioral intervention as the children in the study presented with emergent challenging behaviors in

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addition to language delay (Hancock, Kaiser & Delaney, 2002). A study by Hatcher, Grisham-Brown and Sese investigated a brief caregiver-implemented language intervention with Spanish speaking caregivers in a Guatemalan orphanage (2017). Although the researchers found the intervention program was effective for teaching caregivers to implement language support strategies with children at risk for language delay, the intervention did not include the full array of EMT components. Therefore, it is unknown if the success found in previous studies using parent-implemented EMT would generalize to parents from low-SES environments and their children with LI or parents from more ethnically diverse backgrounds.

Another concern in the literature relates to the setting in which the intervention has been delivered. Roberts and Kaiser (2015) used parent-implemented EMT exclusively in a clinical setting with caregivers and their young children with primary LI and reported positive effects on both children's receptive language skills and caregiver use of strategies. However, the researchers found that teaching parents in a clinical setting, as opposed to a home-based setting, led to reduced generalization and maintenance of strategy use. Additionally, future research using this type of parent-implemented intervention in a home-based setting with low-SES families would be beneficial; especially since EI in home-based environments is currently considered best practice. Furthermore, it is unknown if EMT can be delivered in less than the traditionally prescribed number of sessions and what instructional procedures are best for training parents in EMT. Little is known about which language support strategies might be easier for parents to learn and implement and what parental characteristics might impact implementation of EMT language support strategies. The current study used single-case

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research methodology to extend existing research on parent-implemented language intervention training to additional populations. This study used EMT with young children with LI and their parents who are from low-SES environments to address the areas needing further investigation.

Purpose of the Study

The purpose of this single-case research study was to investigate the effects of a brief parent-implemented language intervention training using EMT in a home-based setting with parents from low-SES environments and their children with LI. EMT is the most commonly studied parent-implemented language intervention that involves training parents to use specific language support strategies in a sequential manner in order to promote their child's language development (Roberts, Kaiser, Wolfe, Bryant, & Spidalieri, 2014). In this study, parents were trained by the primary investigator (PI) who used a slightly modified version of the Teach-Model-Coach-Review (TMCR) method employed in an EMT study conducted by Roberts et al. (2014). This study further investigated the effects of the parent-implemented language intervention on children's expressive language skills.

Research Questions

The overall research questions that guided the current study were:

1. Is there a functional relationship between parent-implemented EMT language intervention training and parent use of four specific language support strategies when the intervention is delivered to low-SES parents in a home-based setting?

2. For children with LI from low-SES households, what are the expressive language outcomes of implementing a home-based training program designed to teach the parents to use EMT language strategies?

The results of this study determined the effects of a parent-implemented language intervention training using EMT in a low-SES, home-based setting on parents' use of language support strategies with their children with LI. The measurement of parent outcomes followed data analysis procedures using a single-case multiple-baseline, across behaviors design. The study also investigated the effects of the intervention on children's expressive language skills. Child expressive language outcomes were informally assessed using pre- and post-intervention child language samples to measure changes in expressive language following the intervention.

Significance of the study

Over the past decade, EI programs have fostered a family-centered and multidisciplinary approach in order to deliver comprehensive and high-quality services to families and children with disabilities (Adams et al., 2013). Among the most studied EI programs is parent-implemented EMT and decades of research report positive results for both parents & children with a variety of developmental disabilities (Hancock, Ledbetter-Cho, Howell, & Lang, 2016). However, there are limitations that exist with previous research on parent-implemented EMT. For example, the majority of EMT study populations have been limited to English speaking, Caucasian parents & children from middle to high SES groups. Although the current study initially presented with recruitment difficulties, the researcher was able to recruit low-income parents and their children with LI. The present study conducted parent training and measured parent use of

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EMT strategies in a home-based setting as opposed to a clinical setting. Child outcomes for expressive language were also measured at pre- and post-intervention. Finally, the current study utilized an abbreviated training model using EMT, compared to previous studies with a longer duration. The current study addressed the limitations of previous research by (a) investigating the effects of a parent-implemented language intervention training exclusively with parents from low-SES environments, (b) examining parents' use of EMT language strategies in a home-based environment, and (c) examining the effects of the intervention on child language outcomes using an abbreviated training model. The contributions of this study would be of interest to clinicians and researchers in special education, early intervention & speech-language pathology, particularly those who seek effective, family-centered intervention programs for improving language skills of young children.

Theoretical and Conceptual Framework

The theoretical base for the current study is multifaceted given that the intervention has multiple components for both parent training and child language intervention. With origins in Bronfenbrenner's seminal work regarding the ecological systems theory, using parents as partners and the primary deliverers of an EI supports a family-centered approach to intervention (Bronfenbrenner, 1986; Espe-Sherwindt, 2008). In family-centered practices, such as parent-implemented language interventions, mutual respect (between parents and interventionists) in combination with a shared trust is built with parents, who are acknowledged as their child's best language teacher. Parent-implemented language interventions, such as EMT, fit in the evidence-based model for EI because they recognize that family is the most important part of a child's life and see the

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family as a dynamic social system in which the child belongs (Dunst, 2000). Figure 1.1 illustrates the following three components of the family-centered model: parenting supports (parent training on EMT), child learning opportunities (parent and interventionist use of EMT strategies), and family resources (provision of early intervention services and learning resources). All three components merge together to form a new domain, learning and development, which illustrates the optimal relationship between all three areas.
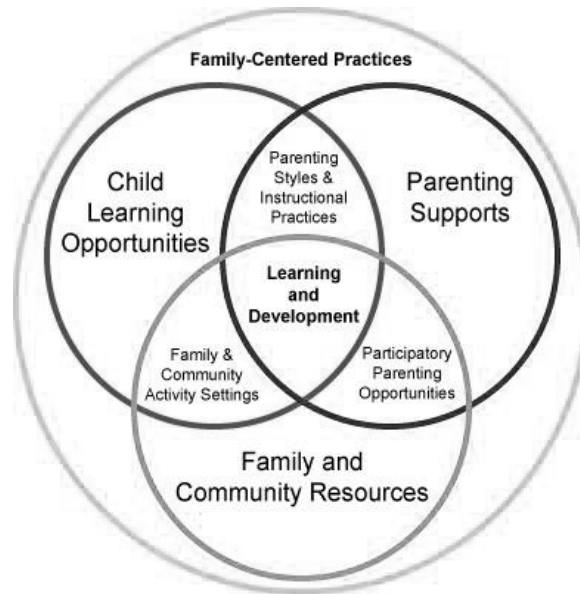
Figure 1. 1. Evidence-based model for early intervention and family support.

Research on family-centered interventions has shown these approaches to empower parents since they involve supporting and strengthening parents' abilities to gain functional and practical skills as well as learn information to help their child who has a disability (Rouse, 2012). Empowerment theory, also employed in the current study, consists of organizing and applying processes that improve an individual's participation

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and control over their life situations. Empowerment theory is also beneficial for setting and attaining an individual's goals in the area of life that the individual seeks to improve (Perkins & Zimmerman, 1995). Dempsey and Dunst (2004) reported that empowerment in parents of children with disabilities increased their sense of self-efficacy regarding their ability to enhance their child's development. The current study uses empowerment to help improve the self-efficacy of parents of children with language impairment (LI) by applying methods that increase parents' participation and control over their life and their children's lives through the use of EMT, in order to reach communication goals for their child.

EMT is a naturalistic language intervention that uses a variety of strategies to enhance language development in young children. The premise of naturalistic approaches is that children are better able to generalize new language skills when communication opportunities are presented in multiple, everyday situations (Sheldon & Rush, 2001). EMT uses strategies and communication opportunities within the context of a child's daily activities and routines (Hemmeter & Kaiser, 1994). EMT components include strategies that connect the adult and child, support child language learning and directly teach new language targets to children. These components are derived from language developmental theories that were historically based on observations of typical children and their parents and include developmental theories such as the Piagetian model and the social-interactionist model (Hancock et al., 2016; Ingersoll, 2010). Milieu teaching procedures are based on behavioral language learning theories often employed in applied behavioral analysis (Hancock et al., 2016). The theoretical basis for EMT includes a hybrid approach to language intervention in that it combines characteristics of both

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social-interactionist and behavioral approaches. The social-interactionist theory of language development supports language learning in children and views the advancement of communication within the context of early parent-child interactions (Bohannon & Bonvillian, 1997). This theory views child language development as an interactive process in which the parent's communication influences the behavior of the child and vice versa. Factors can exist that either positively or negatively affect child language development and include, but are not limited to, the responsiveness of the parent to the child's communicative intent or the child's ability to demonstrate communicative behaviors (Barnard, 1997).

Definition of Key Terms

Key terms directly related to the research project are defined below in order to enhance the reader's understanding of important terms used in this manuscript.

ASHA. The American Speech-Language Hearing Association; a national professional, scientific, and credentialing association for members and affiliates who are audiologists; speech-language pathologists; speech, language, and hearing scientists; audiology and speech-language pathology support personnel; and students.

Early Intervention. A system of organized services offered through Part C of the Individuals with Disabilities Education Improvement Act that promotes appropriate growth and development in young children and supports families by coordinating services to assess and provide intervention for cognitive, behavioral, and physical development for children less than 3 years old at risk for or with a disability (Twardzik, MacDonald, & Dixon-Ibarra, 2017).

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Enhanced Milieu Teaching. An early language intervention using a conversation-based model in which child interest and initiations are used as opportunities to demonstrate and prompt language in daily routines and natural environments (Kaiser, 1993).

History. A threat to internal validity in which events that occur outside of the experimental conditions that influence the behavior being studies (Gast & Ledford, 2014).

Instrumentation. A threat to internal validity in which any mechanical failure of equipment or human error that lead to inaccurate data recording (Gast & Ledford, 2014).

Language Impairment. Impaired comprehension and/or use of spoken, written and/or other symbol systems; may involve impairments in the form of language (phonology, morphology, syntax), the content of language (semantics), and use of language (pragmatics), or any combination of the major language components (ASHA, 1993) .

Maturation. A threat to internal validity in which the normal developmental processes of the Dependent Variable are affected by changes that occur due to the passage of time (Gast & Ledford, 2014).

Milieu teaching. A language teaching intervention that uses specific techniques and functional consequences to teach language form and content to children with beginning verbal communication skills (Warren et al., 2008).

Parent-implemented language intervention. Language intervention programs designed to teach and train parents language intervention strategies in order to promote their children's language development (Roberts & Kaiser, 2011).

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Procedural fidelity. The degree to which the procedures of an experimental condition are implemented as intended (Gast & Ledford, 2014).

Testing. A threat to internal validity in which subject responds differently than they normally would because of repeated testing that occurs during the intervention (Gast & Ledford, 2014).

Matched turns. A verbal language support strategy in which an adult matches conversational turns with a child as a way to connect; can be done by either mirroring and mapping or by equal verbal turn taking (Hancock et al., 2016).

Expansions. A verbal language support strategy in which an adult adds one or more content words to a child's previous word that relates to the context or corrects a child's utterance (Roberts et al., 2014).

Time delays. A nonverbal language support strategy in which an adult attempts to elicit independent, verbal or nonverbal requests from a child by waiting expectantly; strategy should be followed by an adult labeling these requests with specific target language (Roberts et al., 2014).

Milieu prompts. A verbal language strategy in which an adult sequences specific prompts in response to a child verbal or nonverbal request (Roberts et al., 2014).

Nature of the Study and Limitations

The current study used a single-case, multiple baseline design across behaviors to investigate the effects of a home-based parent-implemented language intervention training using EMT on parents who are living in low-SES environments and on their young children with LI. The multiple baseline (MB) design is flexible and rigorous in that it allows researchers to demonstrate experimental control and limit threats to internal

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validity. This single-case research design (SCRD) was deemed the most practical for the researcher who sought to investigate well-established language intervention training in a real-life setting. The multiple baseline design allowed the researcher to investigate relationships between the independent variable (parent-implemented language intervention training using EMT) and the dependent variable (parent use of four language support strategies). Measurements were also conducted on child outcomes for expressive language using a comparison of pre- and post-language samples.

There are several limitations of the present study. These limitations relate to funding, participant demographics and choice of research design. For example, limited funding prevented a more complex research methodology such as a randomized controlled trial. It also prevented extensive evaluation of child participants when confirming eligibility of the study. For example, one inclusion criteria for child participants was the diagnosis of LI without the presence of an intellectual ability. In the current study, the researcher was able to formally evaluate overall language abilities to confirm the presence of LI. However, there were no materials or resources available to formally assess cognition in order to rule out the presence of developmental disabilities such as autism. Instead the researcher relied on parent report and clinical observations to determine this criterion. Furthermore, parent and child participants had to meet specific inclusion criteria for the study that related to demographic characteristics and biographical markers. The recruitment process was manageable for this study, although it did present challenges in that it was difficult to recruit low-SES families to participate in the study. The chosen research design promoted strong internal validity; however, external validity could not be obtained in this study (as in most SCRDs), due to the small

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number of participants and the results not having generality to other populations, settings or behaviors without replication. In spite of limited funding for the project and other limitations, the study provided a high-quality, parent-implemented language intervention training to low-SES parent and their children with LI.

Summary

Enhanced milieu teaching is the most commonly studied parent-implemented language intervention in the literature. This naturalistic approach to language intervention has a theoretical basis that combines both behavioral and social interactionist theories to language learning in children. Since most studies on parent-implemented EMT have been limited to families in middle to high-SES groups, success found in previous studies cannot be generalized to populations of parents and children who are living in low-SES environments. The current study used single-case research methodology to extend the existing research on parent-implemented language intervention using EMT with low-SES parents and their young children with LI in a home-based setting. The following chapters include a literature review, methods, results, and finally, discussion and conclusion.

Chapter Two: Literature Review

This chapter provides a brief introduction to language impairment (LI) in young children. Next, important literature relating to early intervention (EI) and parent-implemented language intervention is reviewed. Finally, enhanced milieu teaching (EMT) is discussed using the most current framework to provide a context for the current single-case research study.

Language Impairment in Young Children

Language impairment is the most common disability in young children and the most frequent cause for EI and special education services in the United States (Justice & Redle, 2013). Young children with LI represent a heterogeneous population since many children present with varying degrees of impairment in receptive, expressive or mixed receptive-expressive language. A variety of clinical classification systems have been used to refer to this population which is mostly characterized by the presence or absence of cognitive deficits (Stark & Tallal, 1981). For example, Primary Language Impairment (PLI) refers to impairment in receptive and expressive language skills without a concomitant diagnosis such as hearing impairment or intellectual disability such as autism spectrum disorder, Down syndrome or developmental delay (Kohnert, Windsor & Ebert, 2009). Specific Language Impairment (SLI) is another classification that has symptoms described in the literature much like PLI. SLI is considered a developmental LI characterized by difficulties with spoken language acquisition (Bishop & Snowling, 2004; Tomblin, et al., 1997). Leonard (1998) further described SLI as marked language difficulties in the absence of conditions such as hearing impairment, neurological damage, or mental retardation. When associated conditions exist, such as a

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developmental delay, intellectual disability, or hearing impairment, the language deficit is typically referred to as a secondary LI. For the purposes of the proposed study, the term language impairment (LI) will suffice to include young children with impairment in receptive and expressive language skills not due to another identifiable etiology.

Prevalence of Language Impairments. LI is a relatively common developmental disorder affecting as many as 7% of young children (Hulme & Snowling, 2009). Prevalence estimates for children living with LI vary in the literature, primarily due to the variances in how LI is defined, location of the population studied, and the differences in diagnostic procedures used by professionals (Pinborough-Zimmerman, Satterfield, Miller, Bilde, Hossain, & McMahon, 2007). The prevalence rate for SLI among monolingual English-speaking, kindergarten children in the upper Midwest region of the United States was 7.4% (Tomblin et al., 1997). Law and colleagues conducted a systematic review on the prevalence of primary LI in the UK according to more specific classifications (receptive, expressive, and mixed receptive-expressive LI) and found the median range to be 2-3% for children 7-years-old and younger (Law, Boyle, Harris, Harkness, & Nye, 2000). Despite some ranging prevalence estimates and diagnostic distinctions regarding young children with LI, developing early language interventions for this population is crucial due to the immediate and potentially lifelong effects of LI.

Impact of language impairment. The long term effects of childhood LIs are well-documented in the literature and include difficulty with behavior, poor academic performance, and limited employment opportunities later in life (Clegg, Hollis, Mawhood, & Rutter, 2005; Johnson, Beitchman & Brownlie, 2010; Tomblin, et al., 1997). Young children with LI are also at increased risk for decreased school readiness

and persistent language problems later in life (Prior, Bavin, & Ong, 2011; Snowling, 2005). During the school-age years, children with LI have difficulty with reading and writing due to the strong relationship between spoken and written language (Hulme & Snowling, 2013). Learning disabilities (LD) such as dyslexia, have been associated with LI; however, the research is sparse in this area and needs further exploration to determine a more precise relationship between the two (Pennington & Bishop, 2009). Children with LI are also vulnerable to socio-emotional problems due to their increased difficulty with social communication skills (Hummel & Prizant, 1993; McCabe & Meller, 2004). Social communication includes the ability to interact socially with a variety of communication partners, which requires individuals to understand general pragmatic rules and appropriately interpret and use both verbal and non-verbal communication modalities. Approximately 50–70% of children with communication disorders demonstrate a co-occurring emotional or behavioral disorder (Benner, Nelson, & Epstein, 2002).

Impact of low-SES environments. Despite the negative impact of language impairment alone, children with LI from families identified as low-SES are at an even greater risk for ongoing language deficits and later academic failure (Catts, Fey, Tomblin, & Zhang, 2002). Hart and Risley (1995) reported in their seminal work that certain variables such as race, birth order, and gender are insignificant when predicting or determining factors that contribute to a child's communication delays; the most significant factor was socio-economic advantage. This is not surprising considering the effects of poverty-related issues, such as lack of attention to physical or biological needs. Failure to meet such needs has been associated with decreased health and educational performance, mental health problems, and behavior issues in both mothers and their

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young children (Whitaker, Phillips, & Orzol, 2006). Duncan and Magnuson (2002) reported that families from low-SES environments experience higher levels of stress as well as less access to educational programs and materials. Other dimensions affected by poverty are mothers' level of education, marital status and overall parenting skills (Isaacs, 2012).

Recent research regarding kindergartners showed that children from higher income levels were more prepared to enter kindergarten compared to children from low-income families (Mistry, Benner, Biesanz, Clark, & Howes, 2010). The more prepared children are when entering school, the greater the chances are of future academic and school success (Waldron-Soler, Martella, & Marchand-Martella, 2002). Not all LIs are a result of a child's environment; however, a child's environment has a monumental impact on their overall development, including language use and acquisition. Hart and Risley (1995) reported a profound disproportion of expressive language input between parents from low-SES and parents from high-SES; by 3-years-old, children from the high-SES families heard over 30 million more words than children who were in families of low-SES. Aside from the quantity of words, the qualitative nature of the responses varied substantially. The young children from the low-SES homes heard more prohibitions and a less diverse vocabulary compared to children from high-SES environments; this may have contributed to a lower vocabulary for the children compared to their peers of higher SES groups.

Research regarding EI services for low-SES populations has identified discrepancies with referral processes and service provision for states that have narrow eligibility guidelines. For example, McManus and colleagues (2009) reported that

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approximately 18% of children from low-SES backgrounds are less likely to receive services due to cultural issues and risk factors associated with low income, ethnically diverse populations. Knowing the profound negative impact of low-SES environment in addition to LI, it is crucial to investigate EI programs that focus on improving child language development and supporting parents and caregivers. These programs would promote academic achievement and overall childhood development during the early childhood years by helping to prevent or decrease the impact of later deficiencies for children with LI from low-SES backgrounds.

Early Intervention

The Individuals With Disabilities Education Act (IDEA) Part C is a state program that provides EI services to infants and toddlers (birth to three-years-old) with special needs and their families. The most important responsibility of a state's Part C program is to form, fully support and deliver a system of EI services that are comprehensive, family-centered and multidisciplinary (Adams et al., 2013). Early Intervention programs work to improve the overall development of children birth to three with special needs, decrease potential costs associated with special education, and support families' abilities to meet the developmental needs of their young children. The 2004 reauthorization of IDEA put greater emphasis on identification and referral for services, improving quality measures of child outcomes, and requiring the provision of services to be in the child's most natural environment. This momentum for early identification has progressively increased the number of young children being identified as at risk for or having a disability, including toddlers with LI. Although it is wise to be cautious about diagnosing LI prematurely, identifying young children who clearly demonstrate deficits in language development is

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necessary in order for these children to access EI services. Early intervention services decrease risk factors associated with LI, as well as improve both short and long-term child language outcomes (Ellis & Thal, 2008; Sharma, Purdy & Kelly, 2009). Furthermore, due to the powerful role parents play as their child's first and best language teacher, examining early intervention programs such as parent-implemented language interventions is critical.

Role of the Speech-language Pathologist. Increased family-centered models of service provision have prompted more stringent guidelines for many EI service providers, including speech-language pathologists (SLPs). For example, in 2008, the American Speech-Language Hearing Association (ASHA) (2016) published guidelines for SLPs in early intervention. Guidelines included providing services that are family-centered, supportive of children's development and participation in natural environments, and reflect a team-oriented and evidence based approach to intervention. SLPs play a vital role when serving young children with LI and their families. SLPs who serve this population have an ethical responsibility to be educated and trained to provide quality services in the areas of screening, assessment, diagnosis, and treatment of LI (ASHA, 2016). Additional and more detailed professional roles and activities for SLPs serving children with LI are outlined in ASHA's Scope of Practice in Speech-Language Pathology (ASHA, 2016). SLPs need a clear understanding of how to best treat young children with LI which should be centered on a profound appreciation of family-centered services, interdisciplinary teamwork, and individualized intervention, based on children's characteristics and other family needs.

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Role of parents. As stated previously, policy and practice emphasize the involvement of parents and/or caregivers in the EI of young children with disabilities (IDEA, 2004; Odom & Wolery, 2003). Studies have shown positive gains for both parent and child outcomes when parents are trained and actively involved in their children's EI program (Kaiser & Hancock, 2003; Sheldon & Rush, 2001) and when outcomes are incorporated into everyday routines and activities (DEC, 2014; Head & Abbeduto, 2007). Parents who have received less direct services and more family-focused EI services report an increase in autonomy within themselves, as well as improvements in their child's overall development (Trohanis, 2008). Research has consistently demonstrated that a parent's involvement in early language intervention is crucial and that the earlier a family is involved, the better the outcomes for the child (Bronfenbrenner, 1986; Powell & Dunlap, 2010; Rossetti, 2001). Due to the fact that parents play such a critical role in the development of their child's language, it is important to teach and coach parents on the most effective ways to enhance their child's language development.

Parent-implemented Language Interventions

Parent-implemented language interventions have been well-studied and are typically defined in the literature as language intervention programs that includes parent training on specific language support strategies and coaching for parents to deliver therapy in everyday routines and natural environments (Roberts & Kaiser, 2011). A variety of terms are used to refer to parent-implemented language interventions such as: 'parent-coached language intervention' (Romski, 2010), 'parent-directed intervention' (Smith, Buch & Gamby, 2000), 'parent-focused language intervention' (Tannock, Girolametto & Siegel, 1992), 'caregiver-provided' (Lawler, Taylor & Shields, 2013) and

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'parent-based language intervention' (Buschmann et al., 2009). Variations in the way parent-implemented language interventions are delivered have been reported. For example, in some studies investigating the effectiveness of parent-implemented language intervention programs, the parent is the primary deliverer of therapy (Roberts & Kaiser, 2011; McConachie & Diggle, 2007). Other studies report outcomes when both the parent and speech-language pathologist deliver intervention simultaneously (Warren, et al., 2008; Yoder & Warren, 2002).

Features of parent-implemented language interventions. Parent-implemented language interventions typically include the following features: (a) The intervention context is within the child's natural environment (home, daycare, etc.) during daily routines (bath time, mealtimes, play time); (b) parents and caregivers are trained to recognize early communicative intent in their children; (c) parents and caregivers are trained to use specific language intervention strategies that are recognized to increase language acquisition in children; and (d) parents are trained, and oftentimes, coached by an SLP or early interventionist over the course of the treatment program. Some programs differ in one or more of these features. The well-known Hanen Parent Programs (Girolametto & Weitzman, 2006; Manolson, 1992) typically provide intervention to parents within a small group including other parents and caregivers in a community-based setting without the children present. Another parent –implemented language intervention, EMT (Kaiser, 1993), teaches and coaches parents individually in a community clinic or home-based setting. Other programs have used a small-group service delivery model with parents only (Buschmann et al., 2008; Gibbard, Coglan & MacDonald, 2004) or with parents and children together (Lederer, 2001).

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Types of parent-implemented language interventions. The literature reports four main types of parent-implemented language intervention programs measuring child language outcomes for young children with primary LI: Hanen Parent Programs, Parent-Implemented EMT, Parent-based Intervention group treatment, and Parent-implemented Video Home Training. Parent training and intervention settings vary between a clinical and home-based setting. All programs include intervention strategies that are taught to parents so they can implement the strategies with their children through naturalistic and play-based or routine-based activities. Specific naturalistic techniques have been taught to parents. A few existing studies include verbal and gestural prompting, imitation, natural reinforcement and focused stimulation strategies to increase children's joint attention. The most commonly taught language support strategies were traditional milieu teaching techniques. Milieu teaching (MT) includes the use of specific techniques and functional consequences to teach language form and content to children with beginning verbal communication skills (Hancock & Kaiser 2006; Warren et al. 2008). Specific MT strategies and techniques typically include: following the child's lead, modeling, time delay, environmental arrangement, incidental teaching and conversational support. Conversational support techniques are quite common among parent-implemented language interventions and include commenting, asking questions, expanding, and recasting the child's communication. Additional information regarding parent-based language intervention types are described below.

Hanen Parent Program. Hanen Parent Programs (HPP) take a naturalistic intervention approach to teaching parents and caregivers language support strategies and are directed through trained professionals to small groups of parents and caregivers as

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opposed to training parents individually. Girolametto, Pearce and Weitzman (1995) examined the effectiveness of a Hanen Parent Program with a focused stimulation approach in stimulating vocabulary growth in a group of young children with expressive language delay. Focused stimulation involves following the child's lead within a play-based or routine-based activity while presenting frequent and precise productions of language targets. Children in the treatment group used a larger number and a greater variety of vocabulary words than the control group. No significant differences between the two groups were found regarding conversational speech. Significant improvements were also found in maternal responsiveness as measured by parents' use of language-modeling techniques. McDade and McCartan (1998) also investigated young children with expressive language delay using a Hanen Parent Program. This study compared the treatment group with a delayed-treatment control group. Children in the treatment group scored significantly higher on receptive and expressive language portions of a standardized language assessment at post-test, while the control group showed no change. A large effect size was reported on the number of different words that were used by the treatment group versus the control group. Significant changes were also seen in the parent's interactive behavior and in the child's social conversational skills. Baxendale and Hesketh (2003) compared the effectiveness of traditional clinic therapy to the Hanen Parent Program, *It Takes Two to Talk* (*ITTT*). Both groups made gains following treatment as evidenced by post-intervention results on standardized language assessments. The differences between the groups were not reported to be statistically significant; however, clinically significant results were reported at the 12-month follow-up for both receptive and expressive language skills.

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Parent-implemented enhanced milieu teaching. Enhanced milieu teaching (EMT) is the most commonly studied parent-implemented language intervention in the literature. Roberts and Kaiser (2012) studied the effects of parent-implemented EMT and evaluated the language skills of toddlers with primary LI as compared with a group of typically developing (TD) toddlers in a randomized controlled trial. The authors hypothesized that teaching parents language support strategies would improve language outcomes for children with LI in the treatment group as evidenced by standardized testing compared to children in the control group. The results of this study showed positive effects for the children with LI in the treatment group when compared to the non-treatment group. Additionally, parents in the treatment group showed an improvement with their communication skills when compared to parents of the children with LI in the non-treatment group and parents of the TD toddlers. In 2013, Roberts and Kaiser used a randomized group design to compare the effects of EMT by therapist and parents versus therapists only on preschool children with language impairment, including those with intellectual disabilities. The intervention was delivered initially in a clinical setting with the last one-third of the intervention using a home-based setting. There were no differences found on child language outcomes at the end of the study; however, at the 6-month follow-up, children in the therapist plus parent group had larger gains in expressive language.

Parent-based intervention group treatment. Buschmann et al. (2009) and Gibbard, Coglan and MacDonald (2004) investigated small-group, parent-implemented language intervention programs they referred to as "parent-based". In parent-based language intervention (PBI) programs, professionals trained in child language

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development taught caregivers in a clinic-based setting, to use language facilitating strategies with their young children. Buschmann et al.'s (2009) PBI program was referred to as the Heidelberg Parent-based Language Intervention (HPLI). HPLI is a highly structured, interactive program developed for small groups (5-10 parents) and has been studied with toddlers with primary LI. The authors found that children of the parents in the intervention group made significant gains in vocabulary, morphology and syntax, compared to the control group. Positive results were also found for expressive language as evidenced by results from standardized language measures. An additional cost-benefit analysis reported the HPLI program to be less expensive and time consuming than one-on-one treatment and Hanen Parent Programs. Gibbard and colleagues (2004) also investigated a similar parent-based group treatment program. The comparison group was considered "standard care" which included two, one-hour parent education sessions over the course of the treatment term in addition to individual treatment. Parents in the treatment group were trained how to teach their children certain language skill targets. This study found positive results in child outcomes for the group whose caregivers received the parent-based group training.

The PBI group treatment studies (Buschmann et al., 2008; Gibbard et al., 2004) used a combination of interactional and naturalistic approaches. Both studies set objectives for parents in addition to linguistic goals for children's expressive language skills that could be targeted during daily routines. Post-intervention results for both studies showed positive gains for overall language skills for children whose parents and caregivers participated in small-group intervention programs compared to children in more traditional interventions, without intensive parent training.

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Parent-implemented video home training.   Van Balkom, Verhoeven,

Weerdenburg and Stoep (2010) conducted an efficacy study of a PBI program involving

Parent Video Home Training (PVHT). PVHT educates and trains parents individually in

the home setting by using video feedback to teach conversational support strategies for

improved conversational coherence between young children and their parents or

caregivers. PVHT was compared to a traditional, clinic-based, speech-language therapy

program. Results from the experimental group showed significant effects, both short and

long-term, on receptive language, grammar, MLU and conversational or discourse

coherence.

Enhanced Milieu Teaching (EMT). The most commonly studied child language

intervention is EMT (Roberts, et al., 2014). EMT is a naturalistic language intervention

using a hybrid approach in that it combines characteristics of both behavioral and social

interactionist approaches to early language intervention. Over the past two decades, the

efficacy of EMT (including EMT blended with behavioral interventions) has been studied

using parents, therapists and teachers as the deliverers of the intervention to children with

a variety of intellectual disabilities such as developmental delay, autism and Down

syndrome (Hemmeter & Kaiser, 1994; Hancock & Kaiser, 2002; Kasari et al., 2014;

Wright & Kaiser, 2017). Positive results have been reported in EMT studies using both

randomized controlled trials and single-case research designs (Barton & Fettig, 2012).

Only one study to date has reported using EMT exclusively with parents and children

with multiple risk factors, including low-SES and language delays (Peterson, 2005).

Several studies of parent-implemented language interventions have been

documented and systematically reviewed in the literature and results show mostly

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positive effects on a variety of parent and child language outcomes; however, limitations exist in areas such as lack of diversity in study populations and treatment parameters (Cable & Domsch, 2011; Girolametto, Pearce & Weitzman, 1995; McConachie & Diggle, 2007; Roberts & Kaiser, 2011). The majority of EMT studies have used parents and caregivers to implement the intervention with their children. EMT is a language intervention approach designed to increase early language skills within the context of daily routines. The intervention includes both parent training and child language intervention. The most current model of EMT includes four major components, including environmental arrangement, responsive interaction techniques, language modeling and milieu teaching procedures (Hancock et al., 2016; Roberts & Kaiser, 2012). Parents receive individual training by a trained professional. One method of parent training is the Teach-Model-Coach-Review (TMCR) method (Roberts et al., 2014; Wright & Kaiser, 2017). This particular method optimizes parent learning of how to use specific language support strategies with their young children in a sequential manner (Hancock & Kaiser, 2006; Roberts & Kaiser, 2015).

The current study investigated whether or not there was a functional relationship between parent-implemented EMT language intervention training and parent use of four specific language support strategies when the intervention was delivered to low-SES parents in a home-based setting. The investigator used a training method referred to as Teach-Model-Coach-Review to teach parents how to enhance language development in their children with LI using the most current framework of EMT. Regardless of the varied prevalence rates and diagnostic descriptions for LI, it is important to study EI programs that target child language development in populations with risk factors such as

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low-SES. Children with LI from low-SES backgrounds are at risk for immediate and later difficulties regarding academic performance and other areas related to language and social communication. Since parents have the potential to be their child's best language teacher, supporting parents' abilities to deliver an effective language intervention may help decrease later deficiencies in children with LI who are low-SES. The present study used single-case research methodology to determine the effects of a brief parent-implemented language intervention training using EMT with low-SES families in a home-based setting. Additionally, child expressive language outcomes were evaluated informally to assess the effects of the intervention using pre- and post-intervention child language samples.

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Chapter Three: Methods

Participants

Four parent-child dyads were recruited for this study through a university-based speech language pathology clinic, a public school preschool program in South Central Kentucky and the Community Action of Southern Kentucky Head Start Program. Interested families were instructed to contact the PI to obtain more information about the project. After the initial phone conference, parents met with the PI to review and sign the informed consent form, and have their child's language assessed. The first four children who met inclusion criteria participated in the study. All parent-child dyads remained in the study for the full duration of the intervention.

Inclusion criteria were as follows: (a) 24-48 months-old at the time of screening; (b) English as the primary language; (c) from a low-SES family (eligible for Head Start or low-income child care programs in Kentucky); (d) total language standard score at the 10th percentile or less on the Preschool Language Scale-fifth edition (PLS-5; Zimmerman, Steiner, & Pond, 2011); (e) normal hearing; (f) parent was willing to allow the intervention to take place in the home-based setting for the full duration of the intervention. Children were not invited to participate if parents reported a primary diagnosis of any particular disability other than LI such as Autism Spectrum Disorder or Down syndrome. Criteria for parents were as follows: (a) spoke English as the primary language; (b) were at least18 years of age at the time of the child's screening; (c) served as the child's primary caregiver, including providing care in the child's home; (d) lived in a low-SES household as evidenced by reporting annual income; (e) gave verbal and signed consent for their willingness to be trained as part of the intervention procedures in

the child's home. Table 3.1 includes demographic information about the parents and

children. Pseudonyms for both parents and children were used to ensure participant

anonymity.

Table 3. 1. Child and parent characteristics.

	Characteristic			
Child	Zack	Cammy	Austin	Evan
Age at entry (months)	46	45	44	34
Gender	Male	Female	Male	Male
Ethnicity	White	White	White	White
Siblings	2	0	0	2
Pre-intervention PLS-5 Total Language Standard Score	62	76	73	60
Speech Therapy	30 min/week	0	0	60 min/month
Other services	0	0	0	0
Parents	Amber	Teresa	Denise	Tiffany
Family role	Mother	Mother	Mother	Mother
Occupation	Homemaker	Teacher	Homemaker	Homemaker
Age (years)	32	29	25	27
Marital status	Married	Single	Single	Single
Highest education	1-year college	4-year college	High school	High school

The PI, a nationally certified SLP trained in EMT and experienced with working

with families and children with LI, worked directly with each parent/child dyad. The PI

not only worked directly with the child but also trained the parents to work directly with

their child using a slightly modified version of the Teach-Model-Coach-Review (TMCR) method described by Roberts et al. (2014).

Setting and Materials

Baseline and intervention sessions were conducted in the homes of the parent and child participants. Sessions were conducted in an area of the home deemed by the caregiver as most representative of where the child typically preferred to play during the day. A variety of age-appropriate toys were used during baseline and intervention sessions. Toys included blocks, dolls, stuffed animals, small action figures, bubbles, Play-Doh, cars, train set, balls, and Little People play sets. All baseline and intervention sessions were video recorded using an iPad. A laptop was used by the SLP for portions of training to show PowerPoint presentations. Parents were also provided handouts at the beginning of each training session on the specific strategy being trained (Appendix A). Specific data collection forms were used by investigators for coding data (Appendix C-D).

Experimental Design and Procedures

A single-case multiple-baseline design across behaviors, replicated across four parent/child dyads was used to evaluate the effects of parent-implemented EMT on parents' use of language strategies with young children with LI (Gast, Lloyd & Ledford, 2014). The behaviors were parent use of four specific EMT strategies: matched turns, expansions, time delays and milieu teaching prompts. The instructional method when training parents to use the language support strategies followed a modified TMCR approach as outlined in a prior research study using parent-implemented EMT as noted previously (Roberts, et al., 2014). All study procedures were reviewed and approved by

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the University of Kentucky Institutional Review Board (IRB). Consent forms were obtained from all parents who agreed to participate in the study.

The researcher sought to address threats to internal validity in the following ways. To minimize the threat of *history,* the investigator limited influences as much as possible that might have affected the parent behaviors or child outcomes during the study. The PI communicated regularly with the parent participants to be aware of anything that might negatively impact the intervention procedures. The investigator also followed a systematic and prescribed introduction of independent variables during parent training. To minimize the threat of *instrumentation*, the researcher clearly defined target behaviors to parents during the training, used only trained data collectors, prepared digital equipment prior to scheduled sessions (i.e., charge iPad), and had adequate interobserver agreement on the dependent variable (DV). These efforts helped to prevent any errors that might have led to inaccurate data recording or training. Attempts made to minimize *attrition* were making sure parents were not planning on moving, selecting an adequate number of participants appropriate for the research methodology, keeping good communication with parents regarding scheduled visits, and providing a generous gift card to a local retail establishment following completion of the study. To limit the threat of *testing*, the investigator attempted to avoid session fatigue by limiting coaching sessions to 10 minutes and evaluating procedural fidelity of the investigator during training. *Maturation* was limited by completing the study in a brief amount of time (8-9 weeks for each parent/child dyad).

Baseline sessions. The primary investigator conducted initial baseline sessions prior to beginning the intervention for each of the four EMT language support strategies.

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Baseline sessions occurred for a minimum of 3 sessions or until baseline data showed

stability in level and trend. All baseline sessions lasted at least ten min in duration.

Parents were instructed to play with their child as they typically would with toys selected

by the child or parent. Only the parent interacted with the child as the SLP watched and

video recorded the sessions. No teaching or coaching was provided during baseline

sessions.

Intervention. Parents were taught four specific EMT language support strategies,

one at a time and in a prescribed order. Details regarding the strategies and the order

presented are described in Table 3.2. The investigator used a slightly modified TMCR

instructional approach over the course of the intervention program (see Table 3.3).

Details regarding the strategies are described below. Once parents learned a strategy and

reached a pre-determined criterion level, the next strategy was introduced. Also, after

parents reached criterion levels, they were instructed by the SLP to continue using that

specific strategy in all subsequent sessions. Criterion levels were set and closely followed

recommendations set forth by Roberts and Kaiser (2012) and Roberts et al. (2014) (see

Table 3.4).

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Table 3. 2. Description and order of EMT strategies taught to parents

Strategies	Procedures for Strategies	Example	Estimated Home Visit(s)
Matched Turns	1. Mirror and Mapping 2. Language Responsiveness	1. Child: {pushes a train car} Adult: {pushes a train car} "Push the train." 2. Child: "The kitty is hungry." Adult: "Let's feed the kitty."	Home visit 1-2
Expansions	1. Adding one or more content words to the child's previous utterance 2. Replacing and/or adding words to the child's previous utterance to make it grammatically correct	1. Child: "car" Adult: "Drive car" 2. Child: "Me get water." Adult: "I will get water."	Home visit 3-4
Time delays	1. Needing Assistance 2. Give Choices 3. Waiting in a routine 4. Not Enough	1. Creating situations in which the child needs help (toys in sight but out of reach). 2. Holding up two items and waits for the child to communicate about which one he/she wants. 3. Setting up a routine in which the child expects certain actions and then waiting before doing the expected action again. 4. Providing inadequate portions of preferred materials	Home visit 5-6
Verbal Prompting Strategies	1. Ask open-ended questions 2. Ask choice questions 3. Use "say" prompts	1. Adult: "What do you want?" 2. Adult: "Cow or sheep?" 3. Adult: "Say ____."	Home visit 7-8
Demonstrate comprehensive use of EMT strategies	1. Use all of the above as indicated		Home visit 8

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Table 3. 3. Description of the modified Teach-Model-Coach-Review method for the current study.

Component	Description
Teach	☐ Describe the purpose of the session ☐ Summarize previous session (if applicable) ☐ Review the current EMT strategy with parent handout ☐ SLP and parent discuss child language targets ☐ SLP and parent role-play for practice (initial teach session only)
Model	☐ SLP interacts/plays with the child participant for 10 minutes using EMT strategies ☐ SLP draws attention to the specific EMT strategy being trained for that session while interacting with the child
Coach	☐ SLP helps parent set up opportunities to evoke communication from the child (arrange environment, etc.) ☐ SLP points out to parent correct use of strategies (praise) ☐ SLP suggests use of a strategy when/if parent misses an opportunity ☐ SLP gives specific feedback on how to use a specific strategy if the mere suggestion does not suffice
Review	☐ SLP asks parent open-ended questions for parental reflection using questionnaire ☐ SLP reports specific episodes of the impact of parent's use of strategy to the parent ☐ SLP summarizes parent use of strategies ☐ Parent reports concerns and asks SLP questions

Source: Adapted from Wright & Kaiser (2017).

Table 3. 4. Criterion for parent use of EMT strategies.

EMT Strategy	Criteria
Matched turns	75 % of adult communicative turns that were appropriately matched to a child's previous utterance
Expansions	50% of child utterances that were appropriately expanded by the adult
Time Delays	80% of episodes that include correctly implemented steps of the nonverbal prompting hierarchy
Milieu Teaching Prompts	80% of episodes that include correctly implemented steps of the verbal prompting hierarchy

Source: Adapted from similar studies by Roberts and Kaiser, 2012 and Roberts et al., 2014.

Each home visit lasted approximately one-hour in which multiple intervention sessions may have occurred. The investigator followed the TMCR method of instruction during each home visit according to which stage of training the parent was in for each strategy. As shown in Table 3.2, the "Teach" component included an educational piece built into the beginning of the session and lasted longer during the initial session of the each phase. The SLP provided handouts to the parents and used Power Point slides using a laptop to help teach about the language support strategy, give examples, and role-play with the parents examples of the strategy (see Appendix A).

The total duration of the intervention was approximately 2 months for each parent/child dyad. The duration was dependent on data and progress with training the strategies. Total duration varied slightly among the four parent/child dyads. This was consistent with the multiple-baseline design, across behaviors. All sessions were conducted during play based activities. Most coaching from the SLP included praise and constructive feedback relating to the specific EMT language support strategy being

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trained; occasionally feedback related to previously taught strategies. As indicated in Table 3.2, the end of the training session required parents to give feedback regarding the experience; although parents were encouraged to ask questions, comment voice concerns at any time.

Procedural Fidelity. Treatment fidelity data were collected on representative samples of the parent training procedures for all EMT strategies, across all four caregivers. The PI served as the parent trainer for all components of the training (teach-model-coach-review). For the teach component for each strategy, the PI followed a checklist (see Appendix B) in order to: provide a rationale for the strategy, give and review a detailed handout, give examples, role-play with the parent, and provide specific instructions regarding the strategy. Procedural fidelity for the teach portion of the training included the PI completing a checklist for the tasks listed above.

Fidelity data on **modeling** EMT strategies for parents were collected from 10 min video recordings of the investigator's session with the child. Fidelity assessments were completed by a trained coder on 20% of modeling sessions (four total modeling sessions; each strategy and target child represented at least once). The coder was a graduate student in speech-language pathology. The coder was trained by the investigator through teaching sessions and watching video recordings of intervention sessions between the parents and children. When the coder and the PI reached at least 80% point-by-point agreement on three 10 minute videos, she was considered reliable. The same data form used to code parent/child intervention sessions was used to code investigator modeling sessions. Fidelity for investigator modeling exceeded set criterion levels for all EMT strategies that were modeled for parents. Fidelity assessment for modeling also included the coder

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verifying two additional requirements: (a) the modeling sessions were at least 10 minute in which the investigator played with the child participant using the EMT strategy of interest, (b) the investigator pointed out to the parent use of the specific EMT strategy being trained for that session while interacting with the child.

To assess procedural fidelity for the **coach** component, a trained coder used a fidelity assessment checklist & coded investigator behaviors for 20% of intervention sessions that included coaching sessions across all four strategies and each parent/child dyad. Intervention sessions were considered coaching sessions since the investigator coached parents to use the EMT strategy during this time. Coaching behaviors that were assessed included the investigator: 1) helping the parent arrange the environment to set up opportunities to elicit communication from the child; 2) giving specific, verbal descriptive praise at least one time every 2 minutes on the correct use of the current strategy being trained or a previously trained strategy; 3) giving zero to three suggestions or reminders regarding target behaviors; 4) answering one to three parent questions during the session, if applicable. Procedural fidelity for the coach component was calculated at 100% for 20% of sessions for all four components of the intervention. For the **review** component, the investigator utilized a questionnaire after the training was complete for each strategy (see Appendix E). Several review sessions were audio recorded. Procedural fidelity data assessments were not completed for the review portion of the training.

Data Collection and Measures

Parent outcomes. Data were collected on two variables: Parent use of EMT strategies and child language outcomes. Parents' use of four EMT intervention strategies

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was of primary interest in this study and was assessed during each intervention session. Parent behaviors were measured using event recording for trial-based behaviors in which occurrences and nonoccurrences of the target behaviors are tallied by data collectors in order to calculate a percentage correct (Ayres & Ledford, 2014). All sessions were video-recorded with an iPad and then analyzed by the PI and a trained coder to determine 1) the percent of accuracy of strategy use of each EMT strategy (matched turns, expansions, time delays, and milieu prompting) trained and 2) when criterion was met for each strategy. The coder was a graduate student in speech-language pathology and trained by the PI. The PI trained the coder during teaching sessions and watching video recordings of intervention sessions between the parents and children. The investigator and coder used specific data collection forms to code parent behaviors from video recordings of home-based sessions (see Appendix C & D). Data were collected for parent behaviors during the baseline, intervention, and maintenance sessions.

Child outcome measures. Child expressive and receptive communication skills were assessed before intervention began using the Preschool Language Scale- Fifth Edition (PLS-5; Zimmerman, Steiner, & Pond, 2011) to determine eligibility for the current study. The PLS-5 is a norm-referenced, standardized, comprehensive measure of receptive and expressive language skills and was administered and scored by trained graduate students in speech-language pathology who were not involved in the intervention sessions.

Data on child language outcomes were collected using informal pre- and post-intervention language samples. Child language samples were taken from video-recordings and then transcribed and coded. Transcriptions were assessed using the

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Systematic Analysis of Language Transcripts (SALT), a software that standardizes the process of transcribing and analyzing language samples (Miller & Chapman, 2008). Pre-intervention language samples were taken from the first 20 minutes of baseline sessions when parents were asked to play with their child as they normally would and to use any materials or toys that were common for the child to use in the home. Post-intervention language samples were taken from a 20 minute play session between the parent and child following the review component (after training and reaching criterion on the last strategy, milieu prompting) on the last day of the intervention. The post-intervention play session was similar to baseline in which there were no instructions or coaching, nor were there any standardized sets of materials or standardized protocols used.

Dependent Variables

Four EMT language support strategies served as the parent dependent variables: matched turns, expansions, time delays, and milieu prompting. When parents reached or exceeded predetermined criterion levels for a strategy for three consecutive sessions, the interventionist began training on the next EMT strategy. Matched turns were taught first and defined as adult verbal communicative turns that immediately (within 3 seconds) followed a child communicative turn (verbal or nonverbal). There were two types of matched turns. The first one included adult synchronized imitation of what the child did (mirroring) and then a verbal labeling of a contingent action or object, if the intent was known (mapping). The second type included equal verbal turn taking in which the adult verbally and immediately (within 3 seconds) responded to child's communication turn using words or phrases or sentences that were directly related to the child's communication followed by a pause to allow child to communicate again. Criterion was

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set at 75% of adult communicative turns that were appropriately matched to a child's previous utterance.

Expansions were defined as: (a) adding one or two content words to the child's previous utterance; (b) replacing a word in the child's previous utterance to make it grammatically correct such as replacing the verb tense. Criterion was set at 50% of child utterances that were appropriately expanded by the adult.

Time delay strategies were defined as nonverbal strategies, including expectant waiting, to encourage the child to verbally or nonverbally request and included: (a) needing help; (b) not enough; (c) giving a choice; and (d) waiting in a routine. Criterion was set at 80% of occurrences that included correctly implemented steps of the nonverbal prompting hierarchy.

Milieu teaching prompts were defined as adult verbal responses to the child's attempt at communication. For example, these prompts consisted of asking open-ended questions, asking choice questions or using "say" prompts and are listed in order of least to most supportive (see Table 2.1). Criterion was set at 80% of occurrences that included correctly implemented steps of the verbal prompting hierarchy.

Interobserver Agreement. Point-by-point agreement using time stamps was used to calculate mean interobserver agreement (IOA) for the dependent variable, caregiver behaviors, for 20 percent of the data points within each condition (baseline and intervention). The PI and a second observer tallied parent use of all four language strategies for all four caregivers from time stamped video recordings. IOA data sheets were utilized and included a task analysis for all target behaviors. Mean agreement was calculated by dividing the number of agreements by the number of agreements plus

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disagreements and multiplying by 100. If occurrences were within 3 s of another, it was coded as an agreement. Overall IOA was 88% (range = 70%-100%), which is within the range of an acceptable value of IOA (Hartmann, Barrios, & Wood, 2004).

Reliability data were also collected for child language measures using transcriptions from language sample sessions. Each 20-minute, pre- and post-language sample session was video-recorded. Two graduate students who were trained research assistants independently transcribed pre- and post-intervention language samples from video recordings. All language samples were separately transcribed by the investigator. Inter-rater reliability for transcribing and coding child utterances was calculated using point-by-point agreement for 25% of the child language samples. Mean agreement was calculated by dividing the number of agreements (for each child utterance) by the number of agreements plus disagreements and multiplying by 100. Overall inter-rater reliability was 91% (range = 85%-95%).

Data Analysis

Data from the intervention sessions were analyzed by detecting effects using visual inspection, which is a more conventional approach to single-case research data analysis. All intervention sessions were coded for parent behaviors from the video recordings as indicated previously. Coders were trained graduate students or research assistants in speech-language pathology who worked closely with the first author. Data for each parent were entered and graphed using Microsoft Excel 2010 by the first author. For example, once the data in all conditions were acquired and graphed, the PI examined changes in one or more of three parameters: level, trend (slope), and variability. Once a parent reached or exceeded criterion level for a strategy for three consecutive sessions,

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intervention on the next EMT strategy was taught. Maintenance data were collected on the previously taught strategies for matched turns, expansions and time delays prior to introducing a new strategy. A functional relation was determined by assessing whether or not the dependent variables increased only following the initiation of the intervention. Patterns of change were tracked across all four EMT language strategies for all four parent/child dyads.

Chapter Four: Results

Parent Behaviors

Results are illustrated in Figures 4.1, 4.2, 4.3, 4.4 and Table 4.1. Figures 4.1 - 4.4 each represent a parent's use of the four EMT strategies (matched turns, expansions, time delays, and milieu prompting) in baseline and in intervention. These time periods are separated by a solid black line in each graph for Figures 4.1 through 4.4. Results indicate a stable trend for most baseline conditions, followed by an immediate increase in accuracy for all strategies after the introduction of the intervention. Data presented in the graphs for intervention are from coaching sessions. Criterion levels were established for each EMT strategy as follows. Criterion for matched turns was set for 75% of correct use of strategy. The criterion for expansions was established at 50% of the parent correctly expanding child verbalizations. Criterion for time delays was 80% correct implementation on attempts made by parents with a suggested 1 to 10 attempts per session. Criterion for milieu prompting was 80% correct implementation with a suggested 1 to 5 prompting episodes per session. Results for each parents' use of the four EMT strategies are summarized below. Maintenance data were collected on the first three strategies after parents reached criterion levels. Visual analysis was the primary method by which the data were interpreted. Common quantitative statistical techniques to calculate effect sizes were not utilized for the current study since these are considered inappropriate and impractical for SCRD (Ledford, Wolery and Gast, 2016). There was not a specific plan to assess parent behaviors following the completion of the intervention due to time- and scheduling related issues.

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Amber and Zack. Prior to training on each strategy, Zack's mother, Amber, demonstrated use of matched turns, expansions and time delay below criterion levels and never engaged in use of milieu prompting during baseline sessions (Figure 4.1). Amber had a stable, near-criterion level baseline for matched turns. After training on matched turns, she immediately engaged in matched turns above the criterion level and maintained above-criterion levels for all intervention sessions. Amber's use of expansions was low and variable during baseline, with a slight increasing trend. In spite of the small increasing trend, the investigator made a decision to begin the intervention since Amber was well below the criterion level for expansions. Immediately after intervention on expansions, her percent of correct implementation showed a rapid increase and remained above the criterion level and she remained above this level for subsequent probes. Amber did not demonstrate use of time delays during baseline except during one session following training on matched turns; however, she was below criterion level for percentage of correct implementation. Amber's use of time delays following intervention immediately increased. During the third session of the coaching intervention on time delays, her frequency of use increased to 12 time delays for the Waiting in a Routine procedure (frequency not graphed since bar would overlap with data point). She remained at the criterion level for percent of correct implementation. Amber also was within the percent of accuracy range for time delays for the subsequent intervention probe session. Amber did not use any milieu prompting during baseline. She immediately increased her frequency and accuracy of prompting during intervention. On the first day of intervention for milieu prompting, Amber attempted 6 milieu prompts and was above the criterion level for accuracy. Her percent of correct implementation exceeded the criterion for the

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two remaining intervention sessions. A functional relation between the introduction of intervention on all four EMT strategies and Amber's use of strategies was demonstrated, as shown in Figure 4.1. For Amber, there were a total of 15 baseline and intervention sessions that took place over the course of eight 1-hr home visits.
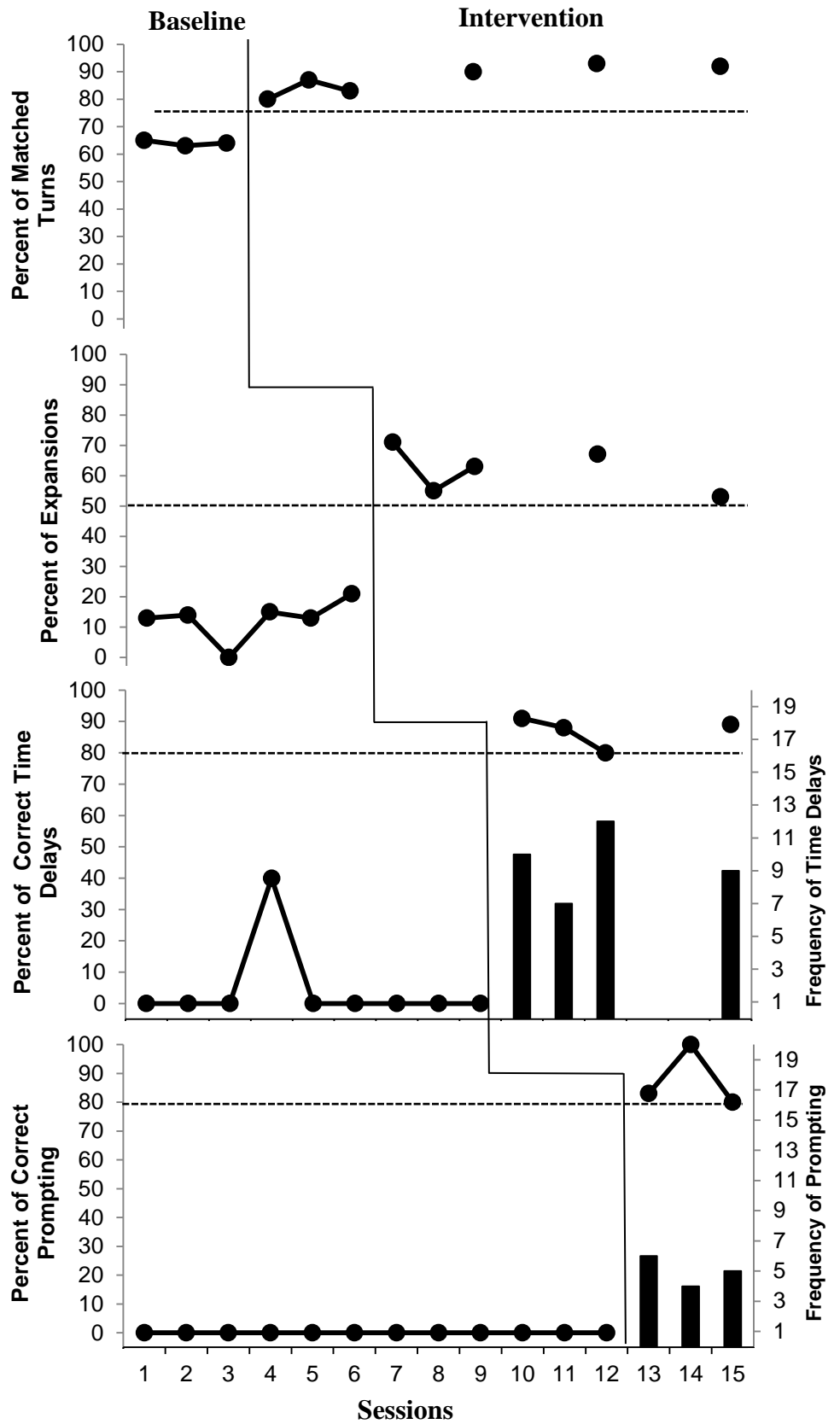
Figure 4. 1. Use of EMT strategies by Zack's mother, Amber.

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Teresa and Cammy. Cammy's mother, Teresa, demonstrated descending, below-criterion use of matched turns during baseline, prior to intervention (Figure 4.2). After training on matched turns, Teresa immediately engaged in matched turns at or above the criterion level and maintained above-criterion levels for all subsequent probes. Her use of expansions was variable and below criterion during baseline sessions. There was a slight increase in use of expansions during the first intervention session, following the training on matched turns; however, the trend decreased thereafter. After intervention on expansions, her use of expansions immediately exceeded the criterion level and remained above this level for subsequent probes. She did not demonstrate use of time delays during baseline. Following intervention on time delays, her use of time delays immediately increased to above-criterion levels for accuracy. Teresa was above the criterion level for percent of accuracy for the subsequent intervention probe session. Teresa never used milieu prompting during baseline. She immediately demonstrated use of milieu prompting during the first intervention session; however, she was slightly below criterion after the first intervention session. During the last two intervention sessions, Teresa performed well above criterion levels for correct use of milieu prompts, reaching 100% of correct prompting for both sessions. A functional relation between the introduction of intervention on all four EMT strategies and Teresa's use of strategies was demonstrated, as shown in Figure 4.2. For Teresa, there were a total of 15 baseline and intervention sessions that took place over the course of eight 1-hr home visits.
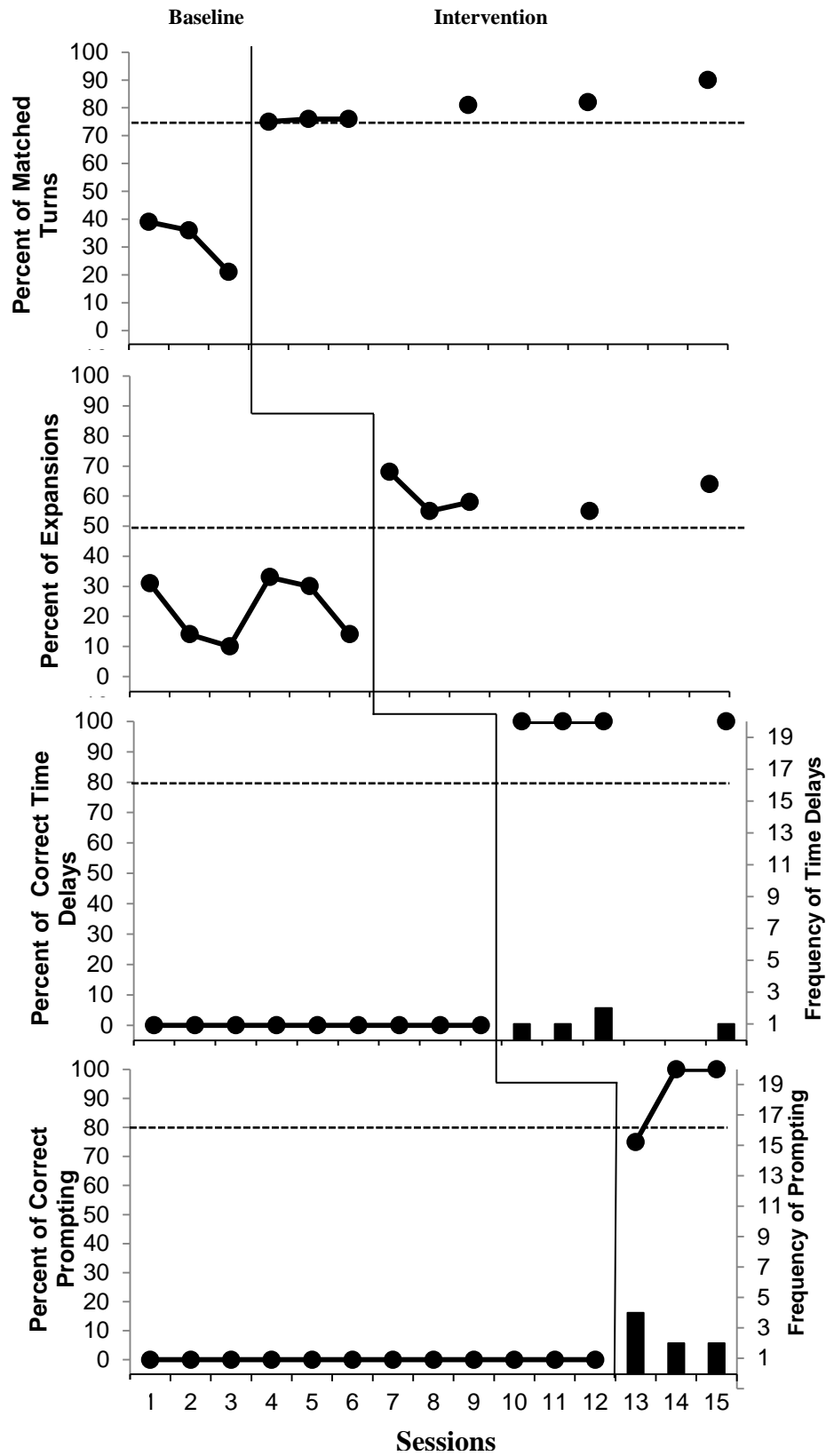
Figure 4. 2. Use of EMT strategies by Cammy's mother, Teresa.

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Denise and Austin. Prior to intervention for each strategy, Austin's mother, Denise, demonstrated minimal use of matched turns, expansions and time delay and never engaged in use of milieu prompting during baseline sessions (Figure 4.3). Denise demonstrated a descending trend at a below-criterion level during baseline for matched turns. Like Teresa, Denise demonstrated a slight increase in use of expansions following the training on matched turns followed by a decrease in trend to zero use of expansions for the remaining baseline sessions. After training on matched turns, Denise immediately engaged in matched turns at or above the criterion level and maintained above-criterion levels for subsequent probe sessions. Denise's use of expansions was variable but remained below criterion during baseline. Following intervention on expansions, her use of expansions exceeded the criterion level and remained above criterion for subsequent probes. Like Amber, Denise did not demonstrate use of time delays during baseline except during the first intervention session that followed training on expansions. Unexpectedly, Denise used 19 time delays during this session by demonstrating the Give Choice procedure during the play activity (frequency not graphed since bar would overlap with data point). However, she was well below criterion level for percentage of correct implementation during this session. Denise did not demonstrate time delays for the next five sessions. Following intervention on time delays, Denise's implementation of the strategy immediately increased to above criterion levels. During the third session of the coaching intervention on time delays, Denise used a variety of 15 time delays and her accuracy remained at the criterion level. Denise was at 100% correct implementation for time delays for the subsequent intervention probe session. Denise did not use any milieu prompting during baseline sessions. She immediately increased her accuracy of

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prompting during intervention. Denise's percent of accuracy exceeded the criterion level

for all remaining intervention sessions. A functional relation between the introduction of

intervention on all four EMT strategies and Denise's use of strategies was demonstrated,

as shown in Figure 4.3. For Denise, there were a total of 15 baseline and intervention

sessions that took place over the course of eight 1-hr home visits.

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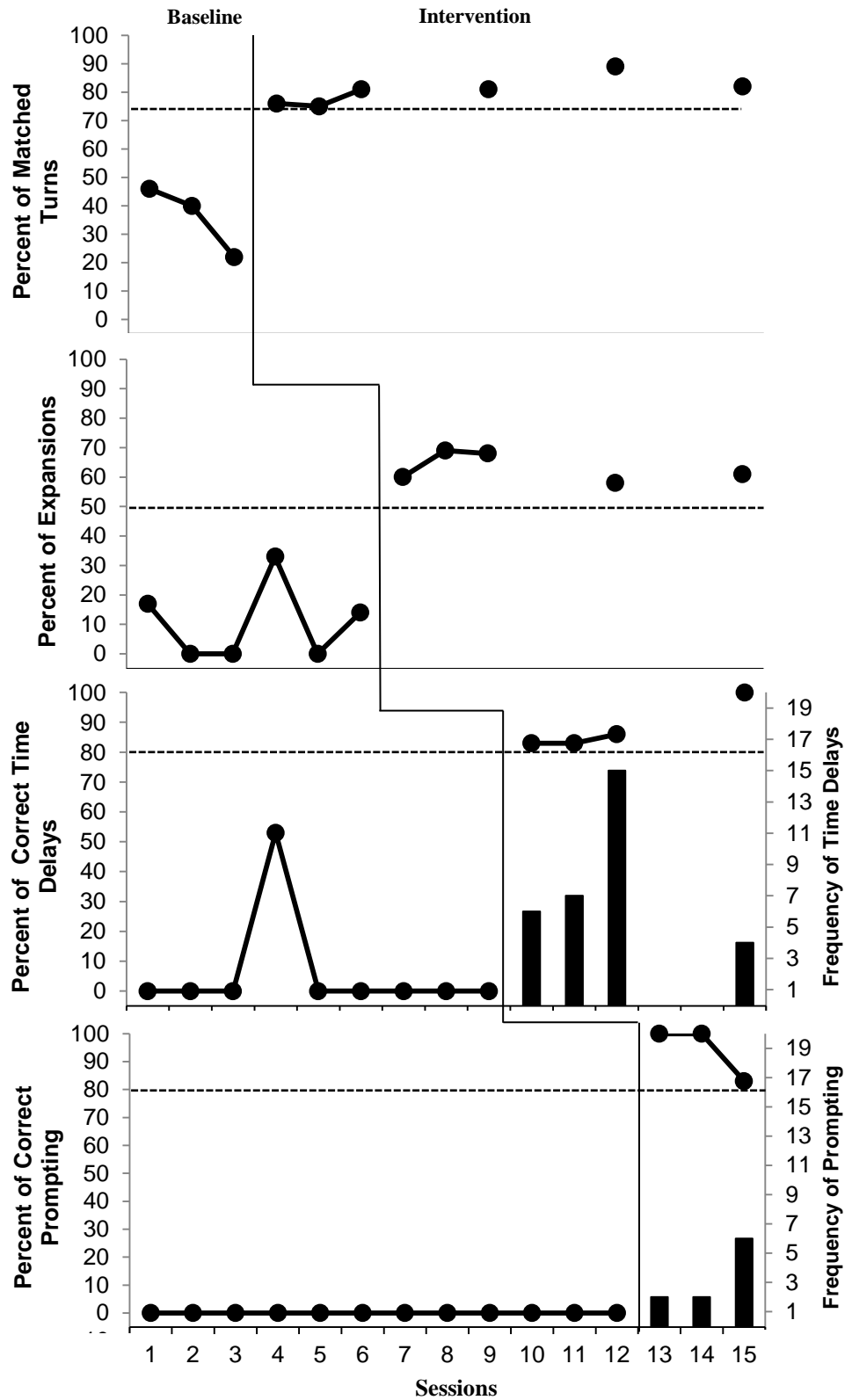
Figure 4. 3. Use of EMT strategies by Austin's mother, Denise.

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Tiffany and Evan. Evan's mother, Tiffany, demonstrated descending, below-criterion use of matched turns prior to intervention and no use of expansions, time delays or milieu prompting during baseline (Figure 4.4). After training on matched turns, Tiffany immediately engaged in matched turns above criterion and maintained at or above-criterion levels for all subsequent probes, with the exception of the first maintenance probe following the last intervention training on expansions. Tiffany never used expansions during baseline sessions. After training on expansions, her use of expansions immediately increased and exceeded the criterion level. She remained well above this level for subsequent probes. Following intervention on time delays, Tiffany's use and accuracy of time delays immediately increased. However, during the first intervention session on time delays, Tiffany was below the accuracy range (i.e., 70% accuracy), therefore an additional home visit was required for more training. The interventionist reviewed the teaching materials and modeled during an additional session. Following the extra training, Tiffany was able to reach criterion level and remained at or above criterion for the remaining intervention sessions. During the last intervention session for time delays, Tiffany demonstrated the Give Choice time delay procedure 20 times. Tiffany was above the criterion level for percent of accuracy for the subsequent intervention probe session. Tiffany never used milieu prompting during baseline. She immediately demonstrated use of milieu prompting during all intervention sessions at above-criterion levels for accuracy. A functional relation between the introduction of intervention on all four EMT strategies and Tiffany's use of strategies was demonstrated, as shown in Figure 4.4. For Tiffany, there were a total of 16 baseline and intervention sessions over the course of nine, weekly 1-hr home visits. Compared to the other parents,

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Tiffany required an additional visit to introduce milieu prompting due to a delay in reaching criterion levels after training on time delays.
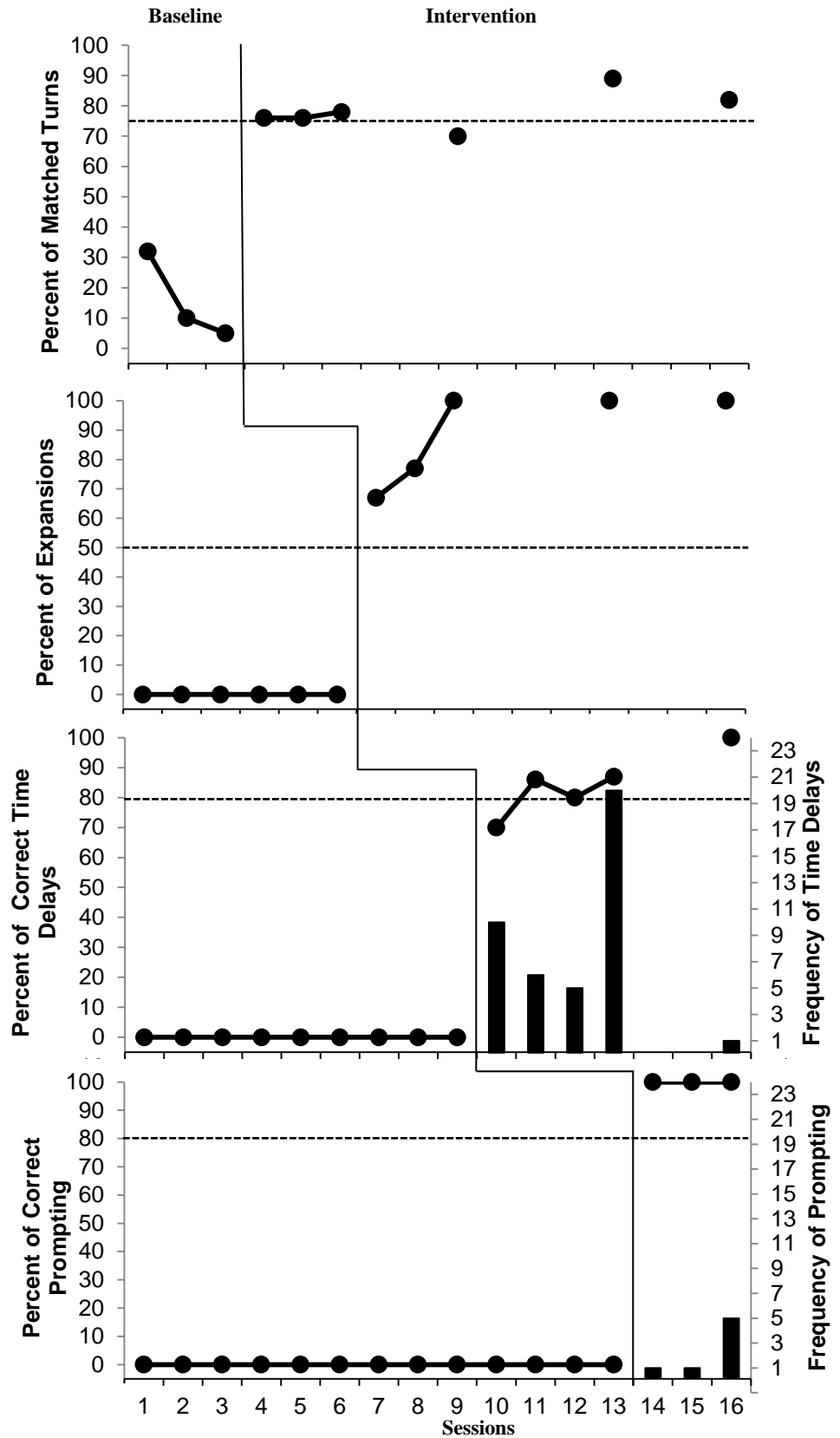
Figure 4. 4. Use of EMT strategies by Evan's mother, Tiffany.

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Child Language Measures

Table 4.1 shows outcomes for child language measures from pre- and post-intervention language samples using SALT analysis software (Miller & Chapman, 2008). All children showed an increase in MLU (mean length of utterances in morphemes), total number of words and number of different words following completion of the intervention. The children increased their utterance length as evidenced by increasing MLUs from 0.08 to 1.73 between the beginning and end of the intervention. Two children, Cammy and Austin, were using 40 or more different word roots and increased between 106 and 344 total words at post-intervention compared to pre-intervention language samples. Other language outcomes are as follows for the child participants. Due to lack of a non-treatment control group, these positive changes should be interpreted with caution.

Table 4. 1. Child outcomes on expressive language measures.

	Zack		Cammy		Austin		Evan	
Measure	Pre	Post	Pre	Post	Pre	Post	Pre	Post
MLUm	1.54	1.62	3.02	3.75	1.20	1.84	1.00	2.73
NDW	64	67	135	175	30	73	15	16
TNW	134	197	286	630	59	165	25	27

Note. MLUm = mean length of utterance in morphemes; NDW = number of different word roots; TNW = number of total words.

Chapter Five: Discussion

Discussion of Findings

The purpose of this study was to investigate the effects of a parent-implemented language intervention on parent use of EMT language support strategies with parents from low-SES backgrounds with children who have LI and consequent changes in child expressive language skills. Results show there was a functional relation between the home-based, parent-implemented language intervention training and parent use of four specific EMT strategies when the intervention was delivered to low-SES parents. All parents were able to successfully learn all four EMT strategies in a sequential manner to criterion levels over the course of the intervention. The current study meets What Works Clearinghouse (WWC) contemporary design standards with reservations due to the following determinants: systematic manipulation of the independent variable, systematic measurement of the dependent variables, adequate IOA measurement, greater than 6 phases for each replication and three or more data points per phase in each condition (Kratochwill et al., 2010; Ledford, Wolery and Gast, 2016).

Measures of parent behaviors during baseline indicated that two out of four parents consistently used two EMT strategies (matched turns and expansions) prior to training; however, their accuracy levels were below criterion levels. One of the two parents, Amber, reported having completed a Hanen *It Takes Two to Talk* parent training one year prior to beginning the study. Perhaps not surprisingly, she demonstrated the highest accuracy levels during baseline for matched turns which was near the set criterion level compared to other parents in the study. She also demonstrated low, yet stable levels for use of expansions during baseline. This provided some evidence that maintenance of language strategy use may have been carried over from her previous parent training.

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Consequent changes in child language outcomes for the child participants were also evaluated and results show positive gains for all child participants using analyses from pre- and post-intervention language samples. It is difficult to interpret if the positive changes in child language outcomes are due to parent use of the EMT language support strategies since changes in specific child communication behaviors were not tracked over the course of the study. However, all four children made measurable gains in expressive language such as MLU (mean length of utterances), number of different words and total number of words as evidence by results from pre- and post-intervention language samples. At post-intervention, child participants were beginning to combine words, use a larger variety of word roots and use a greater number of words per session. For example, two of the four children (Cammy and Austin) were using 40 or more different word roots and increased between 106 and 344 total words at post-intervention compared to pre-intervention language samples. These two children were less delayed compared to the other two children who scored the lowest on the standardized language assessment prior to beginning the intervention. Additionally, the two children reporting the smallest gains in language outcomes also presented with the lowest standard scores for total language development on the standardized measure that was administered prior to the beginning of the study. These findings are similar to other studies in which the least language delayed children made the greatest gains following completion of the intervention (Hancock & Kaiser, 2002). Children in the current study used more novel expressive vocabulary (range from 1 to 43) over the 8-week intervention. Given the brief duration of the study, it is not likely that maturation alone could account for the increase in language measures.

The research methodology employed in this study allowed for continuous monitoring for each parent behavior and allowed refined modifications to teaching and coaching. This individualized the intervention and assisted parents in maintaining criterion levels of strategy use throughout the duration of the study. This was especially beneficial for one parent in the study. This parent, Tiffany, required additional teaching, modeling and coaching to implement time delays to the set criterion level for percent of correct use. Time delays were taught as a nonverbal strategy to elicit verbal or nonverbal communication from a child. During baseline sessions, Tiffany demonstrated the tendency to use an excessive amount of verbal language when interacting with her child. This may explain why she had difficulty refraining from using verbal prompts when presenting time delays during the first intervention session.

The researcher noted a lack of appropriate play materials in three of the four homes over the course of the intervention. To rectify this, a variety of materials were purchased and provided to families during the intervention. These materials included age appropriate puzzles, Little People play sets, Playdoh, magnet tiles, and a train set with tracks. These materials were left at the homes permanently at the conclusion of the intervention. This lack of materials is consistent with previous research which reports that families from low income backgrounds have less access to materials and educational resources (Duncan & Magnuson, 2002).

Findings from the current study further support the dynamic and simultaneous process of communication in which one communication partner's responses are often affected by the other communication partner; in this case, the transactional process of communication is between parents and children. Over the course of the study, it was

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apparent that the amount of parents' use of language strategies was affected by the level of children's expressive language skills. The social-interactionist theory of language development views communication as an interactive process in which early parent-child interactions influence each other's behaviors (Bohannon & Bonvillian, 1997). For example, Cammy had the highest expressive language measures at pre-intervention compared to the other children in the study for MLUm, NDW and TNW. Cammy's mother, Teresa, was able to learn and maintain all EMT strategies; however, she had the lowest frequency for time delays compared to other parents in the study. In addition to being more verbal, Cammy also initiated communication and made more spontaneous requests compared to other children in the study. Therefore, it was not necessary to use time delays. In this case, the social-interactionist theory was found to be adequate in explaining the how the child's communicative abilities affected the parent's level of communicative responsiveness and level of strategy use. These results correspond with results found in a similar study by Roberts and colleagues (2014) which reported that parents with more verbal children used fewer time delays and prompting during intervention sessions.

The frequency with which parents used time delays and milieu prompting strategies was variable across parents. Some parents used very few of these strategies during sessions and others used them frequently. A specific frequency range was not included in the criteria for these strategies as in previous studies (Roberts et al., 2014). However, there were suggested frequencies provided in the training materials. The frequency with which parents used these strategies may need to be addressed in future studies.

This study extends previous research on parent-implemented language interventions in several ways. First, parents were trained exclusively in their homes as opposed to previous studies in which training primarily took place in clinical settings (Roberts et al., 2014; Kaiser & Roberts, 2013). The use of the home setting increases external validity of the results since the current standard of care is for early intervention services to take place within a home-based setting and eliminates the task of teaching parents to generalize learned skills from the clinic to a home-based setting. Second, this is the first study to train parents from low-SES backgrounds in a home-based setting using the most recent framework of EMT which includes four major components taught sequentially using a teach-model-coach-review method. The only similar study to date did train parents with multiple risk factors, including low-SES, but used the more traditional components of EMT with their children with speech and language delay: descriptive statements, imitation, expansions, modeling, manding, mand-modeling, and time delay (Peterson et al., 2005). Third, the current study utilized an abbreviated EMT training model (one 60-minute home visit scheduled each week for 8 weeks) compared to similar studies with a longer duration such as two 40-minute clinic sessions per week over 12 weeks (Roberts et al., 2014) or 1 clinic session and 1 home session once a week for 3 months (Roberts & Kaiser, 2015).

Limitations, Implications and Recommendations

Although the results of this study add to the literature for parents who are low-SES with children who have LI, there are several limitations that must be considered. First, the parents who were recruited for this study may not adequately represent the target population of parents who are low-SES. All parents were highly motivated to

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participate in the intervention since they independently sought additional services for their child with concerns regarding language and agreed to the extensive participation requirements. One professional with the Head Start program stated that it was difficult to schedule two home visits a year with students' caregivers because most families are not willing for people to visit the home regularly, yet the parents in this study were sufficiently motivated to agree to multiple visits. Additionally, two parents (50% of the participants) in the current study had either some college or a four-year college degree. Nationally, only 15% of low-income individuals, 25 and older, have an educational attainment level of some college or a college degree (DeNavas-Walt & Proctor, 2015). Furthermore, there were no families that represented culturally diverse populations since all parents and children in the current study were Caucasian, while data from 2013 indicate that 58 % of low-income families in the U.S. represented a racial/ethnic minority group (Povich, Roberts & Mather, 2015). It should be noted that two children representing minority groups (Filipino and African American) were formally assessed prior to the start of the intervention that represented minority groups; however, their standardized scores on the formal language assessment were too high to meet eligibility criteria. Due to these limitations, it is unknown whether or not the results of the current study would generalize to the general population of parents targeted. The researcher had hoped to enroll more ethnically diverse parents. Future research for the current population, low-income parents of children with LI, may consider modifications to the recruitment process to recruit participants who are more representative of the target population. Previous studies on parent-implemented EMT also suggest the need for

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additional research with more culturally and ethnically diverse populations (Roberts et al., 2014).

Second, this study did not formally train or measure foundational skills related to following the child's lead such as getting face-to-face with the child, choosing toys that the child prefers, arranging the environment during activities, and knowing how to join in a child's play. In fact, parents' lack of basic interaction and play skills was a concern over the course of the intervention. The investigator had not anticipated the need to train parents on these skills. On several occasions, the investigator needed to make suggestions to parents during coaching sessions regarding following the child's lead and selecting appropriate targets to use when modeling language. Although information was given to parents about these foundational skills prior to training on the first strategy, these specific skills (environmental arrangement and following the child's lead) were not measured within the context of the single-case research design. Previous studies on parent-implemented language interventions have devoted more time and attention to measuring these foundational skills in order to teach parents how to set realistic communication goals for their child, join in a child's play, take turns, arrange the environment and recognize nonverbal and minimally verbal communication attempts (Girolametto, Pearce, & Weitzman, 1995; Hemmeter & Kaiser, 1994; Pennington, 2009; Roberts & Kaiser, 2012).

Third, parent behaviors were not investigated during any other common daily activities, such as meal time or joint storybook reading. The intervention in this study was delivered by parents within the context of play in a home-based setting with their child. Since a variety of activities typically occur in a child's day, in addition to play, the current

delivery model is not representative of naturally occurring family events and may not ensure generalization to other contexts. Future research should investigate both parent and child behaviors with the current population within the context of a variety of daily activities with their child, similar to previous studies using parent-implemented EMT (Roberts & Kaiser, 2013; Roberts et al., 2014).

Fourth, results from the current study revealed two out of four parents demonstrating use of time delays at a high level of frequency, yet below criterion levels for percent of accuracy, immediately following training on expansions. Although this did not compromise experimental control, it can be interpreted in a few ways. First, it may indicate observational learning of a strategy not yet trained since the interventionist modeled not only the strategy of interest but also used other strategies as appropriate. In both cases, parents' use of time delays returned to zero after the next intervention session further indicating that expansions and time delays are independent of one another. Roberts et al. (2014) also reported observational learning of untrained strategies with expansions immediately following training and modeling for matched turns. The second interpretation is that the choice of activities may influence certain time delay procedures, such as waiting in a routine. For example, Zack chose to play with a medium-sized, light-weight ball during the intervention session with Amber. This was a high-interest play activity for Zack. The routine eventually led to Amber quietly "waiting in a routine" on multiple occasions, in order to prompt Zack to make a request for the ball. Surprisingly, Amber would hold the ball, wait for Zack to say "ball", expand Zack's utterance ("I want ball."), and then throw the ball back to Zack. These steps properly demonstrate correct use of a time delay procedure called "waiting in a routine". This problem may have been

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eliminated had the order been switched with expansions. This way would have allowed parents to set up child requesting and commenting opportunities first, followed by teaching parents how to use expansions.

Fifth, specific cognitive measures were not part of the inclusion criteria. One inclusion criteria was primary diagnosis of language impairment without the presence of a specific disability such as Down syndrome or Autism Spectrum Disorder (ASD). The researcher took parent report of diagnosis, or lack thereof, as the standard for meeting this inclusion criterion. However, that may not have been sufficient. One parent, Tiffany, reported to the first author that her son, Evan, had been diagnosed with ASD prior to the last intervention session. Due to the large gap between Evan's receptive and expressive language skills (significantly greater impairment with receptive compared to expressive) as evidenced by his formal language evaluation, in combination with challenging behaviors that were observed during intervention sessions, the interventionist began to suspect this diagnosis over the course of the intervention. However, since there was no formal diagnosis reported in the beginning and the researcher had already initiated the intervention, the family remained in the study. Furthermore, results from both parent and child outcomes were included in the study due to the researcher already having completed the intervention and high-quality studies reporting positive results for using parent-implemented and therapist-implemented EMT with children who have an autism diagnosis (Hancock & Kaiser, 2002; Kaiser, Hancock, & Nietfeld, 2000). It should be noted that Evan demonstrated the least amount of progress on child language outcomes regarding total number of words and number of different words, however his MLUm increased considerably (1.00 to 2.73). Previous research on children with ASD

recommends a greater intensity of treatment as it relates to duration and frequency of early intervention (Rogers et al., 2012). In this study, however, results are mixed in that Evan showed the greatest increase in MLU compared to the other child participants but demonstrated the least gains for expressive vocabulary.

Finally, the researcher did not assess children's use of specific communication targets simultaneously with parent use of strategies over the course of the intervention. Due to the brief duration of the intervention and the primary focus being changes in parent behaviors, specific child communication behaviors were not measured intentionally within the context of a single-case research design. However, child language outcomes were assessed at pre-intervention and post-intervention using naturalistic language samples. All four child participants showed positive gains in measures of expressive language for MLUm, NDW and TNW. A follow-up study with this population should address child use of specific communication targets during intervention within the context of a single case design, as was done by Roberts et al. (2014). Furthermore, although the researcher sought to address threats to internal validity, one threat of history was identified. Two of the four child participants were receiving weekly or bi-monthly speech therapy during the course of the intervention which may have influenced child outcomes.

These limitations suggest possible modifications for future studies. Additional research with this population is clearly needed regarding treatment frequency and dosage, procedural methods and intervention contexts to determine whether positive parent outcomes and child outcomes can be achieved through this type of intervention. Furthermore, the training method and EMT language support strategies might be adapted

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to fit the individual needs of families who prefer to have other family members involved. For example, one child's father was present and observed the entire session for at least 50% of intervention sessions. He also occasionally asked questions during the session. During one home visit, following the training and review on milieu prompting techniques, the father independently joined in his child's play and was observed to demonstrate matched turns. The interventionist observed the child to be very responsive to his father's communication and interaction style (which differed from the mother's) in that he stayed in the interaction longer without any challenging behaviors. The child's mother, also reported to have shared the handouts and discussed how to use language strategies with her partner. Flippin and Crais (2011) provided recommendations in their systematic review on the need for more father involvement for children with ASD, and suggested that researchers include more fathers in children's early interventions. Therefore, it is important to consider different family preferences regarding how other family members, especially fathers, might be involved in early intervention and how modifications might be made to better suit fathers' involvement in parent-implemented language interventions.

Despite these limitations, the current study has some implications for practice. The results show that a brief, home-based parent-implemented training program using EMT may be effective in increasing parents' correct implementation of language support strategies with their child with LI within the context of play. First of all, the brevity of the training and intervention implemented in the current study should not be underestimated. The current model provides early intervention service providers a rather brief program for training parents to implement evidence-based, language support strategies that allows for

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practical and measureable changes in both parent and child outcomes. The current intervention was provided to parents in 8 to 9, 1-hr home visits. This aligns with current service provision models for federal early intervention programs for young children with disabilities that families are accessing. For example, Kentucky Early Intervention Services allow up to 24 hours of intervention during a six-month plan for one discipline (i.e., speech-language pathology), which averages one hour per week over the course of the service plan (KEIS, 2015). Furthermore, training parents to implement effective and evidence-based language interventions during routine-based activities in a home-based setting may increase the number of hours per week children receive intervention. This type of family-centered training may be ideal for early interventionists & speech-language pathologists providing Part C services to children and families. Second, early intervention service providers interested in training parents to use EMT need adequate training to be able to implement the intervention with fidelity. Interventionists also need to learn to train parents using the TMCR method and individualize training according to family needs. Third, the robust results from the current study gives way to a shift in the perspective suggesting that parents from low-SES populations are capable and willing to learn and implement a somewhat complex intervention with fidelity and in a relatively short amount of time. This empowers parents in that it allows parents to be actively involved in their children's language intervention, thus increasing control within their life & their children's lives, when otherwise they may feel no control over other situations associated with low-income families. Interventionists may also need to adapt training materials to fit parents' current language and literacy skills as well as be prepared to connect parents to other community resources- especially additional services for their

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children. None of the families in the current study ever received Part C services and only one child in the study was receiving Part B, Preschool Special Education services (services for three to six-year-old children with disabilities under IDEA). Overall, the results of the current study show that parents from low-SES environments were willing to learn and were able to implement a high-quality language intervention with fidelity through adequate teaching, coaching and encouragement.

Conclusion

The results of this study indicate that home-based, parent-implemented language intervention training is a potentially effective early intervention program for teaching low-SES parents to use specific language support strategies with their children within the context of play. However, the study presents with several limitations related to target population demographics and procedural methods and suggests possible modifications to the intervention for future studies. Research is needed to assess maintenance over time as well as generalization of parent use of language strategies in a variety of contexts. Still, results indicate that all parents were able to successfully learn all four EMT strategies in a sequential manner to criterion levels over the course of the intervention. This study adds to the literature supporting the use of parent-implemented language intervention training to improve both parent use of strategies and child language development.

Appendices

Appendix A: Parent Handouts

Foundational Skills for Communication

Play and Engage

Why?
- Children learn best when they are engaged and interacting with a communication partner.
- Children are more likely to be engaged and learn language while doing activities they enjoy.
- When the adult plays with the child at his or her level, the adult optimizes the opportunity for communication to occur.

How?
- Be at your child's eye level and do whatever your child is doing.
- Follow your child's lead, avoiding directions and letting your child lead the play.
- Avoid questions and try to let your child initiate the communication.
- Choose toys that are interesting and engaging and put toys away that aren't being used
- If you don't want your child to do something, give him or her another option.

When?
- Whenever possible; at least once a day for at least 15 minutes of concentrated and individualized adult-child time.

Notice and Respond

Why?
- Noticing and responding to <u>all</u> communication teaches your child that their communication is important to you.
- By acknowledging all communication and communicative attempts you reinforce your child for communicating.
- The more your child communicates the more practice he or she receives and the easier communication becomes.

How?
- Notice and respond every time your child communicates.
- Respond by talking about what your child is doing.
- Language is most meaningful when it's <u>related</u> to what your child is doing OR in <u>response</u> to what your child is communicating.

When?
- As much as possible; in all contexts throughout the day.

Take Turns

Why?
- Taking turns allows your child more opportunities to communicate.
  - More opportunities = more practice = growth in communication skills
- Taking turns teaches your child how to have a conversation.
- Waiting signals to the child that it is his or her turn to communicate.

How?
- Take turns communicating with your child and <u>wait</u> for your child to communicate.
- Play a game of "communication catch."
  - Your child communicates; You respond (and wait)
  - Your child communicates; You respond (and wait)
- Only say something after your child communicates.

When?
- As much as possible; in all contexts throughout the day

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Mirroring and Mapping

What is Mirroring and Mapping?

- Mirroring: when the adult imitates the child's nonverbal behaviors.
- Mapping: when the adult "maps" language onto these nonverbal behaviors.

Why Use Mirroring and Mapping?

- Mirroring allows the adult to join the interaction with the child.
- Mirroring allows the adult to be responsive when the child is not communicating.
- Mapping provides the child with a language rich description of the activity.
- Mirroring and mapping allows the adult and child to have balanced turns.
  - Child: {drives car}
  - Adult: {drives car} I drive the blue car.
- When the adult "mirrors" or imitates the child, the child is more likely to orient toward the adult since the adult is doing what is of interest to the child.
- What the adult says is more meaningful to the child since the adult and child are both engaging in the same activity and language is "mapped" right on top of what the child is doing.

Before — adult / child

After — adult / child

Following the child's lead
Noticing and responding
Mirroring and mapping

⇓

Meaningful conversation
Opportunities for learning
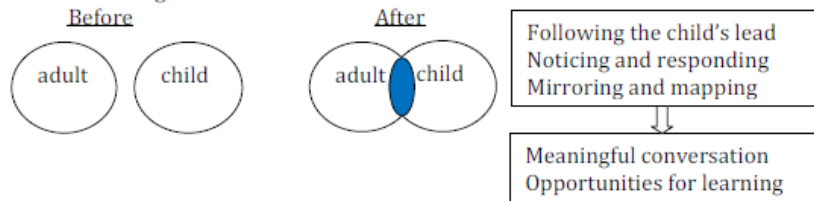
How and When to Mirror and Map?

- Use mirroring and mapping when the child is <u>not</u> communicating.
- Mapping must come <u>after</u> mirroring.
- <u>First</u> imitate the action and <u>then</u> label the action with words.
  - Child : {feeds baby}
  - Adult: {feeds baby} we feed the baby some milk.
- Mirror the child's actions close to the child's actions to make language more salient.
- Avoid mirroring behaviors that are unacceptable (e.g., throwing toys, hitting).
- Balance mapping and playing (e.g., don't over map).

Using Strategies at Home

- During what activities at home can you "mirror" and "map"?
  _____

- What will you do? What will you say?
  _____

Learning Language Through Play

Play Goals

- Extend the time your child plays with a toy.
    - More time = more opportunities for language learning
- Expand the different play actions your child does with the same toy.
    - More actions = more opportunities for language learning
- Expand the types of toys your child uses.
    - More toys = more opportunities for language learning

Why Do We Teach Play?

- Linking words with engaging activities maximizes opportunities for teaching language.
- Choosing toys at the child's play level help keep the child engaged.
- Expanding play activities and objects allows us to use, model, and teach more language.

How to Model New Play Actions?

- Continue to follow your child's lead.
- Do what your child does and try to add a different action or object.
- Set a new toy object in sight or model a new action and WAIT to see if your child shows interest.
- If your child shows interest, model a new play action with the object.
- As always, follow your child's lead and if he/she is not interested, try again later with a different object or action.

When to Model New Play?

- When your child is doing the same action with the same object multiple times.
- When your child is doing an undesired action with the toy (e.g., eating play-doh, hitting the baby, mouthing pretend food).

Choosing Toys

- Choose toys according to your child's play targets and toy preferences.
- Use toys that will lengthen engagement and maintain interest.
- Items that can be added to any toy set to extend and expand play:
    - Water, sponge, shaving cream
    - People figures
    - Pretend food, utensils, flatware
    - Blocks

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Language Responsiveness: Descriptive Talk

Language Goals for the Child
- Help your child use more words: Talk more.
- Help your child use "different" words and build his/her vocabulary.
- Increase the child's independence.
  - Increase the child's ability to talk more on his/her own.
  - Decrease the child's dependence on the adult for talking.

Why & How We Use "Descriptive Talk"?
- Children learn language by hearing adults talk.
- Saying words/phrases that directly relate to what your child is doing at that exact moment is "Descriptive Talk". This is very important because responding appropriately & **immediately** to your child's communication can be very powerful.
- Simplify your words, phrases, or sentences to match your child's language targets (goals) to help him/her learn language more quickly and understand language more. See below.

Set Targets/Goals for the Child
- Choose, with the therapist's help, targets (or goals) based on the level of language your child is already using and what he/she should learn next.
- How does your child communicate now?
  - If Gestures & vocalizations, then try more gestures & vocalizations & one-word utterances
  - If above + some single words, try more single words
  - If over 50 single words, try 2-word utterances; include verbs
  - If child uses 2-word utterances, try 3-word utterances
  - If child uses more than 2-3 word utterances, use 3-5 words; include all grammatical features

Using Your Child's Targets
- Half or 50% of what you say should be one of your child's targets:
  1. _____   2. _____
  3. _____   4. _____
  5. _____
- 50% should be slightly higher than your child's targets.
  - 1-2 words above his/her level
  - All words should be teaching words (See list: objects, actions, modifiers)

Be Responsive to ALL Communication
- Always respond to your child's communication. Respond with meaningful word(s) after your child communicates. Remember, communication can be eye gaze, gestures & vocalizations.
- Use "descriptive talk" to your child when you are doing either the same action or a different action perhaps with the same/similary objects, especially when you have the child's attention.
  - Child: {drives car}
  - Adult: {drives car} car
- Take turns when communicating with your child.

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Expanding Communication: Expansions

What is an expansion?

- Expansion: adding more words to your child's communication.
- The most powerful expansion includes one of your child's communication targets.

Why expand communication?

- Expansions immediately connect the child's communication to additional new communication.
- The more your child hears and practices language that is more complex, the better his/her language skills become.
- When you give your child a little more language than he/she gives you, he/she hears more about the topic in which he/she is interested.
- Expansions help your child learn new vocabulary and talk in more complex sentences.

How to expand communication?

- Gestures: by imitating the gesture or taking/touching the object while labeling the word, you are increasing the saliency of the word and making it more likely that your child will learn this new word.
  - Point/reach:
    - Child: {points to/reaches for ball}.
    - Adult: {points to/reaches for ball} ball.
  - Show
    - Child: {holds up block}.
    - Adult: {points to block} block.
  - Give
    - Child: {gives adult car to drive}.
    - Adult: {takes the car} car.
- Vocalizations: by replacing the vocalization with the word you want your child to say and by imitating his action or pointing to an object you are increasing the saliency of the word and making it more likely that your child will learn this new word.
  - Child: {says "ah" and is walking the cow}.
  - Adult: {walks the cow} walk.
- Words: by adding words to your child's words you connect a new word to a word your child already knows, which increases the saliency of the new word and makes it more likely that your child will learn this new word.
  - Child: car.
  - Adult: drive car.

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Time Delay Strategies

What are Time Delay (TD) Strategies?

- **Non-verbal** strategies that encourage your child to communicate with you.
  - Inadequate Portions: providing small or inadequate portions of preferred materials.
  - Assistance: creating situations in which the child needs the adult's help (toys in a clear container; in sight but out of reach).
  - Waiting in a Routine: setting up a routine in which the child expects certain actions and then waiting before doing the expected action again (pausing when pushing a car down a ramp) OR using items that go together and waiting before completing the action (shoe to foot.)
  - Choice Making: holding up two objects and waiting for the child to communicate about which item he/she wants.

Why Use TD Strategies?

- Provides the child with more opportunities to practice communicating.
  - Increases the child's rate of communication
- Provides the adult with more opportunities to teach new language by
  - Responding
  - Expanding the child's communication

How to Use TD Strategies?

- Set up the opportunity to encourage your child to communicate by using an environmental arrangement strategy.
- Wait until your child communicates (gestures, vocalizes, says a word).
- Expand this communication with a target.

When to Use TD Strategies?

- Use TD Strategies when the child is not communicating frequently (e.g., less than 2 times per minute).
- Some strategies work better than others for different children.
  - Use the ones that work best for the child.
  - Avoid TD strategies that frustrate the child.

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Prompting Language

What is a Prompt?

- An adult prompt is a signal to the child to do or say something.
- There are four types of prompts, with different levels of adult support:
  - Time delay (waiting for 5 seconds)
    - An <u>overt</u> nonverbal cue for the child to use language
    - The adult uses an expectant look and waits for the child to verbalize before performing the expected action or giving the child a desired object.
    - This offers the least language support.
  - Open prompt (e.g., "what do you want?" "tell me what you want.")
    - The adult gives an open prompt (i.e., no single correct answer).
    - This offers a little more support by verbally cueing the child to verbalize his or her requests.
  - Choice prompt (e.g., "dog eats or dog drinks?")
    - The adult uses a choice prompt that has no single correct answer
    - This offers even more support by including the answer in the question.
  - SAY prompt: "say _____".
    - The parent tells the child exactly what to say "say _____"
    - This offers the most adult support as it tells the child exactly what to say.

What to Prompt?

- Your child's communication targets:
  - Target 1: noun (e.g., cat)
  - Target 2: verb (e.g., eat)
  - Target 3: protoverb (e.g., in)
  - Target 4: request (e.g., help, again)

Why Prompt Language?

- Gives children an opportunity to practice language targets during a highly motivating context.
- Gives the child functional practice and reinforcement for communication.

Prompting Language

How to Prompt Language?

- Wait for your child to request OR use time delay strategy to elicit a request.
- Choice Prompt: Adult uses TD choice making strategy to set up the request
    - Use the choice TD strategy (hold up 2 items).
    - Wait for the child to respond (if no response, abandon the prompt since the child isn't interested, but don't give either object)
    - If the child does not use a target, say " _____ or _____ "
    - If the child still doesn't say the target, give model ("say") up to 2 times if the child doesn't use a target.
- Open Prompt: Child requests or adult uses another TD strategy (other than choice) to set up the request.
    - Wait for the request or use an TD strategy (all but choice) to get a request
    - Say "Tell me what you want?" or "What do you want?"
    - Wait for the child to respond or wait 5 seconds if no response.
    - If the child does not use a target, say "say _____ "
    - Give model ("say") up to 2 times if the child doesn't use a target
- Stop prompting after your child says <u>exactly</u> what you wanted him to say.
- Give your child enough time to respond (5 seconds) before giving another prompt.
- Prompting episodes should always result in the child receiving the object or action.
- After your child has said what you wanted OR you have given two model prompts
    - Expand if he has said the target
    - Repeat if he has not said the target

When to prompt language?

- Only when the child is requesting and <u>not</u> using a target.
- Only as one of the many tools (not the only tool) of Enhanced Milieu Teaching.
- No more than three times per minute 15 minute session
    - Too many demands may cause the child to become frustrated.

Appendix B: Data collection form for teaching component

Teaching Checklist for EMT Training

Parent:_____   **Strategy:** _____   **Date:** _____

Interventionist Task	Check when complete
Provide a rationale for the strategy	
Give and review a detailed handout	
Give examples of the strategy	
Provide specific instructions regarding the strategy (refer to handout)	
Role-play with the parent using the strategy	

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Appendix C: Data collection form for coding parent behaviors for matched turns, expansions and time delays

Data Collection Form: Matched Turns, Expansions & Time Delay

Adult ID #:_____

Score each strategy use by adults. Use handout for specific requirements. Mark Y=Proper use of strategy; N= Failed to properly use strategy, U= Unsure/Unintelligible or CLI (Child Loss of Interest). <u>If No</u>, then note in parenthesis: G= failed to respond to gesture, V= failed to respond to vocalization, W= failed to respond to words, T= failed to use proper target

Matched Turns (Criterion 75%)		Expansions (Criterion 50%)		Time Delay (Criterion 1-10 per session; 80% correct)		
Session #=	Video #=	Session #=	Video #=	Session #=		Video #=
Y/N	Time Stamp	Y/N	Time Stamp	Type	Y/N	Time Stamp
Total Y=		**Total Y=**		**Total Y=**		
Total N= (Do not include CLIs or U's)		**Total N=** (Do not include CLIs or U's)		**Total N=** (Do not include CLIs or U's)		
% Matched turns: Y/(Y+N)=		**% Expansions:** Y/(Y+N)=		**Total Number of attempted TD's=** _____ **% Time Delays:** Y/(Y+N)=		

TD Types Legend: Needing Help (NH), Not Enough (NE), Waiting in a Routine (WR), and Giving a Choice (GC)
Enter scores, in percentages, that were calculated in the last row into an excel spreadsheet. Enter total attempted TD's.

Appendix D: Data collection form for coding parent behaviors for mileu prompting

Data Collection Form: Milieu Prompting

Session #: _____   **Parent #:** _____   **Video #:** _____

*Instructions: Write a Yes or No in each box according to the adult behaviors viewed from video. Score a <u>1 for Yes</u> and a <u>0 for No</u>. Then, at the bottom, add the numbers down the column according to the scores. Write CLI if child lost interest.

Adult responded to a <u>child request</u>							
Adult used a child communication target							
Adult followed sequence of *least to most* prompting (open question < choice question < "say" prompt)							
Maintained the child's engagement throughout the episode							
Adult included adequate time for the child to respond to the prompts (3-5 seconds)							
Excluded the use of yes/no or test questions (i.e., questions with only one correct answer, such as, "What is this?")							
Adult ends episode with giving the child the desired object/action and expanding the child's response (if the child used the prompted target) **OR** Adult ends episode with giving the desired object/action and verbally responded with target word/phrase/sentence (if the child did not verbally respond)							
Time Stamp Range							
Total Score (add numbers down each column)							

Formula for calculating % of episodes implemented correctly:

Total Number of episodes with a 6 or 7 (indicates done "correctly") = ☐

_____ = _____%

Total Number of episodes (DO NOT include CLI) = ☐

Enter total number of prompting episodes (include CLIs) AND % of CORRECT episodes (scored 6+) into the spreadsheet. *Criterion is 1-5 prompt episodes per session, with 80% done correctly.

Appendix E: Review session form

EMT "Review" Session Notes & Questions

Section 1 (Interventionist should share the following information):

List specific ways in which the therapist observed the parent using the strategy.	
List & share what the parent did well.	
Explain how the parent could use the strategy in the future.	
List and share what the parent did well, including how the parent's use of the strategy was directly connected to the child's communication.	

Section 2 (Interventionist to ask parent following last session of reaching criterion for strategy):

1. How do you feel about the session and strategy that was taught/practiced?	
2. What was the most challenging part of practicing the strategy?	
3. What do you believe went well?	
4. What is another daily routine in the home or community that you could use this strategy?	

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EDUCATION

Years	Institution	Degree	Specialty
2004	Western Kentucky University	M.S.	Communication Disorders
2000	Western Kentucky University	B.S.	Interior Design

PROFESSIONAL and CLINICAL EXPERIENCES

2012 – Present Full-time Clinical Supervisor/Instructor/Speech-Language Pathologist, Western Kentucky University Communication Disorders Clinic, Bowling Green, KY

2009 – 2012   Part-time Clinical Supervisor/Speech-Language Pathologist, Western Kentucky University Communication Disorders Clinic, Bowling Green, KY

2011 – Present Pediatric Speech-Language Pathologist, Independent Service Provider, First Steps- Kentucky Early Intervention Service Bowling Green, KY

2005 – 2011   Speech-Language Pathologist, Warren County Public Schools, Bowling Green, KY

2005 – 2010   Speech-Language Pathologist, The Medical Center at Bowling Green, Bowling Green, KY

2005 – 2006   Speech-Language Pathologist, Peoplefirst Rehabilitation/ Rosewood Healthcare Center, Bowling Green, KY

2005   Speech-Language Pathologist, Heritage Healthcare/ Russellville Health Care Manor, Russellville, KY

PUBLICATIONS

Hatcher, C. A., Grisham-Brown, J., & Sese, K. (in press). Training Caregivers in Guatemala to Enhance Language Development in Young Children. Journal of International Special Needs Education.