

Spring 5-11-2018

Early Intervention Speech-Language Pathologists: A Systematic Review

Margaret M. Pierce

University of Maine, margaret.pierce@maine.edu

Follow this and additional works at: <https://digitalcommons.library.umaine.edu/etd>

 Part of the [Speech Pathology and Audiology Commons](#)

Recommended Citation

Pierce, Margaret M., "Early Intervention Speech-Language Pathologists: A Systematic Review" (2018). *Electronic Theses and Dissertations*. 2864.

<https://digitalcommons.library.umaine.edu/etd/2864>

This Open-Access Thesis is brought to you for free and open access by DigitalCommons@UMaine. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of DigitalCommons@UMaine. For more information, please contact um.library.technical.services@maine.edu.

EARLY INTERVENTION SPEECH-LANGUAGE PATHOLOGISTS:

A SYSTEMATIC REVIEW

By

Margaret M. Pierce

B.A., University of Maine, 2016

A THESIS

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Arts

(in Communication Sciences and Disorders)

The Graduate School

The University of Maine

May 2018

Advisory Committee:

Nancy E. Hall, Associate Professor of Communication Sciences and Disorders, Advisor

Paige Lane, Lecturer of Communication Sciences and Disorders

Claire Sullivan, Associate Professor of Communication

© 2018 Margaret M. Pierce

EARLY INTERVENTION SPEECH-LANGUAGE PATHOLOGISTS:

A SYSTEMATIC REVIEW

By Margaret M. Pierce

Thesis Advisor: Dr. Nancy E. Hall

An Abstract of the Thesis Presented
in Partial Fulfillment of the Requirements for the
Degree of Master of Arts
(in Communication Sciences and Disorders)

May 2018

Purpose: The purpose of this Thesis is to describe the current supporting evidence base for speech-language pathologists working within early intervention with the birth through two-years-old population.

Aims: The aims of this systematic review are to determine: (a) the current evidence base of early intervention by speech-language pathologists with infants and toddlers and (b) the quality of research available.

Method: An exhaustive systematic review method is used. Search terms are based on subject or index headings related to the aims of this systematic review, i.e. early intervention and speech-language pathologists. A screening method is used to identify eligible publications for the review.

Results: Eight publications are considered eligible for review. Three articles are considered to have a higher-quality level of evidence. Description of all publications are included. General features of the studies are described.

Conclusions: Future research is needed to add to the research-base supporting positive communication benefits by speech-language pathologists working with the birth through two-years-old population. The current evidence base for speech-language pathologists is discussed and the preliminary evidence is identified. Recommendations to continue ongoing research efforts are provided.

TABLE OF CONTENTS

LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF ABBREVIATIONS.....	vii
Chapter	
1. BACKGROUND AND RATIONALE.....	1
Early Intervention	1
The Federal Law	1
Speech-Language Pathologists	3
Speech-Language Pathologists' Presence.....	4
Rationale	5
2. METHODS	6
Review Question.....	6
Identification of the Literature	6
Inclusion and Exclusion Terms.....	7
Search Outcome	8
Quality of Literature	8
3. RESULTS	10
Quality of Results	10
Description	11
Evidence Level IV	11
Evidence Level III.....	13
Evidence Level Ib	15

General Features	18
Participants.....	18
Interventions	18
Measures	19
Outcomes	19
4. DISCUSSION	21
Current Evidence Base.....	22
Intervention Approach	22
Intervention Outcomes.....	23
Limitations	24
Future Directions	24
REFERENCES	26
APPENDICES	30
Appendix A. Methods.....	30
Appendix B. Results	32
BIOGRAPHY OF THE AUTHOR.....	34

LIST OF TABLES

Table 2.1.	Search Terms	6
Table 2.2.	Initial Search Results	8
Table 3.1.	Quality of Results	10
Table 3.2.	Evidence Level IV Results	11
Table 3.3.	Evidence Level III Result	13
Table 3.4.	Evidence Level Ib Results	15
Table 3.5.	Participant Characteristics	18
Table 3.6.	Intervention Approach Characteristics	19
Table A.1.	ASHA’s Levels of Evidence	31
Table B.1.	All Eligible Publications	32

LIST OF FIGURES

Figure A.1. PRISMA, Search Outcomes.....	30
--	----

LIST OF ABBREVIATIONS

ASHA	American Speech-Language and Hearing Association
D.C.	District of Columbia
EI	Early Intervention
EMT	Enhanced Milieu Teaching
IDEA	Individuals with Disabilities Act
IFSP	Individualized Family Service Plan
IPEC	Interprofessional Collaborative Education Model
KTTP	KidTalk TaCTICS—Project
MCT	Milieu Communication Teaching
PMT	Prelinguistic Milieu Teaching
RE/PMT	Responsivity Education/Prelinguistic Milieu Teaching
SLP	Speech-Language Pathologist
SLPs	Speech-Language Pathologists
U.S.	United States

CHAPTER 1

BACKGROUND AND RATIONALE

Early Intervention

Early intervention (EI) describes the services provided for children with disabilities ages birth through five years-old (Centers for Disease Control and Prevention, 2018; Oberklaid, Baird, Blair, Melhuish, & Hall, 2013). Depending on infants' and toddlers' needs, including the needs of their families, services provided through EI can include speech-language therapy, occupational therapy, physical therapy, and others as needed. Infants and toddlers demonstrating delays or impairments in developmental domains may be eligible for EI services. The positive benefits of receiving EI services have been widely documented (Adams, Tapia, & The Council on Children with Disabilities, 2013; Epley, Summers, & Turnbull, 2011).

In 2015, the United States (U.S.) provided services to 354,081 infants and toddlers, ages birth through two-years-old (U.S. Department of Education, 2017). The number of infants and toddlers receiving services accounted for approximately three percent of all infants and toddlers in the U.S. and the District of Columbia (D.C.). However, according to Rosenberg, Zhang, and Robinson (2008), an estimated 13% of all infants and toddlers would benefit from EI services. Infants and toddlers residing in the U.S.—accounting for the 50 states and the District of Columbia (D.C.)—are entitled for EI services under the Federal Law known as the Individuals with Disabilities Education Act (IDEA, 2004).

The Federal Law

Starting in 1986, a federal law has been mandated to serve infants and toddlers with disabilities through EI services (Trohanis, 2008). In its beginning, it was a voluntary program for states to develop a statewide system for comprehensive services for infants and toddlers with

disabilities (Trohanis, 2008). The federal law, which has undergone changes throughout the years, is in its most current reauthorization now known as the Individuals with Disabilities Education Act (IDEA, 2004). Infants and toddlers are entitled to EI services under Part C of the IDEA. Definitions for eligibility, delays/disabilities, service locations, and roles and responsibilities for services providers are briefly outlined in the IDEA (2004).

Nationally, EI Part C services are documented within the Individualized Family Service Plan (IFSP). IFSP services must: (a) be provided under public supervision, (b) be provided at no cost unless otherwise stated, (c) meet developmental needs of an infant or toddler with a disability in one or more of five defined developmental areas, (d) meet State standards and Federal standards, (e) be provided by qualified personnel, and (f) have service provision in the context of natural environments. Eligible infants and toddlers may receive services in one or more developmental areas of: (a) physical development, (b) cognitive development, (c) communication development, (d) social or emotional development, or (f) adaptive development. The IFSP guides the team of qualified personnel in assessment, treatment planning and delivery, and exiting of an infant or toddler from the program and/or services (IDEA, 2004).

Qualified personnel that may provide services to infants and toddlers have been determined to be the following: special educators, speech-language pathologists (SLPs) and audiologists, occupational therapists, physical therapists, psychologists, social workers, nurses, registered dietitians, family therapists, vision specialists, mobility specialists, and pediatricians (IDEA, 2004). The qualified personnel must be agreed upon by the IFSP team which may be comprised of a case manager, family member(s), and other qualified personnel. Qualified personnel working on an IFSP team may function as case management, primary service providers, and direct-service providers for eligible infants and toddlers. Case management entails

qualified personnel may coordinating services and meetings among the IFSP team. As a primary service provider, the role may be to collaborate with other IFSP team members to provide consultative services to an infant and/or toddler. As a direct-service provider, the personnel will deliver services only within their scope of practice. Key differences between the primary service providers and the direct service providers is the way services are delivered (i.e. consultative role or a direct clinician role).

Speech-Language Pathologists

Speech-language pathologists are identified as qualified personnel to provide EI services to infants and toddlers through Part C of the IDEA (2004). Defined roles and responsibilities regarding SLPs are not present in the federal law. Speech-language pathologists' roles may include the roles of other EI qualified personnel previously discussed. Speech-language pathologists' roles in EI services are outlined by the governing body for SLPs, The American Speech-Language-Hearing Association (ASHA), to include participation in the (a) prevention, (b) screening, evaluation, and assessment, (c) planning, implementing, and monitoring of intervention, (d) consultation with the education of team members, including families and other professionals, (e) service coordination, (f) transition planning, (g) advocacy, and (h) awareness and advancement of the knowledge base in EI (ASHA, 2008). Currently, the roles and responsibilities for EI SLPs working with the birth through two-year-old population are not clearly defined by the IDEA (2004).

Speech-language pathologists are highly qualified professionals equipped to provide services to individuals with speech and language delays and/or impairments. This also includes providing speech and language services to the birth through two-years-old population. As of 2015, estimates for infants and toddlers with speech and language delays receiving EI services

are not recorded routinely by the U.S. Department of Education (2017). Worthy of mention, however, are the data from 2015 indicating 43% of all children ages three through five enrolled in IDEA services as having been designated to have speech and language impairment (U.S. Department of Education, 2017).

Speech-Language Pathologists' Presence

Positive benefits of intervention by SLPs in different countries and populations have been documented in a variety of speech and language areas. Although not inclusive of all positive effects, the following populations have been examined to have positive benefits from SLP intervention: aphasia (Brady, Kelly, Godwin, Enderby, & Campbell, 2016; Faroqi-Shah, Frymark, Mullen, & Wang, 2010), apraxia in adults and children (Bailey, Eatchel, & Wambaugh, 2015; Ballard, Wambaugh, Duffy, Layfield, Maas, Mauszycki, & McNeil, 2015), autism spectrum disorders (Lorenc, Rodgers, Marshall, Melton, Rees, Wright, & Sowden, 2017; Wolstencroft, Robinson, Srinivasan, Kerry, Mandy, & Skuse, 2018), language treatment for children (Schmitt, Justice, & Logan, 2017; Roberts, Kaiser, Wolfe, Bryant, & Spidalieri, 2014), voice disorders (Desjardins, Halstead, Cooke, & Bonilha, 2016; Yiu, Lo, & Barret, 2016), and fluency for children and adolescents (Baxter, Blank, Cantrell, Brumfitt, Enderby, & Goyder, 2016; Nye, Vanryckeghem, Schwats, Herder, Turner, & Howard, 2013).

These studies demonstrated the positive impact of SLPs working within different countries and populations. Noticeably missing from the existing positive benefits of intervention by SLPs are early intervention services. Specifically, there is an absence of literature supporting positive benefits of EI by SLPs working with the birth through two-years-old population.

Rationale

Early intervention has been documented to have positive outcomes for those receiving services (Adams et al., 2013; Epley et al., 2011). Early intervention positive outcomes have been documented internationally and with different populations. In Sri Lanka, Perera, Jeewandara, Seneviratne, and Guruge (2016) reported positive benefits of home-based EI implemented by parents of children with autism compared to a no treatment group. Parents were trained and given specific instructions to implement therapies to promote social communication and/or interaction. In Germany, EI for toddlers with expressive language delay demonstrated significant reduced need for treatment by age three (Buschmann, Joos, Rupp, Feldhusen, Pietz, & Philippi, 2009). In the United States, children between 24 and 42-months of age demonstrated positive changes in language skills within an EI parent-training program focused on caregivers' use of four enhanced milieu teaching support strategies (Roberts et al., 2014). These studies reflect a small amount of the research that has been conducted supporting the positive benefits of EI within the ages of birth through five years of age.

However, much remains unknown regarding the positive benefits of SLPs providing EI services to infants and toddlers to improve their communication outcomes. Due to the little evidence of SLPs in the EI settings, this study sets out to determine: (a) the current evidence base of EI by SLPs with infants and toddlers and (b) the quality of research available. A systematic review method was employed to evaluate the current evidence base of EI SLPs working with infants and toddlers.

Chapter 2

METHODS

In this section, the methods for the systematic review are as follows: review question, identification of the literature, inclusion and exclusion terms, search outcome, and quality of the literature.

Review Question

The systematic review question was defined as follows: What is the current evidence base for early intervention speech-language pathologists working with the birth through two-years-old population? The aims of this systematic review are to: (a) identify the current existing literature regarding EI, SLP practices in the U.S. and (b) evaluate the evidence level of the publications included.

Identification of the Literature

A literature search conducted in April 2018 captured articles related to EI and SLPs. The objective was to identify relevant peer-reviewed articles and rate the quality of the literature eligible for review. Four databases were searched, CINAHL, ERIC, MEDLINE, and PsychINFO using subject headings or identifiers, shown in Table 2.1. These four databases were selected based upon their high frequency appearances within the discipline of SLP systematic reviews.

Table. 2.1. Search Terms.

Database	Search
CINAHL	(((MH "speech-language pathologists") OR (MM "speech-language pathology"))) AND ((MM "early childhood intervention"))
ERIC	(((ZU "speech language pathology") OR ((ZU "speech language pathologists")))) AND ((ZU "early intervention"))
MEDLINE	((MM "Early Intervention (Education)") AND ((MM "speech-language pathology"))
PsychINFO	((ZU "early intervention")) AND ((ZU "speech language pathology"))

Inclusion and Exclusion Terms

Journal articles published from January 2004 to April 2018, were considered eligible if all of the following criteria were met: (a) early intervention services for children ages zero through two (i.e. 0-35 months of age), (b) primary focus on clinical SLPs, and (c) peer-reviewed sources. The inclusion criteria are the core topics of the review question. The inclusion criteria of early intervention of children ages zero through two-years-old and a primary focus on clinical SLPs, must be met to capture the review question. To meet the aims of this systematic review (i.e. identifying eligible publications and qualifying the evidence base) publications must come from peer-reviewed sources such as academic journals as these articles have undergone a strict screening from other experts within the field.

Journal articles were excluded when the primary focus was on: (a) cultural diversity, (b) a specific developmental disability (e.g., Autism Spectrum Disorder, Stuttering), (c) a specific congenital disability (e.g., cleft palate, hearing loss), or (d) a primary focus on parent perceptions. Articles with a primary focus on cultural diversity were excluded from the review because the accounts of a representative sample of all infants and toddlers in the U.S. are not detailed. Instead, only a specific picture of EI within the U.S. based upon cultural diversity would be obtained. These accounts may be limited to specific strategies for working with African Americans, Hispanics, and others. Articles with a primary focus on developmental or congenital disabilities were excluded due to narrowing the focus of the review to only experiences of infants and toddlers diagnosed with certain conditions from birth instead of within the general context of EI. Lastly, publications with a primary focus on parent perceptions were excluded from this review because it does not remain focused on EI by SLPs. Instead

publications focused on parent perceptions provide insight into the thoughts and feelings of parents.

Search Outcome

Utilizing an adapted version of the PRISMA flow diagram (see Figure A.1) for systematic reviews (Moher, Liberati, Tetzlaff, Atman, & The PRISMA Group, 2009), an initial 133 publications were identified in the search process, seen in Table 2.2. After the duplicates were removed, 120 publications remained for further analysis. Inclusion and exclusion criteria were applied to the search results excluding 105 publications. The remaining 15 articles were read in full. Full-text articles not available through the University of Maine’s Fogler Library were requested and received through the Interlibrary Loan. The 15 full-text publications were assessed for eligibility resulting in seven publications excluded due to a focus on: (a) children ages 3+, (b) parent perception, and/or (c) cultural diversity. Eight publications were included in this systematic review. The eight publications were then categorized based upon the assessment of the quality of literature.

Table. 2.2. Initial Search Results.

Database	CINAHL	ERIC	MEDLINE	PsychINFO
Search Results	19	79	12	23
Total	133			

Quality of the Literature

The eligible articles were subjected to evidence evaluation. The governing body for SLPs, the American Speech-Language-Hearing Association, set forth guidelines for assessing the level of evidence and study quality from individual studies. ASHA’s (n.d.) recommended evidence levels, referring to the establishment of a hierarchy of study designs based on the ability of the design to protect against bias, identify six evidence levels ranging from well-designed meta-analysis, controlled study, quasi-experimental, non-experimental, and expert opinions

shown in Appendix A, Table A.2. ASHA's evidence levels guide SLPs in making judgments on the quality of research, i.e. evidence on which to base their clinical decisions within treatment of individuals with speech and/or language impairments.

Chapter 3

RESULTS

The results of the systematic review search outcomes were two-fold: (a) to describe all publications eligible for inclusion in the review and (b) to analyze studies with evidence level III or higher using ASHA’s Evidence Levels. Search results for all eligible publications returned eight publications ranging from Evidence Level IV-Ib, see Appendix B. Descriptions of publications are provided by evidence level per ASHA’s evidence based practice guidelines of the hierarchy of levels of evidence.

Quality of Results

Using ASHA’s Evidence Based Practice Guidelines, the quality of the research was determined by assessing the publications’ study designs. The results of the evidence assessments are shown in Table 3.1. Five publications (Coufal & Woods, 2018, Crais, 2011; Paul & Roth, 2011; Wilcox & Woods, 2011; Woods, Wilcox, Friedman, & Murch, 2011), provided clinical expertise from respected authorities in the SLP field. One study (Brown & Woods, 2016) used a well-designed non-experimental study. Brown and Woods (2016) used a sample from a previous study (Brown & Woods, 2015), and did not have a control group. Two studies (Fey et al., 2006; Fey, Yoder, Warren, & Bredin-Oja, 2013) used well-designed randomized controlled methodology. Both studies (Fey et al., 2006; Fey et al., 2013) used randomization to determine groups in which participants were included. Fey et al. (2006) compared outcomes between a treatment group and a control group, and Fey et al. (2013) compared the outcomes between two different treatment intensity groups.

Table. 3.1. Quality of Results.

Level IV: Clinical expertise from a well-respected authority	Coufal and Woods, 2018 Crais, 2011 Paul and Roth, 2011
--	--

Table. 3.1. Continued.

	Wilcox and Woods, 2011 Woods et al., 2011
Level III: Well-designed non-experimental study	Brown & Woods, 2016
Level Ib: Well-designed randomized controlled study	Fey et al., 2006 Fey et al., 2013

Descriptions

The resulting eligible publications are described. The eligible publications are organized by the levels of evidence according to ASHA (n.d.).

Evidence Level IV

Five eligible publications with evidence level IV provided clinical experience from a respected authority in the field of speech-language pathology, see Table 3.2. The following articles detailed clinical experiences from SLPs in EI services working within ASHA’s standards and compliance to Part C regulations.

Table. 3.2. Evidence Level IV Results.

Authors	Description
Coufal and Woods (2018)	A framework for EI SLPs was described using ASHA’s EI principles and The Interprofessional Education Collaborative model.
Crais (2011)	A description of best practices in screening, evaluation, assessment, and results interpretations are described within the SLP scope of practice.
Paul and Roth (2011)	Clinical application of the four guiding early intervention principles are discussed within the importance of service examples.
Wilcox and Woods (2011)	Use of participation-based outcomes enable SLPs to promote infants’ and toddlers’ communication growth in natural contexts.
Woods et al. (2011)	Stressed importance of strategies for collaborative consultations and joining into everyday activities/routines with caregiver.

Coufal and Woods (2018) provided a framework by illustrating the close relationship between EI SLPs’ four guiding principles and The Interprofessional Education Collaborative model (IPEC) due to EI SLPs’ practices within interprofessional teams. The Interprofessional Education Collaborative Model is grounded in definitions provided by the World Health Organization (as cited by Coufal & Woods, 2018). The Interprofessional Education

Collaborative Model's four core competencies are: (a) values/ethics for interprofessional practice, (b) roles/responsibilities, (c) interprofessional communication, and (d) teams and teamwork. The four core competencies are related to interprofessional collaborative team approaches, therefore Coufal and Woods (2018) attempted to define the role of EI SLPs within the context of the IPEC. The authors recommended that all Part-C EI providers, SLPs included, must embrace underlying principles of interprofessional collaboration to achieve the highest quality of service.

Crais (2011) emphasized the key definitions and an overview of recommended practices in EI screening, evaluation, assessment, and results interpretation that originated from the ASHA document, "Roles and Responsibilities of Speech-Language Pathologists in Early Intervention: Guidelines" (ASHA, 2008). Limited evidence from existing literature of expert clinical perspectives, best available research evidence, and family perspectives encouraged the, "use of more naturalistic and functional tools and strategies along with standardized measures; enhancing the roles of families and other caregivers in the process; and working collaboratively with all the partners who surround the child" (Crais, 2011, 353).

Paul and Roth (2011) used the EI SLPs' four guiding principles and clinical expertise to illustrate how to tailor services to families of infants and toddlers eligible for services. The authors also emphasized the importance of EI for infants and toddlers to develop effective communication.

Wilcox and Woods (2011) emphasized the use of participation-based outcomes to enhance infants' and toddlers' communication and language growth within their natural contexts. Clinical examples of an SLP and a caregiver are used to illustrate the implementation of participation-based outcomes. In addition, strategies for assessing participation in routines,

developing participation-based outcomes, and evaluating participation-based outcomes are described for the clinical application for EI SLPs.

Woods et al. (2011) described the shifting service-delivery model of SLPs working in EI capacities from traditional, direct client intervention to a collaborative consultative model. Described were the definitions of family-centered, implementation of family-centered services, evidence based intervention strategies, and consultation and coaching in natural environments. Woods et al. (2011) combined support from existing literature and clinical expertise to describe the importance of SLPs to use: (a) routines-based interventions, (b) appropriate adult-learning strategies to facilitate parent-implemented interventions, and (c) consultative model when providing intervention to the birth through two-years-old population.

Evidence Level III

One eligible publication with evidence level III provided a well-designed non-experimental study, shown in Table 3.3. The following study examined a pre-existing study for SLP coaching strategies for caregivers.

Table. 3.3. Evidence Level III Result.

Author(s)	Population/ Comparison	Intervention	Measure	Outcome
Brown and Woods (2016)	9 infants and toddlers (12-28 months) 9 parents 4 speech-language pathologists	KTTP for 24 sessions	Video Coding Samples: 10-minute video of an intervention session	Infants and toddlers were likely to use communication acts secondary to parent implementation of a specific intervention strategy.

KTTP=KidTalk—TaCTICS Project

Brown and Woods (2016) examined nine triadic pairs of infants and toddlers, parents, and SLPs for parent use of communication strategies with their child. There were nine parents and nine children, ages ranging from 12-28 months, and four SLPs participating in the study using a parent-implemented communication intervention model from a previous Brown and

Woods' (2015) study. Treatment included a blended intervention model of Enhanced Milieu Teaching and Family-Guided Routines-Based Intervention called KidTalk—TaCTICS Project (KTTP) (Brown & Woods, 2015). KidTalk—TaCTICS Project intervention includes an interventionist joining a family within the context of their normal routines in the home setting and/or in community outings. Interventionists and families will practice goals through routines, make environmental arrangements, respond to efforts of communicative attempts, and model targets for language and/or emergent language. Through observation and coaching, interventionists provide skills to families to enable communication outcomes. The researchers measured the objectives of their study by coding 103 10-minute video recordings from the triadic pairs for routine context, caregiver coaching, parent-implemented intervention strategies, and child communication. Routines within EI SLPs included play, caregiving, early literacy, chores, no routine, and transitions. Parents were likely to use strategies immediately following feedback, observation, and guided practice combined with coaching strategies. Further intervention approaches within the Brown and Woods (2016) are further defined in the Brown and Woods (2015) study. The coaching strategies defined by Brown and Woods (2015) were direct teaching, demonstration, guided practice with feedback, caregiver practice with feedback, problem solving and/or reflection, conversation, information sharing, observation, joint interaction, and modeling. Infants and toddlers responded to their parents when a parent-implemented strategy targeted single words. Preliminary data detailed direct applications for EI SLPs such as: (a) coaching strategies involving high levels of parent participation should be implemented, (b) coaching strategies should be implemented in a variety of contexts, and (c) emphasis should be placed on responsive strategies to promote communication.

Evidence Level Ib

Two eligible publications with evidence level Ib conducted a well-designed randomized controlled study, displayed in Table 3.4. Both studies provided supporting evidence for SLPs in EI based upon milieu communication teaching, similar to enhanced milieu teaching. Fey et al. (2006) used responsivity education/prelinguistic milieu teaching in their intervention approach and once participants had exceeded prelinguistic milieu teaching limits, milieu teaching was continued. Responsivity education/prelinguistic milieu teaching is an intervention for children with language delays who have very limited lexical inventories. In responsivity education/prelinguistic milieu teaching parents are directly taught specific gestures, vocalizations, and coordinated eye gaze behavior and parents' compliance to and re-coding their children's verbal and nonverbal acts. Milieu teaching, similar to prelinguistic milieu teaching, is an intervention for children with moderately delayed lexical inventories instead of limited lexical inventories. Milieu teaching is an intervention approach to teaching words and early grammatical constructions within naturalistic conditions and reinforcers selected by the child. Fey et al. (2013) used both Prelinguistic Milieu Teaching and Milieu Communication Teaching in their study.

Table. 3.4. Evidence Level Ib Results.

Author(s)	Population/Comparison	Intervention	Measure	Outcome
Fey et al. (2006)	24-33 months of age Treatment=25 No treatment=26	RE/PMT and MCT for 6 months	Video Coding Samples: CSBS, PCX	RE/PMT may produce medium-size effects on an infant or toddlers rate of intentional communication, 6 months post intervention.
Fey et al. (2013)	21.6-22.5 average months of age 5 sessions/week=33 1 session/week=31	MCT or RE/PMT for 9 months	Video Coding Samples: CSBS, PCFP, ECSS	Increased frequency of MCT sessions may yield improved outcomes dependent upon a child having high interest in objects.

RE/PMT=Responsivity Education/Prelinguistic Milieu Teaching, MCT=Milieu Communication Teaching, CSBS=Communication and Symbolic Behavior Scales, PCX= Parent-Child Interaction, PCFP=Parent-Child Free Play, ECSS=Examiner-Child Semi-Structured Play

Fey et al. (2006) evaluated the efficacy of a six-month course of responsivity education/prelinguistic milieu teaching. Infants and toddlers 24-33 months of age were randomly assigned to treatment (25 children) and no treatment (26 children) groups. Parents of children in the treatment group, on average, received 7.72 one-hour sessions of adapted *It Takes Two to Talk—The Hanen Program for Parents* (Pepper & Weitzman, 2004) with the goal of heightening their awareness of nonintentional and intentional communication behaviors, waiting for an opportunity for an interpretable behavior, following their child's lead, and giving appropriate consequences to their children's acts. Parents also read the book *You Make the Difference in Helping Your Child Learn* (Manolson, Ward, & Dodington, 1995). Children received prelinguistic milieu teaching or milieu teaching sessions in their homes and/or day care in 20-minute sessions four days per week conducted by an SLP with Certificate of Clinical Competence. The goals of Prelinguistic Milieu Teaching were to establish routines, increase frequency of nonverbal vocalizations, increase frequency and spontaneity of coordinated eye gaze, increase the frequency, spontaneity, and range of convention and nonconventional gestures, and combine components of intentional communication acts. Measures employed included the *Communication and Symbolic Behaviors Scales* (Wetherby & Prizant, 2002) which is an interaction with an unfamiliar adult examiner and Parent-Child Interaction which involved someone familiar with the child (i.e. parent/caregiver). Positive results from the study included children in the treatment group scoring higher on the *Communication and Symbolic Behaviors Scales* than the no treatment group. Both samples were coded for intentional communicative acts and analyzed. Clinical applications included medium-size effects on children's rate of intentional communication acts after six months of Responsivity Education/ Prelinguistic Milieu Teaching

intervention. Future research directions included studying the efforts to modify and intensify the Responsivity Education/Prelinguistic Milieu Teaching intervention approach.

Fey et al. (2013) designed a study to investigate nine-month treatment outcomes between high-frequency and low-frequency milieu communication teaching treatment of children with intellectual and communication delay. Sixty-four children, 18- to 27-month-olds, were randomly assigned to each group, 33 children for five times per week treatment and 31 children for one times per week treatment. Within the study, treatment included Responsivity Education, Prelinguistic Milieu Teaching, and Milieu Communication Teaching. These treatments were overseen by a qualified SLP and administered by trained paraprofessionals with Bachelor's level education. Parents of all participants read *It Takes Two to Talk* (Pepper & Weitzman, 2004), completed nine one-hour individual RE trainings with goals of enabling caregivers to increase responsiveness to their child's attempts to communicate, put nonverbal acts into words, expanding upon a child's topic, recast their child's utterance. In Prelinguistic Milieu Teaching, interventionists aimed to produce one teaching episode of a child's goal per minute. Children transitioned from Prelinguistic Milieu Teaching to Milieu Communication Teaching once five or more content words were spontaneously produced. Within Milieu Communication Teaching, interventionists worked collaboratively with supervisors and parents to increase frequency and/or complexity of the child's verbal communicative acts. Children's communication performance was evaluated using the *Communication and Symbolic Behavior Scales*, Parent-Child Free Play, and Examiner-Child Semi-Structured Play. Components of the *Communication and Symbolic Behavior Scales* of Temptations and Sharing Books was completed. The Parent-Child Free Play was completed by a participant and parent with a 10-minute free play with two sets of toys and a five-minute activity to look at board books of which there were three options. The Examiner-

Child Semi-Structured Play was completed by an examiner and a child with one of three sets of toys at one time. The measures were coded with regards to child communication behaviors of behavior regulators, declaratives, total intentional communication acts, and number of different words produced. The examiner used limited scaffolding during play. Clinical applications described that milieu communication teaching may result in moderate enhancement of outcomes if it is suited to a child with high interest in the objects.

General Features

Three data sets were reported in this systematic review. Of the eight eligible publications, only three studies included data sets with evidence level III or higher, the remaining six publications had evidence level IV without data included.

Participants

Participants characteristics are displayed in Table 3.5. The total number of infants and toddlers in reported data sets, shown in Table was 124 with age ranges from 12-33 months. The most common comorbidity was Down syndrome. The most prevalent race was White.

Table. 3.5. Participant Characteristics.

	Age	Gender*	Comorbidities	Race/Ethnicity*	Primary Language**
124 Children	12-33 mos.	F=30 M=43	DS=64 ASD=3 DD, unknown=20 Other=6	White=49 African=6 Hispanic=5	English=7 Luganda=1 Spanish=1

F=female, M=male, DS=Down syndrome, ASD=autism spectrum disorder, DD, unknown=developmental delay with unknown etiology, other=specific type of developmental disorder, *=not reported in one study, **=not reported in two studies

Interventions

Intervention approach characteristics are shown in Table 3.6. The interventions were provided by either parents and SLPs/interventionists, meaning parents and SLPs were both responsible for administering some aspect of intervention. Interventionists were supervised by

SLPs and held their Bachelor’s degree. All interventions were delivered at home and/or in the day-care setting. Interventions included educating parents and provided coaching opportunities. Two interventions involved SLPs providing direct therapy services to infants and toddlers and parent-implemented therapy (Fey et al. 2006; Fey et al., 2013), one intervention was parent-implemented only (Brown & Woods, 2016) and one intervention involved interventionists supervised by SLPs to provide direct therapy services as one of the components of the intervention approach (Fey et al., 2013).

Table. 3.6. Intervention Approach Characteristics.

Duration	Implemented By	Setting	Intervention Approach
6 months	Parents=1	home=1	MCT=2
9 months	Parents and SLPs/interventionist=2	home or day-care=2	KTTP=1

MCT=Milieu Communication Teaching, KTTP= KidTalk—TaCTICS Project

Measures

All studies used video-coding to determine communication outcomes. Two studies used components of the *Communication and Symbolic Behavior Scales* (Fey et al., 2006; Fey et al., 2013). Fey et al. (2006) used the Parent-Child Interaction sample. Fey et al. (2013) measured communication outcomes using the Parent-Child Free Play Sample and the Examiner-Child Semi-Structured Play sample.

Outcomes

Positive outcomes were noted in all studies. One study determined specific coaching strategies from SLPs (e.g., caregiver practice feedback, observation, and guided practice with feedback coaching strategies) produced the most positive outcomes in single-word communication (Brown & Woods, 2016). Within the *Communication and Symbolic Behavior Scales*, children demonstrated higher levels of communicative performance than the children in the no-treatment group (Fey et al., 2006). Comparing for frequency of treatment, children

demonstrated modest growth in language skills independent of a high-frequency treatment group or a low-frequency treatment group (Fey et al., 2013).

Chapter 4

DISCUSSION

The purposes of this systematic review was to determine the current supporting evidence base of EI by SLPs providing services to the birth through two-years-old population and to identify the quality of research available. In the U.S. infants and toddlers with designated speech and language delays are not routinely recorded by the Department of Education (2017). Not much is known about U.S. infants and toddlers with speech and language delays. However, existing literature supports positive benefits of speech-language therapy in the early intervention population, i.e. birth through five-years-old. The positive benefits have been documented; such as, literature from other countries with the birth through two-years old population (Perera et al., 2016 ; Buschmann et al., 2009) and in the U.S. with the two through five-years-old population (Roberts et al., 2014). The results of this systematic review demonstrated that there is a need for further research in this population. This information will be able to guide: (a) clinical practice of SLPs providing services to the birth through two-years old population and (b) future research directions.

The systematic review method allowed for a comprehensive account of peer-reviewed publications on the existing evidence base for EI SLPs. Currently, all eligible publications provide guidance for EI clinical practice by providing clinical expertise but offer a limited evidence base to support SLP practices working with infants and toddlers. The studies included in this review indicated preliminary positive communication outcomes for infants and toddlers served in early intervention.

Current Evidence Base

From the results of this systematic review, supporting evidence base for SLPs was eight publications seen in Appendix B. Clinical applications for embracing the EI service system are described from EI SLP experts within the field. Five clinical expert opinions give guidance to SLPs in the EI regarding using guiding principles, using routines-based intervention, and importance of collaboration between both parents and an interprofessional team. Three studies with evidence level III and higher described types of Enhanced Milieu Teaching with a combination of parent and/or parent and SLP implemented interventions. Altogether, these articles begin to detail the existing evidence base for EI SLPs, however more quality research is needed.

While adhering to ASHA's four guiding principles for EI, SLPs are urged to work within the context of infants' or toddlers' natural environments (Brown & Woods, 2016; Crais, 2011; Paul & Roth, 2011; Wilcox & Woods, 2011; Woods et al., 2011). These natural environments may include home-based services, preschool/daycare-based services, or another as defined by the IFSP team (Department of Education, 2017). Natural environments are extended to include the infants' or toddlers' daily communication partners (i.e. their family members) and daily routines (Department of Education, 2017; Brown & Woods, 2016; Crais, 2011; Woods et al., 2011). Overall, evidence level III or higher studies examined the effects of parent-implemented communication within specific natural environments (Brown & Woods, 2016; Fey et al., 2006; Fey et al., 2013).

Intervention Approach

Within the eligible studies, intervention approaches had general features of parent-education and enhanced milieu teaching. Brown and Woods (2016) used the KidTalk—TaCTICS

Project intervention approach combining Family Guided Routines Based Interventions (i.e. parent-education) and Enhanced Milieu Teaching during 24 sessions. Fey et al. (2006) and Fey et al. (2013) used responsivity education (i.e. parent-education) combined with prelinguistic milieu teaching or milieu teaching (i.e. type of Enhanced Milieu Teaching) during a six-month and nine-month duration respectively. Fey et al. (2006) and Fey et al. (2013) provided detailed intervention approaches with respect to parent education, intervention goals/objectives, and measures used to track communication development. Brown and Woods (2016) provided details about intervention goals/objects within coaching strategies used to enhance child's communication with their parent.

Intervention Outcomes

Preliminary supporting evidence for EI SLPs in infants' and toddlers' communication outcomes were set forth by three studies. All outcomes were measured using video-recording and coding for communicative intents of infants and toddlers. Different samples of communicative attempts were measured including components of the *Communication and Symbolic Behavior Scales* from two studies (Fey et al., 2006; Fey et al., 2011), Parent-Child Interaction (Fey et al., 2006), Examiner-Child Semi-Structured Play (Fey et al., 2013), Parent-Child Free Play (Fey et al., 2013), and one sample described as a 10-minute intervention video (Brown & Woods, 2016).

Positive outcomes were noted in two of three studies with clinician-directed samples for coding analysis (Fey et al., 2006; Fey et al., 2011). Results from parent-implemented (with coaching from SLP) samples demonstrated positive communication outcomes in one study (Brown & Woods, 2016). Preliminary supporting evidence suggests SLPs directly and indirectly assist: (a) parents and (b) infants and toddlers. SLPs support parents' development of awareness and responsiveness to their child's communication attempts. Infants and toddlers are then

indirectly supported by SLPs when their parents receive coaching support and direct support when the SLP provides direct services to the infant and toddler to produce communication outcomes.

Limitations

Some limitations should be observed in this systematic review. First, the predominant limitation is the lack of supporting evidence base for EI SLPs working with the birth through two-years-old population. Second, attempts to conduct an exhaustive search may have been limited due to search strategies employed, databases selected, and search restrictions of peer-reviewed sources may have excluded some publications. Third, use of ASHA's Evidence Based Guidelines for qualifying the level of support and quality of peer-reviewed publications excluding the support from qualified experts in the field. This specific system for evidence levels only allows for certain kinds of research to be considered to apply to evidence based interventions.

Future Directions

This systematic review demonstrates there is great opportunity to continue building a research base supporting SLPs' intervention in the birth through two-years-old population. Currently, evidence level III and higher research has preliminarily indicated positive benefits of SLPs within EI. The most reported intervention type was associated with Enhanced Milieu Teaching and parent-education components. Future research directions may include a few areas. First, using well-defined intervention approaches detailing parent-education and specific goals/objectives/strategies used in approach type. Second, additional evidence level III and higher research studies contributing to the communication outcomes of infants and toddlers from

SLPs to guide clinical practice. Third, conducting evidence-level III and higher studies with consistent tools used to measure infants and toddlers' communicative outcomes.

REFERENCES

*=indicates publications included in systematic review

- American Speech, Language, and Hearing Association. (2008). Roles and Responsibilities of Speech-Language Pathologists in Early Intervention: Guidelines. Retrieved from: <https://www.asha.org/policy/GL2008-00293/>
- American Speech, Language, and Hearing Association. (n.d.). *Steps in the Process of Evidence-Based Practice. Step 3: Assessing the Evidence*. Retrieved from: <https://www.asha.org/Research/EBP/Assessing-the-Evidence/>
- Adams, R. C., Tapia, C., & The Council on Children with Disabilities. (2013). Early intervention, IDEA Part C services, and the medical home: Collaboration for best practice and best outcomes. *Pediatrics*, 132(4). doi: 10.1542/peds.2013-2305
- Bailey, D. J., Eatchel, K., & Wambaugh, J. (2015). Sound production treatment: Synthesis and quantification of outcomes. *American Journal of Speech-Language Pathology*, 24, S798-S814. doi: 10.1044/2015_AJSLP-14-0127
- Ballard, K.R., Wambaugh, J. L. Duffy, J.R., Layfield, C., Maas, E., Mauszycki, S., & McNeil, M.R. (2015). Treatment for acquired apraxia of speech: A systematic review of intervention research between 2004 and 2012. *American Journal of Speech-Language Pathology*, 24, 316-337. doi: 10.1044/2015_AJSLP-14-0118
- Baxter, S., Johnson, M., Blank, L., Cantrell, A., Brumfitt, S., Enderby, P., & Goyder, E. (2016). Non-pharmacological treatments for stuttering in children and adults: A systematic review and evaluation of clinical effectiveness, and exploration of barriers to successful outcomes. *Health Technology Assessment*, 20(2), v-302. doi: 10.3310/hta2002
- Brady, M.C., Kelly, H., Godwin, J., Enderby, P., & Campbell, P. (2016). Speech and language therapy for aphasia following stroke. *Cochrane Database of Systematic Reviews* 2016, 6, doi: 10.1002/14651858.CD000425.pub4
- Brown, J.A., & Woods, J.J. (2015). Effects of a triadic parent-implemented home-based communication intervention for toddlers. *Journal of Early Intervention for Toddlers*, 37(1), 44-68. doi: 10.1177/1053815115589350
- *Brown, J.A., & Woods, J.J. (2016). Parent-implemented communication intervention: Sequential analysis of triadic relationships. *Topics in Early Childhood Special Education*, 36(2), 115-124. doi: 10.1177/0271121416628200
- Buschmann, A., Joos, B., Rupp, A., Feldhusen, F., Pietz, J., & Philippi, H. (2009). Parent based language intervention for 2-year-old children with specific expressive language delay: A randomized controlled trial. *Disease in Childhood*, 94(2), 110-116. doi:10.1136/adc.2008.141572

- Center for Disease Control and Prevention (2018). *What is “Early Intervention”?*. Retrieved from: www.cdc.gov/ncbddd/actearly/parents/states.html
- *Coufal, K.L., & Woods, J.J. (2018). Interprofessional collaborative practice in early intervention. *Pediatric Clinics of North America*, *65*, 143-55. doi:10.1016/j.pcl.2017.08.027
- *Crais, E.R. (2011). Testing and beyond: Strategies and tools for evaluating and assessing infants and toddlers. *Language, Speech, and Hearing Services in Schools*, *42*, 341-364. doi:10.1044/0161-1461(2010/09-0061)
- Desjardins, M., Halstead, L., Cooke, M., & Bonilha, H.S., (2016). A systematic review of voice therapy: What “effectiveness” really implies. *Journal of Voice*, *31*(3), 392.e13-392.e32. doi: 10.1016/j.jvoice.2016.10.002
- Epley, P. H., Summers, J.A., & Turnbull, A. P. (2011). Family outcomes of early intervention: Families’ perceptions of need, services, and outcomes. *Journal of Early Intervention*, *33*(3), 201-219. doi: 10.1177/1053815111425929
- Faroqi-Shah, Y. Frymark, T., Mullen, R., & Wang, B. (2010). Effect of treatment for bilingual individuals with aphasia: A systematic review of the evidence. *Journal of Neurolinguistics*, *23* (4), 319-341. doi: 10.1016/j.jneuroling.2010.01.002
- *Fey, M.E., Warren, S.F., Brady, N., Finestack, L.H., Bredin-Oja, S.L., Fairchild, M., Sokol, S., & Yoder, P.J. (2006). Early effects of responsivity education/prelinguistic milieu teaching for children with developmental delays and their parents. *Journal of Speech, Language, and Hearing Research*, *49*, 526-547. doi: 1092-4388/06/4903-0526
- *Fey, M.E., Yoder, P.J., Warren, S.F., & Bredin-Oja, S.L. (2013). Is more better? Milieu communication teaching in toddlers with intellectual disabilities. *Journal of Speech, Language, and Hearing Research*, *56*, 679-693. doi: 10.1044/1092-4388(2012/12-0061)
- Individuals with Disabilities Education Act, 20 U.S.C. § 1400 (2004)
- Lorenc, T., Rodgers, M., Melton, H., Rees, R., Wright, K., & Sowden, A. (2017). Support for adults with autism spectrum disorder without intellectual impairment: Systematic review. *Autism*. doi: 10.1177/136236131798939
- Manolson, A., Ward, B., & Dodington, N. (1995) *You Make the Difference in Helping Your Child Learn*. Toronto, Ontario, Canada: The Hanen Centre.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., & The PRISMA Group. (2009). Preferred reporting items for systematic review and meta-analyses: The PRISMA statement. *PLoS Med*, *6*(7). Doi: 10.1371/journal.pmed1000097

- Nye, C., Vanryckeghem, M., Schwarts, J.B., Herder, C., Turner, H.M., & Howard, C. (2012). Behavioral stuttering interventions for children and adolescents: A systematic review and meta-analysis. *Journal of Speech, Language, and Hearing Research, 56*, 921-932. doi: 10.1044/1092-4388(2012/12-0036)
- Oberklaid, F., Baird, G., Blair, M., Melhuish, E., & Hall, D. (2013) Children's health and development: Approaches to early identification and intervention. *Archives of Disease in Childhood, 98*, 1008-1011. doi: 10.1136/archdischild-2013-304091
- *Paul, D., & Roth, F.P. (2011a). Guiding principles and clinical applications for speech-language pathology practice in early intervention. *Language, Speech, and Hearing Services in Schools, 42*, 320-330. doi: 10.1044/0161-1461(2010/09-0079)
- Pepper, J., & Weitzman, E. (2004). *It Takes Two to Talk: A practical guide for parents of children with language delays*. Toronto, Ontario, Canada: The Hanen Centre.
- Perera, H. Jeewandara, K.C., Seneviratne, S., & Guruge, C. (2016). Outcome of home-based early intervention for autism in Sri Lanka: Follow-up of a cohort and comparison with a nonintervention group. *BioMed Research International, 2016*, 1-6. doi:10.1155/2016/3284087
- Roberts, M.Y., Kaiser, A.P., Wolfe, C.E., Bryant, J.D., & Spidalieri, A.M. (2014). Effects of the teach-model-coach-review instructional approach on caregiver use of language support strategies and children's expressive language skills. *Journal of Speech, Language, and Hearing Research, 57*, 1851-1869. doi: 10.1044/2014_JSLHR-L-13-0113
- Rosenberg, S.A., Zhang, D., & Robinson, C.C. (2008). Prevalence of developmental delays and participation in early intervention services for young children. *American Academy of Pediatrics, 121*(6), e1503-e1509. doi:10.1542/peds.2007-1680
- Schmitt, M.B., Justice, L.M., & Logan, J.A.R. (2017). Intensity of language treatment: Contribution to children's language outcomes. *International Journal of Language & Communication Disorders, 52*(2), 155-167. doi: 10.1111/1460-6984.12254
- Trohanis, P. (2008). Progress in providing services to young children with special needs and their families: An overview to an update on the implementation of the Individuals With Disabilities Education Act (IDEA). *Journal of Early Intervention, 30* (2), 140-151. doi: 10.1177/1053815107312050
- U.S. Department of Education. (2017). The 39th Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act, 2017.
- Wetherby, A.M., & Prizant, B.M. (2002). *Communication and Symbolic Behavior Scales—Developmental Profile*. Baltimore, MD: Paul H. Brookes.

*Wilcox, M.J., & Woods, J. (2011). Participation as a basis for developing early intervention outcomes. *Language Speech and Hearing Services in School*, 42(3), 365-278 doi: 10.1044/0161-1461(2011/10-0014)

Wolstencroft, J., Robinson, L., Srinivasan, R., Kerry, E., Mandy, W., & Skuse, D. (2018). A systematic review of group social skills interventions, and meta-analysis of outcomes, for children with high functioning ASD. *Journal of Autism and Developmental Disorders*. doi: 10.1007/s10803-018-3485-1

*Woods, J.J., Wilcox, M.J., Friedman, M., & Murch, T. (2011). Collaborative consultation in natural environments: Strategies to Enhance family-centered supports and services. *Language, Speech, and Hearing Services in Schools*, 42, 379-392. doi: 10.1044/0161-1461(2011/10-0016)

Yiu, E.M.-L., Lo, M.C.M., & Barrett, E.A. (2016). A systematic review of resonant voice therapy. *International Journal of Speech-Language Pathology*, 19(1), 17-29. doi: 10.1080/17549507.2016.1226953

APPENDIX A: METHODS

Figure A.1. PRISMA, Search Outcomes.

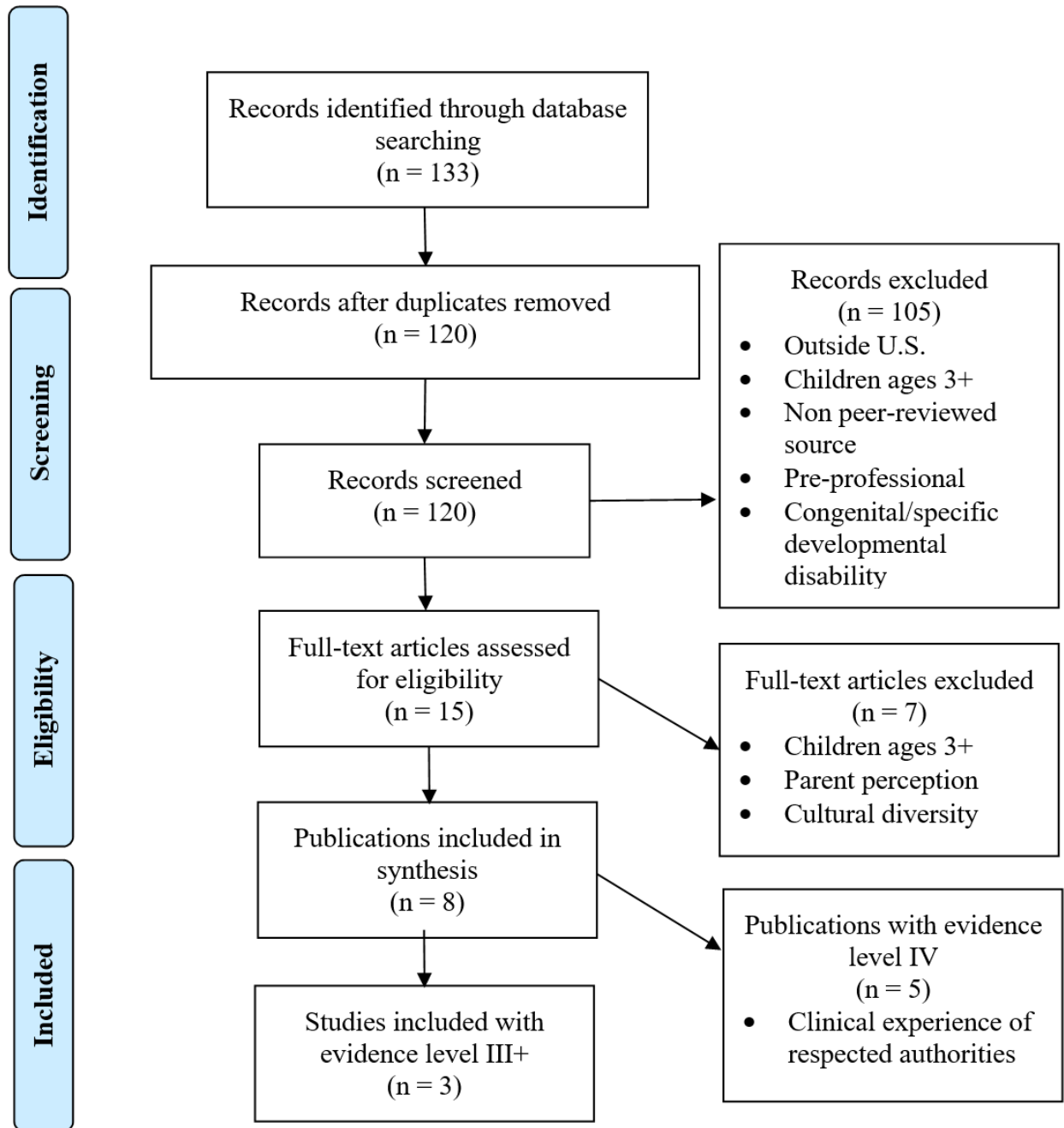


Table. A.1. ASHA's Levels of Evidence.

Level	Description
Ia	Well-designed meta-analysis of >1 randomized control trial
Ib	Well-designed randomized controlled study
IIa	Well-designed controlled study without randomization
IIb	Well-designed quasi-experimental study
III	Well-designed non-experimental studies, i.e., correlation and case studies
IV	Expert committee report, consensus conference, clinical experience of respected authorities

APPENDIX B: RESULTS

Table. B.1. All Eligible Publications.

Author(s)	Evidence Level	Methods	Participants	Measures	Results
Brown and Woods (2016)	III	Well-designed non-experimental study of KTTP	9 infants and toddlers (12-28 months) 9 parents 4 speech-language pathologists	Video Coding Sample: 10-minute video of an intervention period	Infants and toddlers were likely to use communication acts secondary to parent implementation of a specific intervention strategy.
Coufal and Woods (2018)	IV	Clinical expertise	----	----	A framework for EI SLPs was described using ASHA's EI principles and The Interprofessional Education Collaborative model.
Crais (2011)	IV	Clinical expertise	----	----	A description of best practices in screening, evaluation, assessment, and results interpretations are described within the SLP scope of practice.
Fey et al. (2006)	Ib	Randomized groups: Treatment Group (RE/PMT or MCT)=25 No Treatment Group=26	51 children, ages 24-33 months	Video Coding Samples: CSBS PCX	RE/PMT may produce medium-size effects on an infant or toddlers rate of intentional communication, 6 months post intervention.
Fey et al. (2013)	Ib	Randomized groups of RE/PMT and MCT: 5x/week MCT=33 1x/week MCT=31	63 children, average ages: 21.6-22.5 months of age	Video Coding Samples: CSBS PCFP ECSS	Increased frequency of MCT sessions may yield improved outcomes dependent upon a child having high interest in objects.
Paul and Roth (2011)	IV	Clinical expertise	----	----	Clinical application of the four guiding EI principles are discussed within the

Table. B.1. Continued.

					importance of service provision.
Wilcox and Woods (2011)	IV	Clinical expertise	----	----	Use of participation-based outcomes should enable SLPs to promote infants' and toddlers' communication growth in natural context.
Woods et al. (2011)	IV	Clinical expertise	----	----	Stressed importance of strategies for collaborative consultations and joining into everyday activities/routines with caregiver.

KTTP=KidTalk—TaCTICS Project, RE/PMT=Responsivity Education/Prelinguistic Milieu Teaching, MCT=Milieu Communication Teaching, CSBS=Communication and Symbolic Behavior Scales, PCX=Parent-Child Interaction, PCFP=Parent-Child Free-Play, ECSS=Examiner-Child Semi-Structured Play

BIOGRAPHY OF THE AUTHOR

Margaret M. Pierce was born in Bangor, Maine on September 2, 1994. She was raised in Hermon, Maine with her mother and father, Penny and John, and older brother, Lucas. She graduated from Hermon High School in 2012. She graduated from the University of Maine in 2016 with a Bachelor's degree in Communication Sciences and Disorders (CSD). She was active in the Sophomore Eagles, Alternative Breaks, Delta Zeta National Sorority-Alpha Upsilon, All Maine Women, and the National Student Speech, Language, Hearing Association (NSSLHA)-University of Maine. She was involved nationally within the CSD profession by engaging in the American Speech, Language, and Hearing Association's (ASHA) Minority Student Leadership Program and presenting research at ASHA's Conventions. In the Summer of 2016 she began her graduate studies in CSD. She pursued engagement in NSSLHA as the Vice President for Student State Officers (SLP), ASHA's SLP Advisory Council, the Maine Speech, Language, and Hearing Association's Member Development Committee, and trainee in the Leadership Education in Neurodevelopmental Disabilities Program. She gained speech-language pathology experiences at the Conley Speech, Language, and Hearing Center, Special Olympics: Healthy Hearing, Brewer Community School, and Maine Center for Integrated Rehab. She worked closely with her mentor, Dr. Nancy Hall, Ph.D., CCC-SLP, as a graduate research and teaching assistant working on team-based projects, presenting at ASHA's Convention, and assisting with two CSD undergraduate courses: (a) Clinical Observation and (b) Senior Capstone: The Research Process. After receiving her degree, Margaret will be pursuing a Clinical Fellowship in Speech-Language Pathology to continue making effective communication, a human right, accessible and achievable to all. Margaret is a candidate for the Master of Arts degree in Communication Sciences and Disorders from the University of Maine in May 2018.