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UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

PROVIDING ORIENTATION AND MOBILITY SUPPORT
VIA IN-PERSON AND TELEINTERVENTION
HOME VISITS FOR CHILDREN WITH
VISUAL IMPAIRMENT IN
EARLY INTERVENTION

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy

Hong Bich Phangia Dewald

College of Education and Behavioral Sciences
School of Special Education

August 2019

ABSTRACT

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The purpose of this study was to show that teleintervention can be used to provide early intervention (EI) services, specifically orientation and mobility (O&M) support services, to very young children and their families in the sensory impairment field of blindness and visual impairment (BVI). Teleintervention has been shown to be an effective method of providing EI services to very young children and their families in the sensory impairment field of deaf and hard of hearing (DHH). However, there are no previous empirical studies that address the use of teleintervention in providing any specialized instruction/services to young children with BVI and their families in the EI system. A qualitative investigation using a multiple case approach was used to explore O&M support services when they were delivered through in-person consultations and via teleintervention for three families ($n = 3$) of children with BVI in EI.

The data for this study were collected through multiple sources and analyzed using multiple methods. Data collected from interviews, field notes, video-recorded sessions of home visits, and documents were analyzed to obtain the results for this study. The results of the data analyses revealed that participants perceived O&M support services in person, as they were currently being provided in EI, as the best way to help

them and their children learn skills and concepts related to O&M, with teleintervention being a good supplement or alternative if needed. Additionally, home visiting practices were observed to be similar when O&M support services were delivered in person or via teleintervention. The results of the study also found that the costs of in-person O&M support home visits were higher than the costs for teleintervention O&M support home visits.

Conclusions drawn from the study suggest that teleintervention has the potential to be a successful and viable way to supplement, not replace, in-person O&M support home visits with families of children with BVI, particularly to increase the availability and frequency of services. However, guidelines are needed to help direct families and providers in successfully implementing teleintervention home visit sessions to accommodate the dynamic aspects of O&M support visits, such as travel out in the community. Concerns associated with maintaining the safety of the children and their caregivers while engaging in teleintervention O&M support visits must be addressed as this model of service delivery is evaluated further.

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TABLE OF CONTENTS

CHAPTER	
I.	INTRODUCTION 1
	Orientation and Mobility for Gabriel
	Statement of the Problem
	Tele-Orientaion and Mobility for Gabriel
	Rationale for the Study
	Purpose of the Study
	Research Questions
	Summary
	Definition of Key Terms
II.	REVIEW OF LITERATURE 18
	Individuals with Disabilities Education Act
	Early Intervention
	Orientation and Mobility Support for Young Children with Blindness and Visual Impairment
	The World of “Tele”
	Summary
III.	METHODOLOGY 77
	Research Design
	Research Methods
	Data Analysis
	Research Trustworthiness
	Summary
IV.	ANALYSIS 113
	The Early Intervention Orientation and Mobility Explorers
	Summary of the Within-Case Analysis
	Results for Research Questions
	Participant Perceptions of Orientation and Mobility Support Services Delivered via In-Person and Teleintervention Service Delivery Models
	Home Visiting Practices
	Cost of Providing Orientation and Mobility Support Services in Early Intervention
	Summary

TABLE OF CONTENTS (CONTINUED)

CHAPTER

V.	CONCLUSIONS AND RECOMMENDATIONS	189
	Discussion of the Results	
	Conclusions	
	Implications for Practice	
	Limitations	
	Recommendations for Future Research	
	Summary	
	REFERENCES	206
APPENDIX		
A.	Informed Consent	220
B.	Child and Family Demographics Form	231
C.	EI-TSVI Demographics Form	235
D.	Interview Questions for Caregivers	238
E.	EI-TSVI Interview Questions	240
F.	Reflective Journal Questions for O&M Specialist	242
G.	Cost of Providing Orientation and Mobility Support Services Form	244

LIST OF TABLES

TABLE

1. Orientation and mobility services as defined by the Individuals with Disabilities Education Act	27
2. Average Cost Savings for Providing EI Services Using Virtual Home Visits to 18 Families in September 2010	65
3. A Description of the HOVRS-A+ Scales	97
4. Cronbach's Alpha Values for HOVR-A+ Scales	99
5. Means (Standard Deviations) for Home Visit Outcome Measures	181
6. Cost of Providing Early Intervention O&M Support Services in Person	184
7. Cost of Providing Early Intervention O&M Support Services via Teleintervention	186

LIST OF FIGURES

FIGURE

1. A description of the expanded core curriculum	29
2. Theme map for perceptions of O&M support services delivered in-person and via teleintervention for the within-case analysis	161
3. Theme map for perceptions of O&M support services delivered in-person and via teleintervention for the cross-case analysis.....	179
4. Monthly interobserver agreement levels for home visiting practices	182

CHAPTER I

INTRODUCTION

The first three years of children's lives are prime for growth, development, and learning. During this time frame, young children learn the most about themselves and the world around them through movement, exploration, and interactions with others. "The ability to understand, interact with, and move within one's physical and spatial environment is a fundamental developmental skill" (Hazekamp & Huebner, 1989, p. 23) that impacts learning in all areas of growth (e.g., physical, cognitive, communication, social/emotional, and self-help). As children begin to attain highly anticipated milestones, such as grasping, reaching, crawling, and walking, their ability to understand, interact with, and move within their physical and spatial environment expands. However, for infants and toddlers who have blindness or visual impairment, differences in development, especially in the area of motor development, have been shown to adversely affect how these children initiate contact with their surrounding environments and interact with the people around them (Adelson & Fraiberg, 1974; Brambring, 2006; Celeste, 2002; Ferrell, 1998; Ferrell et al., 1990; Norris, Spaulding, & Brodie, 1957; Troster & Brambring, 1993; Troster, Hecker, & Brambring, 1994).

The impact that sensory impairments (e.g., blindness/visual impairment (BVI), deafness/hard of hearing (DHH), deafblindness) are likely to have on early development in young children with these exceptionalities is consequential enough to be recognized by the Individuals with Disabilities Education Act (IDEA), the law governing the education

of children with exceptionalities. Broadly, young children aged birth to three years old who have been determined to have exceptionalities, delays in development, or potential for experiencing delays in development are entitled to receive early intervention (EI) services under the Part C system of IDEA to help support their growth and development. The purpose of EI is to help mitigate the effects that exceptionalities or delays may have on children's growth and development. Services provided under Part C of IDEA are family-based and must be provided by qualified personnel in the child's/family's natural environment (i.e., home and/or community). Under IDEA, a diagnosis of sensory impairment may determine categorical eligibility for services in Part C with or without evidence for delays in development (IDEA 2004, §632(5)(A)).

In the case of BVI, IDEA (2004) defines visual impairment as “an impairment in vision that, even with correction, adversely affects a child's educational performance” (34 C.F.R. Sec. 300.8(c)(13)). BVI, perhaps more than any other exceptionality, has the potential to influence how children learn (Ferrell, 2000). Whether it does, and to what degree, depends on parent/caregiver knowledge and understanding of the potential impact of BVI, parent/caregiver understanding of how children with BVI learn, and professional/educator ability to support families in their daily routines (Ferrell, 2000, 2011).

Although young children with BVI are expected to grow and learn as most “typically” developing children do, research has shown that young children with BVI consistently experience developmental differences that place them behind their typically developing peers. Among these differences, the attainment of skills related to early gross motor development (EGMD) is a recurrent area of concern. Research on EGMD in

young children with BVI repeatedly shows that children with severely impaired vision tend to achieve developmental motor milestones later than their peers who are sighted (Adelson & Fraiberg, 1974; Brambring, 2006; Celeste, 2002; Ferrell, 1998; Ferrell et al., 1990; Norris et al., 1957; Troster & Brambring, 1993; Troster et al., 1994).

The primary contributor to delays in self-initiated locomotion and mobility in young children with BVI is the lack of vision. Vision is a very strong motivator for children to move about and explore their immediate surroundings (Ferrell, 2000). Child experiences, child interactions with the environment, and parent-child interactions are also identified as other contributors to these delays. Since movement and exploration are primary ways in which young children learn about and understand the world around them, concerns related to appropriate EGMD could have a negative impact on how young children with BVI experience the world around them. An impairment in vision can make learning and acquiring a vast array of life and educational skills challenging for children with BVI. Environmental adaptations and instruction in highly specialized skills, such as braille and orientation and mobility, are often required to help these children access the world around them.

Since movement and exploration are primary ways in which young children learn about and understand the world around them, it is concerning that research has shown that children with BVI consistently achieve developmental motor milestones later than their peers who are sighted. The literature on gross motor development in infants and toddlers with BVI repeatedly shows that these children acquire and master gross motor skills at a different rate, age, and sequence than the norms set for their peers who are not BVI (Adelson & Fraiberg, 1974; Bak, 2000; Brambring, 2006; Celeste, 2002; Ferrell,

1998; Ferrell et al., 1990; Norris et al., 1957; Troster & Brambring, 1993; Troster et al., 1994). Delays in the development of early gross motor skills, particularly those related to self-initiated movement (e.g., reaching, rolling, creeping, walking, etc.), can have a negative impact on how young children with BVI learn about and experience the world around them. Orientation and mobility (O&M) support, a BVI-specific educational service, has the potential to facilitate gross motor development in infants and toddlers with BVI and empower families to help their children discover and understand the world around them. O&M support provides individuals who are BVI with training to develop the skills necessary to travel through their homes and communities safely and independently. For young children, learning and mastering a combination of orientation skills and mobility skills enables them to navigate and manage their travel environments confidently, safely, and independently. Additionally, the quality of gross motor skill development during the early years of childhood can have a significant impact on the development and demonstration of skills related to O&M as children with BVI grow older. Poor and/or underdeveloped gross motor skills can have detrimental effects on a child's ability to independently execute appropriate street crossings, demonstrate proper cane technique, manage changes in elevation (e.g., stairs and curbs), and travel for extended periods of time (Rosen, 2010).

Educational services that are specific to educating individuals with BVI are often employed to address the instructional needs of children with BVI. However, many providers in the EI system have little to no training in how visual impairment impacts learning and how children with BVI experience the world around them. Orientation and mobility (O&M) specialists are educators/professionals with training and experience in

providing BVI-specific educational services for children with BVI. In addition to educating children with BVI, O&M specialists also help caregivers and other educators understand the nature of a child's visual condition and how it impacts the child's development, learning, interactions with others, and access to the environment. O&M specialists provide O&M training, which teaches individuals with BVI the skills that are necessary to travel through their surrounding environment safely and independently. Some individuals with BVI may require orientation and mobility training to help them learn how to use a long white cane to travel safely and independently. The acquisition and mastery of BVI-specific skills that children with BVI need to develop, learn, and access their environments alongside their peers who are "typically" developing does not begin when they start preschool or kindergarten. The foundation upon which these skills are built is set during the early years of infancy and toddlerhood. Teachers of students with visual impairments (TVIs) and certified O&M specialists (COMSs) can work alongside providers in the EI system to assist families in creating environments that are conducive to learning for infants and toddlers with BVI.

Since young children develop and learn within the context of their families and routines (Bruder, 2010), the integral role families play in the development of young children with BVI cannot be stressed enough. The opportunities and encouragement families provide infants and toddlers with BVI are essential to their development of skills related to early gross motor movement patterns, and, eventually, O&M. The familiarity of family members, family routines, and the home environment often provide young children with BVI with their first opportunities to securely understand that they can produce self-initiated movement and use these movements to accomplish a variety of

tasks, including moving out to explore and interact with the environment around them, with no or impaired vision. The variability of family activities outside the home provide young children with BVI with opportunities to experience new environments and to encounter objects and situations that may be novel and unfamiliar to them, all within the security of their family unit. Through familiar and unfamiliar experiences with their families, children with BVI are afforded opportunities to construct knowledge and understanding of the world around them through movement and exploration.

Orientation and Mobility for Gabriel

Gabriel was almost 18 months old when I first met him. He was diagnosed with bilateral optic nerve hypoplasia, a condition where the optic nerves in both of his eyes were underdeveloped. From what Gabriel's family and ophthalmologist could tell, he did not seem to have any usable vision, perhaps light perception at most if he did have some functional use of his vision. Since Gabriel had severe visual impairment, he and his family started receiving early intervention (EI) services from a teacher of students with visual impairments who specializes in early intervention (EI-TSVI) when he was three months old to help support his growth and development.

I remember the first time I met Gabriel's EI-TSVI, JoAnn. I was starting the first semester of my doctoral program when I met JoAnn, a fellow doctoral student who had started her program the year before. We were in Washington DC for a conference and had been assigned to be roommates by our doctoral advisor. JoAnn and I had never met until this point in time so naturally, we started the process of getting to know each other and ended up having a long discussion about why orientation and mobility (O&M) support services were important for infants and toddlers with visual impairment (VI).

JoAnn had been working as an EI-TSVI for over 20 years and was familiar with O&M services for children with visual impairment, but in her experience, young children with VI were not considered for O&M services until they were close to transitioning to or in preschool. At the organization in which she was employed, O&M services were available for families of children with VI who were enrolled in its center-based programs, which included EI programs and preschool, but were not as readily available for families of children VI who were receiving outreach EI services across the state. As an O&M specialist who is passionate about young children with VI receiving O&M support services as soon as possible and who is a firm believer in EI, it took me about three hours to convince JoAnn why it was important for young children with VI to be evaluated for and to receive O&M support services long before they transition to preschool. My message must have struck a chord with JoAnn, because a few years later, JoAnn asked me if I would be willing to participate in an ethnographic study with one of her families who had a child with VI who needed O&M support services, but was not receiving them due to the availability of O&M specialists at the organization with whom she was employed.

JoAnn was frustrated. She had submitted an O&M referral for Gabriel many months ago, but since there were only two O&M specialists working for the organization with which she was employed, it was going to take time for one of them to respond to her request for referral. JoAnn knew Gabriel needed some level of O&M support because Gabriel was 18 months old and was not moving about independently to explore his home environment. Gabriel was able to sit on his own if he was placed in that position and he was content to lie on his back to play with objects within arm's reach, but he was not

moving out in space on his own (e.g., rolling, scooting, crawling, or walking) to locate people or objects of interest or explore his immediate surrounding environment. JoAnn had consulted several times with the physical therapist who was providing EI services to Gabriel about Gabriel's delay in independent motor movement skills, but the physical therapist told her that there was nothing motorically that should be inhibiting his ability to move out into space on his own. JoAnn concluded that the severity of Gabriel's visual impairment was most likely impacting his ability to independently move out and explore the world around him – it was time for him to be evaluated for O&M support services.

Statement of the Problem

O&M support during the early years of life has great potential to facilitate gross motor development in infants and toddlers with BVI and to empower families to help their children discover and understand the world around them. However, there is a critical shortage of qualified professionals in the field of BVI to work with this population of children and their families nationwide, and this shortage has been historically persistent (American Association for Employment in Education, 2002, 2008, 2010, 2016, 2017). The number of professionals currently working in the field to provide services for children with BVI has not been well documented. Very few studies have been conducted to specifically gather statistics on the number of O&M specialists currently working in the field of BVI and none have been conducted to survey the number of O&M specialists currently providing support services to children and families in EI. Almost two decades ago, a study by Kirchner and Diament (1999a, 1999b) estimated that there were approximately 2,000 full-time O&M specialists working in the field in 1998 to provide services to an estimated 93,600 children with BVI, aged birth to

21 years, with need for BVI-specific educational services nationwide. Based on these data estimates, the estimated caseload ratio for each O&M specialist to fulfill the O&M support needs of these children is one instructor for every 72 students (1:72) – an almost impossible, unreasonable, and unsustainable model of service delivery. A panel of experts in the field of BVI collaborated with Kirchner and Diamant to calculate an optimal caseload ratio for O&M specialists to reasonably provide consistent, quality services to this group of children, and a consensus was reached at a ratio of one instructor for every 8 students (1:8). Based on this optimal ratio for instructor caseloads, an additional 10,000 full-time O&M specialists were needed then to provide consistent, quality services to this group of children with BVI. No evidence currently exists to refute that the number of O&M specialists needed is any less today. Even though the authors of the study acknowledged that these estimates were most likely underestimates and derived from a less than optimal sample of data, it is clear that many children with BVI have limited access, or even no access, to O&M services provided by a qualified instructor.

Young children with BVI and their families in the EI system are particularly vulnerable to this nationwide shortage of O&M specialists. Historically, O&M services have been focused on training for adults and school-aged children. Although the movement towards providing O&M support to children and families in the EI system has been gaining momentum within the last 10 years, instructional priorities for adults and school-aged children with BVI still perpetuate limited access to O&M support for very young children with BVI and their families. Increasing access to O&M support with qualified personnel requires creativity and innovation in service delivery models. Investigating alternative service delivery methods, such as teleintervention, has the

potential to increase the availability of O&M support for very young children with BVI and their families in EI programs.

“Teleintervention” is a term used to describe distance-based EI services for children aged birth through 3 years old who have been identified as having exceptionalities, delays in development, or potential for experiencing delays in development. The term “teleintervention” captures the educational focus of EI services provided by a variety of health and non-health professionals (Cohn & Cason, 2012). Teleintervention involves using telecommunication technology (e.g., computers; the internet; and synchronous videoconferencing applications, such as Skype™, FaceTime™, or Zoom™) to deliver professional services to clients at a distance (American Speech-Language-Hearing Association [ASHA], 2019). Research in telepractice, the overarching domain of distance-based EI services under which teleintervention exists, has shown that caregivers and practitioners found technology-based EI educational services at least as effective as in-person consultations (Behl et al., 2017; Kelso, Fiechtl, Olsen, & Rule, 2009; Olsen, Fiechtl, & Rule, 2012).

Although there is a successful history of using technology to provide healthcare, therapeutic assessment, and therapeutic intervention (Behl, Houston, Guthrie, & Guthrie, 2010; Boisvert, Lang, Andrianopoulos, & Boscardin, 2010), there are no previous empirical studies that address the use of teleintervention in providing any specialized instruction/services to young children with BVI and their families in the EI system. Additionally, other areas of EI (e.g., the fields of DHH and speech and language pathology) have used teleintervention to successfully provide services to families with limited personnel in rural and remote areas (Kelso et al., 2009; Olsen et al., 2012). With

other fields paving the way to address concerns with personnel shortages, access to EI services in rural and remote areas, and cost efficiency with teleintervention, it is perplexing why the field of BVI in the United States has not yet utilized this service delivery model to address its own concerns with personnel shortages, access to EI services in rural and remote areas, and cost efficiency.

As the technology for teleintervention becomes more available and reliable, and the use of teleintervention becomes a more viable way to provide educational services in the EI system, additional research is needed to determine the potential that teleintervention has for increasing the availability of O&M support services for very young children with BVI and their families in EI programs.

Tele-Orientation and Mobility for Gabriel

I was more than willing to work with JoAnn on helping to introduce Gabriel and his family to O&M support services and to provide them with information and services as necessary until the O&M specialist from JoAnn's employing organization could come in and see him. I was extremely concerned when JoAnn told me about Gabriel and his not moving out into space on his own at the age of 18 months. I was also concerned about the limited availability of O&M specialists in Gabriel's service area to provide O&M-related support services to families in EI. Since I resided in a different state than JoAnn and Gabriel, the only way we could connect with each other for home visits was through two-way videoconferencing (i.e., Skype). JoAnn and I scheduled and conducted monthly visits with Gabriel and his family via Skype for about a year. Since we were conducting these home visits as part of JoAnn's university Institutional Review Board (IRB)-approved research study, we recorded qualitative data to document our experiences and

to monitor Gabriel's progress. I coined the term "tele-O&M" for our O&M home visits via Skype since we were venturing into the world of "tele-name of discipline here," where practitioners were connecting with their clients to provide discipline-specific services using distance technologies.

JoAnn and I learned a lot through our tele-O&M journey with Gabriel. We learned that technology was not infallible, but it provided us with a viable avenue to provide Gabriel and his family with O&M support services that were not available to him at that time. Overall, we felt that our time with Gabriel was successful. Although Gabriel's grandmother was not quite comfortable working with Gabriel during our tele-O&M visits – she held the iPad and talked with me while JoAnn worked with Gabriel – JoAnn told me that this was the most engaged she had been in home visits since she started working with Gabriel. My visiting with Gabriel from a distance did not seem to bother him at all. In fact, he started associating me with the Skype ringtone. JoAnn told me he would say my name each time he heard the ringtone when she connected us for our visits. Although Gabriel was not quite walking on his own by the time we concluded our O&M visits the summer he would turn 3 years old, he was walking more confidently using a reverse-walker and seemed to be more willing to reach out and explore the space around him. A few months later, JoAnn and I were at a conference when Gabriel's grandmother sent JoAnn a text from out of the blue with a picture of Gabriel standing on his own. We were brought to tears (of joy) when we read her message: "Gabriel's O&M specialist said he was ready for a cane."

Rationale for the Study

Research investigating the use of teleintervention to provide specialized services to children with sensory impairment and their families in EI have yielded very promising outcomes (Behl et al., 2017; Kelso et al., 2009; Olsen et al., 2012). The success with teleintervention in these research studies, as well as my own experience with JoAnn and Gabriel, was the impetus for this research study utilizing teleintervention to provide O&M support services for children with BVI and their families in EI. The use of teleintervention, with accessible technology and a thoughtfully designed protocol, has great potential to increase children with BVI and their families' access to O&M support services with qualified personnel that would otherwise not be typically available to them.

Purpose of the Study

Teleintervention has been shown to be an effective method of providing EI services to very young children and their families in the sensory impairment field of DHH (Behl et al., 2017; Blaiser, Behl, Callow-Heusser, & White, 2013). The purpose of this study was to demonstrate that teleintervention could also be used to provide O&M support services to very young children and their families in the sensory impairment field of BVI. The use of teleintervention to successfully provide O&M support services in the EI system would not only help children with BVI and their families access O&M support services with qualified personnel that would otherwise not be typically available to them, but it would also encourage the field of BVI to use teleintervention as a viable option to address concerns related to personnel shortages, access to EI services in a variety of geographic service areas (e.g., urban, suburban, rural, and remote areas), and cost efficiency in the future.

Research Questions

The primary objective of this study was to compare O&M support services when they were delivered through in-person consultations and via teleintervention. A multiple case study approach was used in this study to construct an in-depth account of providing O&M support services to three families of children with BVI in EI using the two above-mentioned service delivery models. Data collected from this research study attempted to answer the following research questions:

- Q1. How do caregiver perceptions of O&M support services differ when services are provided via teleintervention and in-person service delivery models?
- Q2. How do home visiting practices differ between teleintervention and in-person service delivery models?
- Q3. How do the costs of providing O&M support services differ between teleintervention and in-person service delivery models?

The answers to these questions and the information obtained from this study provide insight on the provision of O&M support services for the participants of this study and future directions for research and practice.

Summary

Although there is a successful history of using technology to provide healthcare, therapeutic assessment, therapeutic intervention, and specialized services to families of children with exceptionalities in EI (Behl et al., 2010; Behl et al., 2017; Blaiser et al., 2013; Boisvert et al., 2010; Kelso et al., 2009; Olsen et al., 2012), there have been no previous empirical studies that have been conducted to explore the use of teleintervention in providing any specialized instruction/services to young children with BVI and their families in the EI system. The purpose of this study was to show that teleintervention can

be used to provide EI services, specifically O&M support services, to very young children and their families in the sensory impairment field of BVI. A qualitative investigation using a multiple case approach was used in this research to compare O&M support services when they were delivered through in-person consultations and via teleintervention for three families of children with BVI in EI.

The data for this study were collected through multiple sources and analyzed using multiple methods. Data collected from interviews, field notes, video-recorded sessions of home visits, and documents were analyzed to obtain the results for this study, which were used to answer the research questions. The information obtained from this case study of three families of children with BVI in EI provide insight on the provision of O&M support services for the participants of this study and inform future directions for research and practice.

Definition of Key Terms

Certified orientation and mobility specialist (COMS®). An O&M specialist who is professionally certified by the Academy for Certification of Vision Rehabilitation and Education Professionals (ACVREP); professional certification as a COMS® indicates that the O&M specialist has pledged to adhere to a professional Code of Ethics for O&M Specialists and demonstrated professional competency that supports quality service delivery to individuals with visual impairments through the certification requirements and process (e.g., attained an undergraduate or graduate level degree with an emphasis in O&M, completed discipline-specific, supervised practice under a COMS; passed the ACVREP COMS® certification exam) (ACVREP, 2019).

Early intervention. A system of services designed to help young children who have been identified with a diagnosed condition or confirmed developmental delay and/or exceptionality, and their families, learn basic and new skills that typically develop within the first three years of life (Ferrell, 2011; National Dissemination Center for Children with Disabilities [NICHCY], 2014).

Orientation and mobility (O&M). Concepts and skills related to safe, independent movement/travel in a variety of environmental settings (e.g., familiar, unfamiliar; indoor, outdoor; home, school, community) and lighting conditions.

Orientation and mobility specialist (O&M specialist). An educator/professional with specialized training, skills, and professional certification or endorsement to provide education, instruction, and support to students with visual impairments in the area of orientation and mobility.

Teacher of students with visual impairments who specializes in early intervention (EI-TSVI). An educator with specialized training, skills, and certification to provide education, instruction, and support to families of children with visual impairments in early intervention programs.

Telehealth. “The use of electronic information and telecommunication technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health and health administration” (Health Resources and Services Administration, 2019).

Telepractice. “The application of telecommunications technology to the delivery of speech language pathology and audiology professional services at a distance by linking clinician to client or clinician to clinician for assessment, intervention, and/or consultation” (ASHA, 2019).

Teleintervention. “The application of telehealth technologies to providing EI [early intervention] services” (National Center for Hearing Assessment and Management, 2019).

Visual impairment. “An impairment in vision that, even with correction, adversely affects a child's educational performance” (34 C.F.R. Sec. 300.8(c)(13)).

CHAPTER II

REVIEW OF LITERATURE

Nationwide, there is a critical shortage of qualified professionals in the field of blindness and visual impairment (BVI) to work with very young children with BVI and their families, and this shortage has been historically persistent (American Association for Employment in Education, 2002, 2008, 2010, 2016, 2017). The number of professionals currently working in the field to provide services for children with BVI has not been well documented. Very few studies have been conducted to specifically gather statistics on the number of orientation and mobility (O&M) specialists currently working in the field of BVI, and none have been conducted to survey the number of O&M specialists currently providing support services to children and families in early intervention (EI). Historically, O&M services have been focused on training for adults and school-aged children, making young children with BVI and their families in the EI system particularly vulnerable to this nationwide shortage of O&M specialists. Although the movement towards providing O&M support to children and families in the EI system has been gaining momentum since the 1986 amendments to IDEA, when EI services were first required, instructional priorities for adults and school-aged children with BVI still perpetuate limited access to O&M support for very young children with BVI and their families. Increasing access to O&M support with qualified personnel requires creativity and innovation in service delivery models. Investigating alternative service

delivery methods, such as teleintervention, has the potential to increase the availability of O&M support for very young children with BVI and their families in EI programs.

The focus of this review of literature is to build the case for why O&M support services are important for very young children with BVI and to explore the potential of using telecommunication technologies (i.e., teleintervention) to make O&M support services more visible and available to families in EI.

Individuals with Disabilities Education Act

The impact that sensory impairments (e.g., blindness/visual impairment (BVI), deafness/hard of hearing (DHH), deaf-blindness) are likely to have on early development in young children with these exceptionalities is consequential enough to be recognized by the Individuals with Disabilities Education Act (IDEA), the law governing the education of children with exceptionalities. Broadly, young children aged birth to two years old who have been determined to have exceptionalities, delays in development, or potential for experiencing delays in development are entitled to receive early intervention (EI) services under the Part C system of IDEA to help support their growth and development. The purpose of EI is to help mitigate the effects that exceptionalities or delays may have on children's growth and development. Services provided under Part C of IDEA are family-based and must be provided by qualified personnel in the child's/family's natural environment (i.e., home and/or community). Under IDEA, a diagnosis of sensory impairment may determine categorical eligibility for services in Part C with or without evidence for delays in development (IDEA 2004, §632(5)(A)).

In the case of BVI, IDEA (2004) defines visual impairment as “an impairment in vision that, even with correction, adversely affects a child's educational performance” (34

C.F.R. Sec. 300.8(c)(13)). BVI, perhaps more than any other exceptionality, has the potential to influence how children learn (Ferrell, 2000). Whether it does, and to what degree, depends on parent/caregiver knowledge and understanding of the potential impact of BVI, parent/caregiver understanding of how children with BVI learn, and professional/educator ability to support families in their daily routines (Ferrell, 2000, 2011).

Early Intervention

Early intervention (EI) is a system of services designed to help young children who have been identified with a diagnosed condition or confirmed developmental delay and/or exceptionality, and their families, learn basic and new skills that typically develop within the first three years of life (Ferrell, 2011; NICHCY, 2014). EI is mandated by federal legislation, Part C of the Individuals with Disabilities Education Act (IDEA) (Bruder, 2010; Ferrell, 2011; Hickman, McCoy, Long, & Rauh, 2011; IDEA, 2004; NICHCY, 2014). Growth in the developmental areas of physical, cognitive, communication, social/emotional, and self-help are often addressed in EI (Ferrell, 2011; NICHCY, 2014). Best practices in EI generally employ a transdisciplinary approach that focuses on family-centered practices to help families build capacity to understand the unique needs of their children and how to help support and boost their development (Ferrell, 2011; NICHCY, 2014).

Theories and Best Practices in Early Intervention

The evolution of early childhood education and intervention have been informed by theories grounded in human development, bioecological systems, and family systems (Dunst & Family Infant and Preschool Program, 2000; Hickman et al., 2011). Child-

centered models, where the “experts” (i.e., professionals and educators) determine and directly remediate a child’s areas of deficit, once dominated early childhood education/intervention (Dunst, 1985; Dunst & Family Infant and Preschool Program, 2000; Hickman et al., 2011). However, in today’s model of EI, the prevailing principles that guide EI assessment, program development, and practices stem from family systems theory (Dunst & Family Infant and Preschool Program, 2000; Hickman et al., 2011).

Family systems theory. Family-centered approaches in education and intervention are keen on helping families understand the unique needs of their children and how to help support their growth and development. A context- and support-based framework, concentrated in environmental and family systems theories, powers these intervention models; and families (i.e., caregivers, the child, and other family members) and professionals work together to address the concerns and priorities of the family and to support not only the growth of the child, but of the family unit as well.

Family systems theory was derived from the works of Ackerman, Jackson, Minuchin, and Bowen in family therapy in the 1960s and 1970s (Christian, 2006) and focuses on the interconnectedness of family members and how their interactions with each other contribute to the growth of the family as a whole (Christian, 2006; Dunst, Boyd, Trivette, & Hamby, 2002; Ferrell, 2000; Hickman et al., 2011; Hooper & Umansky, 2014). The family unit (or system) is dynamic, always adapting to its members and outside environment. Family characteristics (e.g., number of family members, cultural background, socioeconomic status), interactions with each other, strength of interconnectedness, and ability to adapt to situations within and beyond the family’s control can significantly impact development in young children, as these are

factors that will affect how families prioritize and complete day-to-day tasks to meet the individual and collective needs of the family (Christian, 2006; Hickman et al., 2011; Hooper & Umansky, 2014).

Young children spend a large percentage of their time with their parents/caregivers and families during their first few years of life, and it is during this time where EI services can make the most difference in helping families support the growth and development of their children (Hooper & Umansky, 2014).

Parents/caregivers are truly children's first teachers (Cutter, 2007; Ferrell, 2011) and with most “new” teachers, support from other teachers with experience and access to resources are key in nurturing confidence in self to grow as a teacher. Therefore, it is important that the provision of EI services be family-centered and support-focused.

Family-centered practices. Family-centered practices are characterized by family-professional partnerships that focus on addressing the priorities and concerns of families in regard to the growth and development of their children. The Division for Early Childhood (2014) defines family-centered practice as:

Practices that treat families with dignity and respect; are individualized, flexible, and responsive to each family’s unique circumstances; provide family members complete and unbiased information to make informed decisions; and involve family members in acting on choices to strengthen child, parent, and family functioning.

(p. 9)

The goals of family-centered practices are to: (a) develop capacity-building help giving practices, (b) address and respect family needs (concerns and priorities), (c) identify and utilize family strengths, and (d) provide social support resources (Trivette,

Dunst, & Hamby, 2010). In family-centered intervention models, professionals assume a supportive role, coaching families and providing them with resources to help address their needs in areas of their child's development and to increase competency-enhancing outcomes (Dunst et al., 2002).

Research shows there is a connection between family-centered practices and positive child and family outcomes. A meta-analysis conducted by Dunst, Trivette, and Hamby (2007) examined 47 studies that explored the relationship between family-centered helpgiving practices and parent, family, and child behavior and functioning. The studies originated from seven countries and included over 11,000 participants (N = 11,187), with an average sample size of 235 per study. Mothers comprised 89% of the participants and the age of the participants' children ranged from 7 to 157 months. Children were identified as typically developing, at risk for poor outcomes, or having a developmental exceptionality or identified condition, developmental delay, or mental health-related disorder. All study participants were involved in or receiving services from a variety of sources, such as early intervention, educational, clinical, rehabilitative, and/or family support programs. Family-centered helpgiving practices were measured primarily through multiple-item rating scales. Helpgiving practices were classified as relational (where the help giver (i.e., professional service provider) applied good clinical practices, such as active listening, compassion, empathy, and respect, and positive beliefs about family strengths and capabilities in their practices) or participatory (where the help giver provided services that were individualized, flexible, and responsive to family needs and engaged family members in learning how to find and use information to make informed choices and achieve desired goals and outcomes). The results of the analysis

indicated that both relational and participatory helpgiving practices positively influence the self-efficacy beliefs of help receivers and outcomes for parents, families, and children.

Family-centered practices have been linked to the following in families (Espe-Sherwindt, 2008): (a) greater satisfaction with and perceptions of the helpfulness of program supports and services; (b) stronger beliefs in self-efficacy and sense of control; (c) improved parent perceptions of child behavior and status of development (more positive than negative); (d) healthier perceptions of family well-being; and, most importantly, (e) heightened feelings of parenting competence and confidence (two factors that significantly impact child development in the short- and long-term).

Orientation and Mobility Support for Young Children with Blindness and Visual Impairment

The literature on gross motor development in infants and toddlers with severe VI consistently shows that these children acquire and master gross motor skills at a different rate, age, and sequence than the norms set for their peers who are not BVI. The lack of vision and experiences with the environment seem to be primary factors contributing to these differences, with parent-child interaction as another potential contributing factor. Knowing that these factors play a considerable role in the development of early gross motor skills in very young children with BVI, it is confounding that there is a scarcity of research to date that examines the following: (a) the effects of O&M support on the development of gross motor skills in this population, and (b) the efficacy of O&M support in helping very young children, and their families, learn the concepts and skills necessary to independently explore and interact with the environment and the people and

objects within it. Studies investigating gross motor development in young children with BVI in the current body of literature have hinted at the need for young children with BVI to receive some kind of support to help them reach out and explore their world on their own, but O&M support is not explicitly named. O&M support has great potential to facilitate gross motor development in infants and toddlers with BVI and empower families to help their children discover and understand the world around them.

History of Orientation and Mobility Support Services for Children with Blindness and Visual Impairment

O&M support services for children with BVI is relatively “new” in the history of O&M. The profession of O&M and methods for O&M services/training were originally developed in the late-1940s and throughout the 1950s to help rehabilitate veterans who were blinded during World War II. Before this time period, formal preparation of O&M specialists did not exist and instruction in travel for individuals who were BVI was rudimentary and usually limited to the environment in which the instruction was taking place (e.g., specialized institutions or schools for individuals who were blind) (Bledsoe, 2010). Early explorations and development of skills and techniques associated with “foot travel” (the precursor term for the contemporary term for O&M) could be traced back to the 1860s and 1870s when Sir Francis Campbell at the Perkins School for the Blind in Watertown, Massachusetts and W. Hank Levy, an author in London who was blind, experimented with using a long cane for travel (Bledsoe, 2010; Wiener & Siffermann, 2010; Wiener, Welsh, & Blasch, 2010).

In the 1960s, the first university programs were launched to formally prepare O&M specialists through grants provided under the Vocational Rehabilitation Act by the

federal Office of Vocational Rehabilitation (Wiener & Siffermann, 2010). Until the mid-1960s, O&M instructional techniques and methods and O&M personnel preparation programs were developed and established to concentrate on the independent travel needs of the adult learner. Consequently, adults with BVI benefitted the most from O&M support services during this time. As the profession progressed and the demand for O&M specialists increased, the unique needs of children with BVI learning O&M concepts and skills were addressed when O&M support services for school-aged children came in to focus during the late-1960s. Although several universities had started to include content in their programs to prepare their O&M program graduates to work with school-aged children, sponsorship from the U.S. Department of Education helped to expand this programming in O&M personnel preparation (Wiener & Siffermann, 2010). In 1966, San Francisco State University instituted the first graduate-level program to prepare O&M specialists to work with children with BVI (Wiener & Siffermann, 2010). Over the next couple of decades, as the importance of early childhood education became more prominent in the field of special education, the need to refine instructional philosophy (i.e., young children learn differently than older children and adults) and actual teaching techniques to make O&M support services more developmentally appropriate for young children with BVI began with preschool-aged children in the 1980s (Anthony, Bleier, Fazzi, Kish, & Pogrud, 2002; Wiener & Siffermann, 2010).

As children with BVI began being integrated into the general education setting, the need for exceptionality-specific instruction, such as braille and O&M support services, was necessary for many of them to access the general education curriculum and their learning environment (e.g., classroom and school campus). The passage of the

Education for All Handicapped Children Act (P.L. 94-142) helped support exceptionality-specific instruction as an important part of the educational programming for children with BVI (Hatlen, 2000). In 1990, the Education for All Handicapped Children Act was reauthorized as the Individuals with Disabilities Education Act (IDEA), and in 1997, the reauthorization of IDEA identified O&M as a related service. Table 1 provides more information about how O&M is defined per the IDEA.

Table 1

Orientation and Mobility Services as Defined by the Individuals with Disabilities Education Act.

<p>O&M services, a related service, as defined by IDEA:</p> <p>Means services provided to blind or visually impaired children by qualified personnel to enable those students to attain systematic orientation to and safe movement within their environments in school, home, and community.</p> <p>34 C.F.R. Sec. 300.34(c)(7)</p>
<p>O&M areas of instruction for children, as appropriate, listed by IDEA</p> <ul style="list-style-type: none"> • Spatial and environmental concepts and use of information received by the senses (such as sound, temperature and vibrations) to establish, maintain, or regain orientation and line of travel (e.g., using sound at a traffic light to cross the street) • use of the long cane or a service animal to supplement visual travel skills or as a tool for safely negotiating the environment for children with no available travel vision • understand and use remaining vision and distance low vision aids • other concepts, techniques, and tools

Prior to the reauthorization of IDEA in 1997, O&M training for children with BVI existed within an exceptionality-specific educational framework called the Expanded Core Curriculum (ECC). The ECC was developed by professionals in the field of BVI from 1995 to 1996 as part of a grassroots effort to further address the educational and instructional needs of children with BVI beyond the academic core curriculum (i.e., math,

science, reading, writing) that may be directly impacted by an impairment in vision (Hatlen, 1996; Lohmeier, Blankenship, & Hatlen, 2009; Sapp & Hatlen, 2010). Due to the impact that visual impairment has on the learning and life experiences of individuals with BVI, the ECC was founded on the premise that children with BVI require instruction that is BVI-specific to attain the skills that are necessary to live as independently and productively as possible (Hatlen, 1996; Koenig & Holbrook, 2000; Sapp & Hatlen, 2010). The ECC is comprised of nine areas, which are described in Figure 1.

Although the ECC was created to fill a need in the field at the time to ensure that children with BVI have the knowledge and skills to be fully integrated in their families, schools, and communities during childhood and adulthood, the reauthorization of IDEA in 1997 and 2004 solidified the importance and need for O&M support services for children with BVI by mandating it as a related service for any child with BVI who may need it, including young children aged birth to 3 years old.

O&M as a field and profession has made great transformations since its formal inception almost three-quarters of a century ago. The evolution of instructional philosophies and training methods and techniques have embraced both the learning and travel needs of adults and children with varying levels of vision impairment and abilities. However, the reach of the evolutionary trend toward O&M support services for younger learners has not fully extended into the population of children with BVI aged birth to 3 years old.

Expanded Core Area	Points of Interest (Hatlen, 1996, 2003)
Compensatory Skills	Skills that students who are visually impaired need to access all areas of the core curriculum. Mastery of compensatory access skills usually means that the student has access to learning in a manner equal to that of his or her peers who are sighted. Examples include concept development, communication modes (e.g., braille, print), and organizational skills.
Orientation and Mobility	O&M emphasizes the fundamental need and basic right of people who are visually impaired to travel as independently as possible, enjoying and learning to the greatest extent possible from the environment through which they are passing. Examples include body image, travel, spatial awareness, directionality, and safety.
Social Interaction	Individuals who are visually impaired cannot learn social interaction skills in a causal and incidental fashion. They learn them through sequential teaching and modeling. Examples include social concepts, social integration, parallel and group play, eye contact, and tone of voice.
Assistive Technology	Assistive technology devices provide access to the general learning environment. Technology enhances communication and learning and expands the world of persons who are visually impaired in many ways. It makes information that is typically inaccessible readily available. Examples include media literacy and selection of appropriate assistive devices.
Independent Living	This area is often referred to as daily living skills and consists of all the tasks and functions that people perform, according to their abilities, to live as independently as possible. Students who are visually impaired cannot learn these skills without direct, sequential instruction. Examples include hygiene, dressing, food preparation, money management, and time monitoring.
Recreation and Leisure	These skills must be deliberately planned and taught to students who are visually impaired and should focus on the development of lifelong skills. Examples include hobbies, sports, games, and physical fitness.
Career Education	Career education is vital because general instruction assumes a basic knowledge of the world of work that is based on prior visual experiences. Examples include exploring interests, job awareness, planning, preparation, placement, and work ethic.
Sensory Efficiency	Systematically training students to use their remaining functional vision and tactile and auditory senses better and more efficiently is vital. Examples include visual, auditory, and tactile learning; environmental cues and awareness; and use of low vision devices
Self-Determination	This area is based on the premise that students who are visually impaired must acquire specific knowledge and skills and have many opportunities to practice them to become successful. Examples include sense of self, decision-making, problem-solving, goal setting, self-control, and personal advocacy.

Figure 1. A description of the expanded core curriculum (Lohmeier et al., 2009, p. 105)

Even though O&M support services are mandated by federal law (i.e., Part C of IDEA), young children with BVI aged birth to 3 years old have not received as robust attention in the area of O&M as their adult and school-aged counterparts. Anecdotal evidence from the field within the past decade indicate that there is a movement towards refining instructional philosophies and training methods and techniques to address the unique learning and travel needs of this population of children and their families; this evidence includes the following: chapters in texts about developing early O&M concepts and skills in young children with BVI; content and coursework related to O&M instruction for infant and toddlers with BVI in university personnel preparation program; articles about O&M in early intervention programs; presentations and workshops at local, national, and international conferences that focus on working with children aged birth to 3 years old; development of assessment tools, curricula, and handbooks that address O&M development in young children with BVI. Currently, research is scarce in the area of O&M for infants and toddlers with BVI, as are the actual numbers of children and families receiving O&M support services.

Early Gross Motor Development Research and Children with Blindness and Visual Impairment

Young children learn the most about themselves and the world around them through movement, exploration, and interactions with others. “The ability to understand, interact with, and move within one’s physical and spatial environment is a fundamental developmental skill” (Hazekamp & Huebner, 1989, p. 23) that impacts learning in all areas of growth (e.g., physical, cognitive, communication, social/emotional, and self-help). As children begin to attain highly anticipated milestones, such as grasping,

reaching, crawling, and walking, their ability to understand, interact with, and move within their physical and spatial environment expands. However, for infants and toddlers with BVI, differences in development, especially in the area of gross motor development, have been shown to adversely affect how these children initiate contact with their surrounding environments and interact with the people around them (Adelson & Fraiberg, 1974; Brambring, 2006; Celeste, 2002; Ferrell, 1998; Ferrell et al., 1990; Norris et al., 1957; Troster & Brambring, 1993; Troster et al., 1994).

Developmental differences in infants and toddlers with severe visual impairment. Research in the area of EGMD in children with BVI has revealed that children with significant visual impairment consistently achieve gross motor milestones later than their peers who are sighted. Norris et al. (1957) conducted a longitudinal study that observed the development of 295 children with BVI. The observations began as soon as the children were diagnosed with visual impairment and assessed every three months until the age of two and every six months until the age of six. Within the total sample of children, 66 children met the criteria to be a part of the “intensive” group. Children in this subgroup entered the study at or before the age of 15 months and participated in the study up until the age of six years. This subgroup had vision that was described as “educational blindness,” where an ophthalmologist determined that their level of vision would most likely require them to use braille for their education (Norris et al., 1957), and they did not appear to have any other physical impairments that would impede development in children who were not BVI. The intensive study of this subgroup of children comprised the qualitative part of this study. Norris et al. (1957) observed the age range in which five “milestone” gross motor skills emerged in the children in their

intensive group and compared them to those found by Gesell and Ilg (1953) in their study of young children who were “typically” developing. The five milestone skills included sitting unsupported with a straight back; pulling self to standing with assistance; moving about on the floor, specifically referring to creeping; walking with assistance; and walking alone. Norris et al. (1957) found that the majority of the children in their intensive group experienced delays in attaining the aforementioned skills when compared to the age range in which children in Gesell and Ilg’s study attained them. Norris et al. (1957) attributed the lack of experience and appropriate opportunities during the early months of life and misunderstanding of how children with BVI learn as primary factors in their difficulties with motor development. The authors stress the importance of providing infants with BVI with appropriate opportunities for “normal development” (Norris et al., 1957) during the early months of their lives. They also advocated for parents to receive sustained help from professionals to help them understand their child with BVI’s behavior and find ways to promote their child’s development.

Adelson and Fraiberg (1974) observed the development of gross motor skills in 10 infants with severe vision loss, and no other identified exceptionalities at the time of the study, over a period of two years. They found that these children developed skills related to postural stability and control within the age range of norm-referenced developmental scales (specifically, the Bayley Scales of Infant Development; Bayley, 1969). However, the development of more dynamic gross motor skills, such as reaching for an object, transitioning from one position to another, crawling, and walking, became markedly delayed as the children grew older. Adelson and Fraiberg (1974) hypothesized that the primary cause of this developmental difference was related to the lack of vision.

Their hypothesis was supported by a related study on prehension with infants with severe vision loss (Fraiberg, Siegel, & Gibson, 1966). During this study, Fraiberg et al. (1966) discovered that self-initiated mobility and locomotion were delayed in their participants because the substitution of sound for sight to incentivize independent movement and mobility is a cognitive adaptation that occurred later during the first year of life in these infants' developmental sequence. In other words, these infants with severe vision loss did not engage in self-initiated movement until they were able to cognitively connect a sound with its source and then reach for it. Adaptive behavior such as this takes time to develop and, consequently, gathering information about one's self and one's environment will take longer.

Norris et al.'s (1957) and Adelson and Fraiberg's (1974) work generated more interest in researching gross motor development in infants and toddlers with BVI in the decades to come. Troster and Brambring (1993) conducted a study to compare the development of gross motor skills in 9-month-old and 12-month-old infants who were sighted ($n=47$) to 9-month-old and 12-month-old infants who had severe vision loss ($n=24$). The infants with severe vision loss were drawn from the sample of participants of a previous study conducted by the same authors during a study on EI with young children with BVI. They assessed the children's performance on 29 gross motor skills, some of which did not require visual perceptual skills (e.g., skills related to postural control and stability) and some that did (e.g., dynamic skills such as crawling and walking and transitional movements). The results of Troster and Brambring's (1993) study were very similar to the results of Adelson and Fraiberg's (1974) study: infants with severe vision impairment developed skills related to postural stability and control

within the age range of their peers who were sighted, but consistently developed skills related to self-initiated mobility and locomotion later than their peers who were sighted. Troster and Brambring agreed with Adelson and Fraiberg that the lack of vision was a major contributor to these developmental differences, as concept development took longer with no visual input, and auditory replacement required prerequisite skills in concept and cognitive development. They also attributed factors, such as motivation, environment, social interactions, and prematurity, as other factors influencing developmental differences.

Troster et al. (1994) conducted a longitudinal study that tracked the development of 10 children with BVI (5 children born full-term and 5 children born pre-term). As part of their study, they observed the development of basic gross motor skills in the children. Observations began as soon as the children entered the research study's EI program, which was specifically developed to provide EI and parent counseling services to these 10 children and their families. The ages of entry for the children ranged from 7.5 months to 16.0 months old, and their level of visual functioning was limited to none or light perception at best. EI service providers visited the children and their families in their homes and delivered services every two weeks until the children were 36 months old and then once a month until the children were 48 months old. The EI service providers used observation and developmental checklists to collect data during each EI/parent counseling home visit. The checklists were created by the researchers for the study and adjusted to reflect the impairment-specific perceptions and reactions of children with BVI (Troster et al., 1994). The basic gross motor skills that were observed included the following (Troster et al., 1994): posture and balance (sitting and standing); self-initiated

changes in posture and position (sitting up and standing up); and basic locomotor skills (crawling and taking first steps). After each home visit, the EI service providers noted whether each child had not yet, partially, or completely mastered/exhibited the skill/behavior (Troster et al., 1994).

The results of Troster et al.'s (1994) study showed that infants with severe levels of BVI experienced delays in achieving gross motor milestones when compared to their peers without BVI. The infants who were born full-term showed a slight delay in achieving postural control and balance stabilization and bigger delays in achieving transitional positions and self-initiated locomotion. The infants who were born pre-term showed big delays in achieving postural control and balance stabilization and even bigger delays in achieving transitional positions and self-initiated locomotion. Troster et al. (1994) surmised that the lack of vision was the greatest contributing factor to these delays in gross motor development (as far as they could tell, the children did not display any signs of neurological impairment and all received intensive EI services). Other factors the authors thought may have contributed to the delay in the development of basic gross motor skills included (a) vision and its relationship to receiving, processing, and reacting to information (vision is faster than touch and hearing); (b) motivation and incentive; and (c) safety and risk assessment of environment (including facial expressions from parents). Troster et al. (1994) also noted concerns about issues related to prematurity, which may include neurological damage in addition to vision loss.

Brambring (2006) conducted a longitudinal assessment of four children with BVI in their acquisition of 29 motor skills over a period of five years to gain more insight on where differences in the development of gross motor skills occurred in young children

with BVI. The participants were drawn from a larger group of 10 children involved in a prior study on the development of young children with BVI (the same study reported in Troster and Brambring, 1993 and Troster et al., 1994) and included three children who were completely blind and one child who had minimal light perception. Developmental data for the children were collected biweekly during home visits with early interventionists. Data were collected through observation and recorded using a data collection tool that was specifically developed for the study. The items on the data collection tool (observation scales) were selected to “provide a differentiated assessment of blind-specific problems” (Brambring, 2006, p. 623) in young children with severe vision loss.

Brambring (2006) analyzed the data from three angles to measure the degree of developmental difference observed in the participants’ acquisition of the 29 gross motor skills in comparison to their peers who are sighted. The first analysis utilized categories to describe the strength of developmental difference (based on median scores for age of acquisition); the second analysis used absolute and relative differences to determine ages of acquisition (based on mean age of acquisition); and the third analysis used regression to explain the relationship between ages of acquisition for the participants and the norming population. The results of the first analysis showed the participants experiencing various strengths of developmental difference for the skills observed: slight developmental delay for four skills, strong developmental delay for eight skills, and extreme developmental delay for 13 skills. A comparison of median age of acquisition scores revealed that children in the norming population acquired skills earlier than the participants. The results of the second analysis showed the participants acquiring gross

motor skills later than their peers in the norming population. Absolute developmental differences (the difference in age when the participants acquired skills from when their peers in the norming population did) ranged from 2.2 months (climbs up on sofa) to 24.9 months (can run). Relative developmental differences revealed high variability in when the participants acquired the 29 motor skills and suggested that the participants acquired these skills later than their peers who are sighted. Participants experienced significant delays in the areas of dynamic balance, acquisition of locomotion, and refinement of locomotion. The results of the third analysis showed the participants at a developmental age of 18.1 months for gross motor skill acquisition when their peers were at a developmental age of 30 months. A high correlation between acquisition age for single skills across both groups was found and suggests that the sequence in which developmental skills are acquired is generally the same for children with and without BVI; however, the age at which these skills were acquired by the participants with BVI occurred later.

Brambring (2006) reiterated the primary role vision plays in gathering and processing visual information to control and gain feedback on gross motor activities. Although the sample size was small, the study shows that very young children with severely impaired vision were experiencing major differences in the acquisition of gross motor skills, especially if those skills require them to self initiate movement through space. Brambring (2006) affirmed that gaining clarity on the alternative path of development in young children with BVI will help families and EI professionals design and adopt adaptive strategies to help children with BVI attain gross motor skills during the early years of their lives.

Developmental differences in young children with visual impairment. A

common thread seen in the research reviewed thus far is the focus on EGMD in young children who have no vision or severely impaired vision with no additional impairments. The natural consequence of observing such a specific group of children is a small sample size – all but one study reviewed thus far had 10 or fewer participants. Accurate representation of the larger population and generalization of the results are predominant concerns with research studies that utilize such small numbers of participants (Remler & Van Ryzin, 2011). More representative of the population of children with BVI would include children who have varying levels of vision impairment due to their visual conditions, with and without additional impairments. Research observing EGMD in young children with BVI that included those who had severe vision impairment and those who had low vision, with and without additional impairments, yielded greater numbers of participants than the studies reviewed above. The extraction of children with BVI, with no additional impairments, from these studies still concluded that young children with BVI, aged birth to five years old, consistently experienced differences in the development of gross motor skills when compared to their peers who were sighted.

Ferrell et al. (1990) conducted a pilot study to retroactively determine when 21 developmental milestones were acquired by 82 children with BVI and to identify factors that may have contributed to the development of these milestones. Of the 21 developmental milestones, seven of them were easily recognized as gross motor milestones. Record review, in-person and/or telephone interviews of parents with young children with BVI, or both were used to collect data. The sample of participants for the study included children who were first referred for services at the age of 3 days old to just

over 4 months old with varying levels of visual functioning (no vision to reduced visual acuity). The results of the study revealed two distinct subgroups within the total number of children in the sample: children with BVI who had no additional impairments ($n=39$) and children with BVI who had additional impairments ($n=43$).

The age at which children in the subgroups acquired all the developmental milestones ranged from a median age of 6.0 months to 38.0 months; for the gross motor milestones, the ages ranged from a median age of 6.0 months to 30.0 months. Based on the results of the study, it was noted that the children, including those with additional impairment, achieved gross motor milestones within range of their peers who are sighted; some of the children even achieved certain gross motor milestones before the average age referenced for their peers who were sighted (sitting alone without support, rolling from back to stomach, and going up and down stairs with alternating feet). However, between the two subgroups, many of the children with BVI who had additional impairments exhibited lengthier times in attaining gross motor milestones than their peers with BVI who had no additional impairments (especially in skills that require self-initiated locomotion). Although the results of this study indicated that young children with BVI seemed to acquire gross motor milestones within the same age range as their peers who are sighted, closer perusal of the reported data revealed that the number of children in each subgroup attaining these milestones tapered off significantly as the complexity of the motor skills increased. The majority of children in both subgroups acquired gross motor skills involving posture, stability, reaching, and rolling over within age range of their peers who were sighted. However, the number of children steadily decreased to less than half for the subgroup of children with just BVI and to less than a quarter for the

subgroup of children with BVI and additional impairments for the acquisition of gross motor skills involving self-initiated locomotion (crawls on hand and knees for 3 or more feet, walks alone without support for at least 10 feet, walks up and down stairs with alternating feet).

Ferrell et al. (1990) concluded that in addition to the rate of acquisition, the sequence in which young children with BVI attained developmental milestones was different from what has been generally observed in their peers who are sighted and developing “typically.” Since the children with BVI who had additional impairments seemed to demonstrate the greatest differences in acquiring the developmental milestones included in the study, Ferrell et al. (1990) affirmed that “visual impairment alone does not predict developmental delay, the role of iatrogenic handicaps related to other factors in children’s environments may play a far more predictive role than was previously assumed” (p. 409). Ferrell et al. identified the following as other factors that may contribute to the developmental differences observed in young children with BVI: birth history (birth weight, gestation, and length of hospitalization at birth), reduced visual input (visual input is used to guide visual-motor skills); etiology of VI; presence of additional impairments; age of VI diagnosis (the age at which children with BVI are diagnosed with VI will ultimately have an impact on how long they receive EI services); and EI service provision.

Celeste (2002) conducted a retrospective study, surveying parents with infants and young children with BVI, aged 4 months to 48 months, on when their children reached gross motor developmental milestones. Parents were asked to recall when their children reached certain milestones using baby books and other developmental records as

references. The participants included 84 children with varying etiologies of visual impairment; levels of visual functioning (no light perception (NLP), light perception (LP), and partially sighted); birth histories (born full-term or pre-term); and abilities (with and without additional impairments). Survey results indicated that all the children showed delays in achieving all the gross motor milestones presented in the survey within age range of norm-referenced developmental scales (specifically, the Peabody Developmental Motor Scales (Folio & Fewell, 2000)). The delays were particularly predominant with milestones that involve self-locomotion (e.g., crawls or creeps; cruises around furniture, walks independently, walks up and down stairs (Celeste, 2002)). Children with the most severe vision impairment (NLP or LP) were significantly delayed compared to children with some vision. The subgroup of children who were born prematurely seemed to have the poorest motor outcomes.

Ferrell, Shaw, and Deitz (1998) conducted a longitudinal study to investigate the sequence and rate of development in young children with BVI (aged birth to 5 years old) over a period of 5 years. The project, known as Project PRISM, collected data through a nationwide consortium of service providers and utilized assessment instruments that were well known, norm-based assessments of development (e.g., Battelle Developmental Inventory (Newborg, Stock, Wnek, Guidubaldi, & Svinicki, 1984), Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984), Milani-Comparetti Motor Development Screening Test (Trembath, Kliewer, & Bruce, 1977)) and specifically developed for the project (questionnaires for child, family, and service measures). The researchers were interested in analyzing variables related to the child, family, and service measures, their interactions, and their influence on child competence and family

adaptation (Ferrell et al., 1998). A total of 159 families, out of the 202, remained active in the study at the conclusion of the project. Depending on the age of when the children entered the study, they were assessed at the chronological ages of 4, 8, 12, 18, 24, 36, 48, and 60 months. The mean age at project entry was 8.67 months. Of the participants, 59.9% were identified as having additional impairments and 30%, at each age level, were classified as having no light perception (NLP). All the children were receiving EI services; however, the frequency, intensity, duration, and site of services were variable.

The developmental milestones selected for Project PRISM were similar to those identified in the VIIRC study (Ferrell et al., 1990). Of the 19 milestones, six of them were easily recognized as gross motor milestones (rolls over intentionally from stomach to back; reaches for and touches object; sits alone without support for 5 seconds; moves 3 or more feet by crawling; walks without support for at least 10 feet; walks down stairs with alternating feet). The results of the study revealed delays in the participants' acquisition of 12 milestones, which included all of the gross motor ones. The results suggest that the median age at which all the participants and those who were BVI with no additional impairments attained gross motor milestones within 3 to 6 months after the normed age range for children without BVI who are "typically" developing. The motor milestone that was attained 6 months after the normed population involved more complex, self-initiated movement (i.e., walking). The median age at which participants who were BVI with additional impairments attained gross motor milestones seem to be double that of the normed population and slightly behind the PRISM participants with just BVI, until encountering the milestones that involved self-initiated movement. From there, the median age difference noticeably increased (7 months' difference from those

with just BVI). The sequence of developmental milestone acquisition, as measured by the study, did not differ for the four visual functioning groups (NLP, LP, severe low vision, and moderate low vision) of children. However, children with BVI who had additional impairments were reported to acquire milestones later than their peers with just BVI. Additionally, children whose gestation was less than full-term were reported to acquire milestones later than their peers whose gestation was full-term or better. No differences in the rate and sequence of milestone attainment were significant across family variables (social, cultural, other family variables).

The Project PRISM researchers acknowledged that the data they collected for milestone attainment were useful, but not readily comparative to previous studies because the recording of the data for the project was delayed by the procedure that was used to collect the data (Ferrell et al., 1998). Concerns about the “true” picture of when the PRISM population attained milestones were raised because data collection occurred at six-month intervals and milestone attainment was recorded as attained or not attained at the time of data collection. Indirectly, it was concluded that the children in Project PRISM were older when attaining most milestones, but it was difficult to tell how much older they were at the time of attainment.

Other considerations from the literature. Further perusal of the literature uncovered more research and articles that focused on the development of very young children with BVI. However, these studies and articles referenced or highlighted EGDM from various perspectives. For example, research studies conducted by Reynell (1978) and Hatton, Bailey, Burchinal, and Ferrell (1997) examined the growth of young children with BVI in several major domains of development (e.g., cognitive, communication,

motor, personal/social) and generated developmental growth curves in each domain for the children based on their level of vision functioning (e.g., blind or severely impaired vision, partially sighted or low vision). The ages of the participants ranged from birth to five years old in Reynell's (1978) study and from 12 to 78 months old in Hatton et al.'s (1997) study. Both studies included children with BVI and children with BVI with additional impairments. Although Reynell's (1978) study did not explicitly collect data pertaining to the development of specific gross motor skills, as was done in the studies reviewed previously, it collected developmental data in the areas of sensorimotor understanding and exploration of the environment. From the perspective of EGMD, the areas of sensorimotor understanding and exploration of the environment have strong ties to the development of gross motor skills. Sensorimotor understanding involves early sensorimotor integration and coordination to help children develop an understanding of concrete objects and their relationships with one another (Reynell, 1978), and exploration of the environment involves the ability to understand orientation within a room and the ability to use orientation in relation to fixed objects (Reynell, 1978). Both are necessary to help children learn, understand, and connect with their environments so they can learn and practice gross motor movements and patterns. Hatton et al.'s (1997) study measured motor skills as part of the assessment battery, however, it appears that the resulting motor section included skills in both fine and gross motor areas. Specific motor skills that were assessed were not identified in the article.

The results of both studies indicated that children with BVI do experience developmental differences when compared to their peers who are sighted. The developmental growth curves generated in both studies showed children with BVI falling

below their peers who were sighted in the developmental domains that were examined. The growth curves in the areas of sensorimotor understanding and exploration of the environment in Reynell's (1978) study and motor skills in Hatton's et al.'s (1997) study were notably lower than the other domains. Comparisons within the group of children with BVI showed that with those who had the least vision performed worse than their peers who had some or better vision.

Articles written by Sonksen, Levitt, and Kitsinger (1984) and Lowry and Hatton (2002) provide more practical perspectives on EGMD in young children with BVI from the literature. Through their own reviews of the literature – and, in the case of Sonksen et al., observations – the authors of both articles expressed their concerns about the developmental differences being observed in young children with BVI and their impact on various aspects of gross motor development. Sonksen et al.'s (1984) article identifies constraints (limiting factors) that impact EGMD in young children with BVI and offers strategies for remediation. Through clinical observations of over 160 young children with BVI (infants to preschoolers, 40 who did not appear to have additional impairments to their vision impairment), Sonksen et al. (1984) identified these factors to be: diminished drive, poor body image, reduced opportunity, delays in the formulation of basic concepts (e.g., object and people permanence), sensorimotor integration (e.g., developmental differences in learning to localize sound and in engaging the vestibular and proprioceptive systems to develop motor feedback circuits to help the body make adjustments when changing positions in space), reduction in monitoring capacity (e.g., ability to observe and understand the effect of gross and fine motor movement on the environment and to perfect movement skills), and fears (e.g., fear of moving out into

space will affect the development of motor competence). Sonksen et al. (1984) remarked that level of visual functioning plays a role in the development of gross motor skills in infants and toddlers with BVI, but “below normal levels of integration within and between alternative sensory systems plus immaturity of [the] motor system” (Sonksen et al., 1984, p. 273) also play contributing roles, possibly even more so than visual functioning.

Strategies to help remediate the aforementioned constraints on motor development in young children with BVI focus on assessment and early support from caregivers and health professionals (e.g., pediatricians, ophthalmologists, therapists). The authors advocate for quality assessment in young children with BVI to evaluate their level of visual functioning, repertoire of motor skills, and areas of constraint (i.e., constraining factors mentioned previously). Information gained from the assessment can then be used to drive the design and implementation of individualized programs for the children to help guide and support their development. The authors acknowledge that vision supersedes all the other senses when it comes to the development of the motor system and constraint areas (Sonksen et al., 1984); therefore, it is important to incorporate however much vision children have into their developmental support programs. The authors provide specific strategies, with rationales, on how to help guide, and involve, parents and other caretakers in supporting the development of gross motor skills in their children with BVI.

Lowry and Hatton’s (2002) article regards walking as a major developmental milestone for young children in many cultures and focuses on strategies to help facilitate walking in young children with BVI. The authors’ review of the literature corroborates

the literature reviewed in this paper thus far that young children with BVI do experience differences in EGMD when compared to their peers who are sighted, with independent walking being among the top skills that children with BVI take longer to acquire than their peers who are sighted. The authors' review of the literature also aggregated several factors that contribute to the differences observed in locomotion and movement in young children with BVI: diminished incentive to move, restrictive environments, differences in attaining the concepts of body and of objects, the inability to monitor the environment visually, and fear of movement.

Although Lowry and Hatton (2002) concentrate on independent walking in their article, they emphasize the foundational role EGMD plays in preparing young children with BVI to reach that point in gross motor development. Learning to walk not only requires postural stability and the orchestration of motor skills, it also involves motivation and cognitive awareness (Lowry & Hatton, 2002). Lowry and Hatton (2002) also echo what others have pronounced before them: vision plays a dominant role in organizing environmental information for children and provides the primary incentive for moving out in space. Since research has documented that children with BVI, particularly those who have severe levels of vision impairment, exhibit developmental differences in the area of independent walking, the authors offer strategies to facilitate independent walking in young children with BVI. Similar to Sonksen et al.'s (1984) article, Lowry and Hatton (2002) provide specific strategies, with rationales, on how to help guide caregivers, educators, and related service professionals in supporting the development of gross motor skills in their children with BVI. The strategies they present center around: (a) incentives for movement; (b) trust (e.g., allowing children time to build and establish

relationships and trust with the adult(s) assisting them); (c) postural readiness (e.g., forming collaborative partnerships between families and health professionals, such as physical and occupational therapists, in early intervention programs to develop trunk strength and quality transitional movements); (d) cruising (e.g., using the cruising stage, when children use furniture or other surfaces to develop and support their rudimentary walking skills, to help children build comprehensive orientation to their immediate environment and to help them refine their basic postural skills); (e) familiar spaces and short distances (e.g., making children's early attempts at taking independent steps feel safe, inviting, and meaningful through the use of small, predictably arranged spaces and short travel distances); and (f) protective and support devices (e.g., using support walkers and/or push toys as necessary to facilitate independent walking).

Gross motor skill performance and physical activity in older children with visual impairment. Review of the literature thus far has corroborated that young children with BVI do experience developmental differences in the area of early gross motor skill development when compared to their peers who are sighted and “typically” developing. The impact of these differences may not be immediately discernible during the first few years of life for children with BVI, as the sequence in which they acquire major gross motor milestones and the age at which they do so may be different than what has been determined as “typical” for the normed population. In the long term, these developmental differences may become more apparent as children with BVI are observed moving their bodies and interacting with their surrounding environment.

Research in the areas of motor skill performance and physical activity in the past decade and a half have shown that children and adolescents (youth) with BVI,

particularly those who have no vision or severely impaired vision, consistently trail behind their peers who are sighted. Youth with BVI have been documented to have restricted motor activity in their upper and lower extremities (Brambring, 2001), reduced motor skill competency and proficiency (Haibach, Wagner, & Lieberman, 2014; Houwen, Hartman, & Visscher, 2009, 2010; Houwen, Visscher, Hartman, & Lemmink, 2007; Houwen, Visscher, Lemmink, & Hartman, 2008, 2009; Wagner, Haibach, & Lieberman, 2013), underdeveloped locomotor and object control skills (Haibach et al., 2014; Houwen, Hartman, et al., 2009; Houwen et al., 2008; Houwen, Visscher, et al., 2009; Wagner et al., 2013), and decreased levels of physical activity and fitness (Houwen, Hartman, et al., 2009; Houwen et al., 2010; Houwen et al., 2007; Kozub & Oh, 2004; Lieberman & McHugh, 2001; Lieberman, Byrne, Mattern, Watt, & Fernández-Vivó, 2010). Vision impairment, issues related to motor skill acquisition and mastery, strength and physical fitness, motor skill competency and proficiency, opportunities to learn and engage in movement activities, and familial and social expectations have been identified as predominant factors that contribute to these observed behaviors (Brambring, 2001; Haibach et al., 2014; Houwen, Hartman, et al., 2009; Houwen et al., 2010; Houwen et al., 2007; Houwen et al., 2008; Houwen, Visscher, et al., 2009; Wagner et al., 2013; Kozub & Oh, 2004; Lieberman & McHugh, 2001; Lieberman et al., 2010). Similarly, the majority of these factors were also observed in the literature for EGMD in infants and toddlers with BVI. Research in the areas of motor skill performance and physical activity in youth with BVI seem to be natural derivatives of the research that has been completed on EGMD in infants and toddlers with BVI. The results of this research provide a prospective view of the potential impact that developmental differences in the

development of early gross motor skills can have on children with BVI as they grow older.

The prevailing patterns of decreased motor skill proficiency and physical activity levels observed in youth with BVI are concerning. Although vision is not the single determinant of gross motor skill performance in children with BVI, the impairment of it may slow children's acquisition of movement patterns or lead them to develop qualitatively different movement patterns (Houwen et al., 2007). Consequently, poor motor skill performance can hinder children's engagement in movement activities that are more complex and executed in environmental conditions that are less stable (Haibach et al., 2014; Houwen et al., 2007; Houwen et al., 2008; Wagner et al., 2013). Additionally, low motor skill competency and proficiency can decrease children's opportunities to interact with the environment, resulting in limited movement experiences (Houwen et al., 2007) and decreased levels of physical activity (Houwen, Hartman, et al., 2009; Houwen et al., 2010; Houwen et al., 2007; Kozub & Oh, 2004; Lieberman & McHugh, 2001; Lieberman et al., 2010). General consensus within the literature for motor skill performance and physical activity in youth with BVI points to the need for earlier movement experiences and support to develop quality gross motor movement patterns in children with BVI (Brambring, 2001; Haibach et al., 2014; Houwen, Hartman, et al., 2009; Houwen et al., 2010; Houwen et al., 2007; Houwen et al., 2008; Houwen, Visscher, et al., 2009; Wagner et al., 2013; Kozub & Oh, 2004; Lieberman & McHugh, 2001; Lieberman et al., 2010).

Orientation and Mobility Support for Young Children with Blindness and Visual Impairment in Early Intervention

Research on EGMD in young children with BVI consistently shows that children with severely impaired vision tend to achieve developmental motor milestones later than their peers who are sighted (Adelson & Fraiberg, 1974; Brambring, 2006; Celeste, 2002; Ferrell, 1998; Ferrell et al., 1990; Norris et al., 1957; Troster & Brambring, 1993; Troster et al., 1994). O&M support during the early years of life has the potential to facilitate gross motor development in infants and toddlers with BVI and empower families to help their children discover and understand the world around them. O&M support provides individuals who are BVI with training to develop skills necessary to travel safely and independently through their environment. For young children, learning and mastering a combination of orientation skills and mobility skills enables them to navigate and manage their travel environments confidently, safely, and independently. Additionally, the quality of gross motor skill development during the early years of childhood can have a significant impact on the development and demonstration of skills related to O&M as children with VI grow older. Poor and/or underdeveloped gross motor skills can have detrimental effects on a child's ability to independently execute appropriate street crossings, demonstrate proper cane technique, manage changes in elevation (e.g., stairs and curbs), and travel for extended periods of time (Rosen, 2010).

Since young children develop and learn within the context of their families and routines (Bruder, 2010), the integral role families play in the development of young children with BVI cannot be stressed enough. The opportunities and encouragement

families provide infants and toddlers with BVI are essential to their development of skills related to early gross motor movement patterns, and, eventually, O&M. The familiarity of family members, family routines, and the home environment often provide young children with BVI with their first opportunities to securely understand that they can produce self-initiated movement and use these movements to accomplish a variety of tasks, including moving out to explore and interact with the environment around them, with no vision or impaired vision. The variability of family activities outside the home provide young children with BVI with opportunities to experience new environments and to encounter objects and situations that may be novel and unfamiliar to them, all within the security of their family unit. Through familiar and unfamiliar experiences with their families, children with BVI are afforded opportunities to construct knowledge and understanding of the world around them through movement and exploration.

Research on EGMD in young children with BVI uncovered that parents/caregivers often expressed their uncertainty and trepidation about caring for and raising their child with BVI. Therefore, it is critical to employ family-centered practices in EI O&M support services for young children with BVI and their families to address family needs, wants, concerns, and desires; foster self-efficacy and confidence to bolster growth; and improve family and child outcomes.

The World of “Tele”

Advances in technology have allowed various areas of healthcare and education to generate and utilize innovative practice and service delivery models to connect service providers with their clients and educators with their students. In healthcare, the broad term of “telehealth” is defined as “the use of electronic information and

telecommunication technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health and health administration” (Health Resources and Services Administration, 2019). Telehealth has been used to help practitioners (e.g., doctors, nurses, occupational therapists, speech-language pathologists) conduct remote screenings with their patients and clients and provide them with diagnoses, intervention, counseling, education, and specialized interdisciplinary care (Swanepoel & Hall, 2010; Cason, Behl, & Ringwalt, 2012; Havenga, Swanepoel, le Roux, & Schmid, 2017).

In education, the use of telecommunication technology to deliver and support educational services has been most prominent in the area of early childhood special education. The terms “telepractice” and “teleintervention” are the terms that have been closely associated with the provision of services via telecommunication technologies for families in early intervention (EI) programs. Telepractice is the “application of telecommunications technology to the delivery of speech language pathology and audiology professional services at a distance by linking clinician to client or clinician to clinician for assessment, intervention, and/or consultation” (ASHA, 2019).

Teleintervention is “the application of telehealth technologies to providing EI services” (National Center for Hearing Assessment and Management, 2019).

Historically, support for using telecommunication technologies as a service delivery model to provide specialized services to individuals who may have needed them, but may not have had proximate access to them, emerged early in the field of medicine. The use of telehealth/telemedicine models to provide patient care has been shown to improve health and wellness outcomes for patients and decrease economic costs for

services (e.g., time, travel, wages) for healthcare providers and patients (Harper, 2006; Marcin et al., 2004).

Telehealth/Telemedicine for Children with Special Healthcare Needs

Pediatric applications of telehealth were adopted early in the provision of medical and rehabilitative services to children with special healthcare needs. Marcin et al. (2004) examined access to subspecialty care by children with special health care needs via telemedicine in California over a three-year period. A telemedicine clinic was established in a rural community located about 90 miles away from a major metropolitan children's hospital to connect two primary care offices that provided care to local families of children with special health care needs to the children's hospital's pediatric subspecialty clinic. Each telemedicine consultation included the patient (child), the child's parent or guardian(s), and the referring healthcare provider (e.g., physician or physician assistant) and utilized live interactive video and audio, a peripheral general patient examination camera, and a high-speed internet connection.

After each telemedicine consultation, satisfaction surveys were administered to the child's parent/guardian(s) and the physician or physician assistant who was present during the examination. Satisfaction surveys were standardized and pretested and consisted of eight questions that required answers to be rated using a 5-point Likert scale. Parents were asked questions about the training of staff, ability to speak freely, and having needs met; providers were asked questions about video quality, audio quality, and confidence in performing exams; and both were asked about the ability to understand the

consultant providing services and overall satisfaction with the telemedicine visit/consultation.

Results of the study indicated that the majority of parents/guardians were satisfied with their care via telemedicine (average satisfaction ratings were either 4 - very good or 5 - excellent), as were the physicians and physicians assistants (average satisfaction ratings were either 4 - very good or 5 - excellent). Technical difficulties and not being able to hear or understand the consultant providing services were the most cited factors impacting satisfaction with the telemedicine visits. High satisfaction ratings by parents/guardians and rural healthcare providers over the course of the study helped Marcin et al. conclude that pediatric subspecialty telemedicine consultations are feasible for children with special healthcare needs in rural, medically underserved communities.

Harper (2006) conducted a study to evaluate the efficacy of providing multidisciplinary medical and health services via telemedicine to children with special health care needs living in several rural areas in Iowa. Three remote sites (two public schools and a small regional hospital) were established to connect the families in these rural areas with physicians and other healthcare professionals from the Center for Disabilities and Development, which was located about 100 miles away in a major metropolitan hospital. Studios equipped with large-screen monitors, ceiling-mounted or handheld cameras, and push-to-talk microphones were used at the remote sites to connect families via a fiber optic cable communication network to their healthcare providers at the center. The providers included physicians, nurses, social workers, educational specialists (e.g., psychologists, speech-language pathologists, and educational consultants), and other professionals (e.g., teachers and service providers). In addition to

the families and healthcare providers participating in the telemedicine group, a control group of families who received services face-to-face (F2F) at the center, along with their healthcare professionals, also participated in the study. Families in both groups were matched for age, gender, socioeconomic status, and special healthcare need type.

A comprehensive 55-item satisfaction survey, administered by phone, was used to collect data from the participants of the study. Complete survey data were obtained for 54 families and 135 providers in the telemedicine group and 50 families and 36 providers in the F2F group. Results of the study revealed that parents in the telemedicine group viewed their telemedicine consultations at least as effective as on-site, F2F consultations with their childrens' healthcare team. Providers were generally satisfied with the telemedicine evaluations and rated them as comparable to on-site F2F consultations. Providers who favored telemedicine consultations said telemedicine helped in the coordination and provision of patient care; offered patients access to higher quality care; generated positive feedback from patients; increased patient-provider contact, communication, and participation in consultations; and was a productive use of professional time. During the study, a subgroup of 36 families who experienced care in both F2F and telemedicine formats reported no significant differences in their ratings for either format; both were highly positive. Issues with technology and difficulty with being able to hear, communicate, and see others were common factors that impacted satisfaction ratings for both the families and providers in the telemedicine group.

As part of the study, the researchers calculated the economic costs of using telemedicine to provide care for the participants in the telemedicine group. Overall,

telemedicine provided significant cost savings for families and providers in travel time, travel costs, costs of on-site team consultations, and missed work time for parents.

Heimerl and Rasch (2009) conducted a study to evaluate a telehealth program at the University of New Mexico's Center for Development and Disability (CDD) that was developed to provide rehabilitative services (e.g., occupational therapy, physical therapy, speech-language pathology, psychology) to young children with special health care needs, ages birth to three years old, who participated in EI programs. A needs assessment conducted with EI providers and community partners before the initiation services revealed a need for "specialized therapy consultation and services from clinical specialists and continuing education for telehealth technology" (Heimerl & Rasch, 2009, p. 2). Three models of telehealth clinical services were used in the study to conduct follow-up visits with families and their local EI providers after in-person evaluations with a clinical therapist for the CDD; provide direct intervention services to children and their families; and offer monthly continuing education seminars to EI providers in rural areas. Families in the study received home-based EI services with their developmental specialist, case manager, or both while the CDD clinical specialist (e.g., occupational therapist) provided consultation through videoconferencing during the session. Families and their EI service providers connected with the CDD clinical specialists using Polycom equipment and an internet protocol with medium-high bandwidth. Satisfactory visual and audio quality, on-going technical support, and adequate training in the use of technology required for telehealth visits were essential in conducting successful visits.

The results of the study concluded that although telehealth services are not meant to replace in-person services, it is a viable alternative when in-person services are not

feasible. Heimerl and Rasch provided a methodological guide to promote successful clinical encounters using telehealth, which includes characteristics of telehealth providers and protocols for providing rehabilitation services. Additionally, the authors identify the following as barriers to telehealth that need to be addressed in future studies (Heimerl & Rasch, 2009): deep-rooted attachment to a hands-on approach to assessment and intervention, practitioner skills and training, patient populations that benefit from this mode of intervention, the lack of valid assessments and outcomes data, licensure laws, and reimbursement.

Telepractice/Teleintervention in Early Intervention

The efficacious implementation of telehealth with pediatric populations with special health care needs in the areas of medicine and rehabilitation motivated practitioners in the field of EI to conduct their own experimentations with “tele.” Cason (2009) investigated the potential of using telerehabilitation to provide consultative occupational therapy (OT) services to two families participating in EI services in a rural area of Kentucky over a period of 12 weeks. The families were currently receiving OT services from an EI OT provider who had to travel about 400 miles roundtrip, once a month, to provide services to the children. Both parents and the EI OT provider agreed that the children would benefit from more frequent in-person visits. However, due to a shortage in providers, this was not an option available to them. The families and the EI OT provider connected with each other within their local community through a telehealth site established by the Kentucky Telehealth Network. Technical support staff at the telehealth sites initiated the connection needed for videoconferencing and positioned the

cameras for the families for each visit. Only the child, caregiver, and EI OT provider participated in each visit.

Interviews of all the participants and journals kept by the families to record their impressions of the telerehabilitation visits were used to collect data for the study and provided answers for the following areas of inquiry (Cason, 2009): personal challenges related to accessing needed therapy services; expectations and level of satisfaction with telerehabilitation visits; strengths and weaknesses of the telerehabilitation program; and recommendations for program changes.

Results of the study showed that the families benefited from additional consultation visits via telerehabilitation with the EI OT provider, allowing the EI OT provider to provide the families with timely recommendations for other strategies to try and implement as their children mastered new skills. Additionally, both families reported high levels of satisfaction with their telerehabilitation experiences. The environment in which the visit was conducted in and the room arrangement were identified as challenges for both the families and EI OT provider during their visits (e.g., room needed to be large enough for the children and caregivers to play within view of the camera; same equipment at both the provider and family telehealth site would increase the variety of therapeutic opportunities and allow the EI OT provider to demonstrate activities to the caregivers). Both families expressed interest in technology that would enable them to conduct EI service visits within their home environment. During the study, a cost-analysis of service delivery was conducted and revealed significant cost savings in terms of travel time and costs for both the state of Kentucky and the EI service provider (e.g., for this study, the EI provider would save 9 hours of travel time and the state of Kentucky

would save \$390.00 in reimbursement rates for the therapist per visit if telerehabilitation was used to provide services to the families who participated in the study). Although the number of participants in Cason's study was small, the results contributed to the growing body of evidence that supports the use of telecommunications technology to provide EI services to families living in rural areas.

Kelso et al. (2009) conducted a pilot study to examine the feasibility of using virtual home visits (VHV) to provide EI services to four families living in rural communities across a large western state in the United States. The families had at least one child under the age of three years old who was receiving EI services through a Part C program. One interventionist who had a history of conducting in-person home visits with the families was selected to participate in the study and included the following: two speech-language pathologists, one occupational therapist, and one physical therapist. VHV were conducted in the child's natural environment (i.e., home) using a computer (desktop or laptop), webcam, microphone, and videoconferencing software. Survey and interview data were collected to determine the following: parent and interventionist satisfaction with and usability of VHV; parent and interventionist reactions to the VHV experience; and cost, time, and travel savings. During the study, families participated in one VHV visit per month, in addition to their regularly scheduled in-person home visit with their designated interventionist, for about four months.

The results of the study revealed that VHV were more favorable in the views of the interventionists than the parents. Overall, the interventionists were slightly more satisfied with the VHV experience and found the technology easier to use than the parents. Concerns related to the quality of audio and video were expressed by both the

parents and interventionists, with both wanting higher quality audio and video so they could see and communicate with each other better. For parents, the lack of physical interaction between their child and the interventionist; feelings of discomfort associated with seeing themselves on camera; difficulty in understanding what the interventionist was describing to them; challenges in using and becoming acquainted with the technology; and the need for additional training to use the technology more proficiently impacted their satisfaction with VHV experiences. However, parents reported that being able to review recordings of their home visits later and being able to keep scheduled visits during situations that may have resulted in cancellations of in-person home visits (e.g., ill child or adverse weather conditions that would have prevented travel) were benefits of VHV. For the interventionists, the implementation of therapies involving large-scale movements (e.g., crawling or walking) with the limited viewpoint of a camera; ability to provide effective instruction to parents in how to use new therapeutic equipment; and use of coaching practices with parents rather than direct instruction with the children were major points of concern with VHV. Further analysis of the data by the researchers uncovered the need for more training in the application and use of family-centered practices during home visits, particularly in the areas of coaching and modeling, for the interventionists.

Although the results of the VHV experience were mixed with the parents and interventionists, the outcome for cost savings in time and travel expenses were notable. Overall, VHV allowed the Part C program to save a mean of about \$500.00 across all participants for the duration of the study.

Olsen et al. (2012) evaluated various aspects of VHV in EI to determine the feasibility of “virtual intervention” (p. 267). Evaluation data were collected over a period of two years through the Virtual Home Visit Project. The project used VHV to provide EI services to 36 families who were already receiving services from an IDEA Part C program that provides EI services to families in three rural counties in the state in which they resided. In addition to the families, service providers who were providing EI services to these families also participated in the study. A total of 17 EI service providers participated in the study (six during the first year and an additional 11 during the second year) and represented the following disciplines: speech-language pathology, occupational therapy, physical therapy, child development, and special education. During the study, families maintained their regularly scheduled in-person home visits with their EI service providers and received additional visits through VHV. VHV were conducted in the child’s natural environment (i.e., home or community) using videoconferencing software and technology that already existed in the family’s home or loaned to families as needed by the project (e.g., laptop computers, webcams, speakers, microphones). Survey data and video recordings of the home visits were collected to determine the following: cost savings; participant comfort with technical skill requirements; parent and provider satisfaction with service delivery; and interactions between parent, provider, and child.

The results of the study showed promise for using VHV as a viable service delivery model for EI. In the area of technical skill needed to participate in VHV, the majority of the participants (both parents and providers) indicated they were very comfortable with the technical skill requirements for VHV. However, it was noted that providers who participated in year two of the project were not as comfortable with the

technical skill requirements as the providers in year one. Parent satisfaction with the service delivery models varied between the first and second years of the project. During year one, parents seemed to be generally satisfied with their in-person and virtual home visits. Over the six months in which survey responses were collected, the majority of parents rated their satisfaction with both service delivery methods as being the same. During year two, parents had more variable opinions of VHV. Over the ten months in which survey responses were collected, the majority of parents indicated that they preferred in-person home visits over VHV. Although parent satisfaction ratings for VHV were initially low, they did increase over time and by the end of the study, about half of the parents rated VHV as the same as in-person home visits. Factors that impacted parent satisfaction with VHV included technology issues; scheduling conflicts; preference for in-person home visits; and desire for hands-on training and demonstration of skills. Benefits included more interaction and hands-on work with their child; increased opportunity for visits in less than optimal conditions (e.g., geographic location with long travel times; season with high potential for and occurrences of illness); and greater time efficiency (e.g., fewer interruptions; better focus on purpose of the visit). Provider satisfaction with the service delivery models also varied between the first and second years of the project. During year one, the majority of service providers indicated that they were either very satisfied (32%) or somewhat satisfied (47%) with their VHV experiences. During year two, service providers seemed to be more satisfied with their VHV experiences (very satisfied - 52%; somewhat satisfied - 38%) than the service providers in year one. The factor that impacted provider satisfaction with VHV the most was technology issues.

Interactions between the adults and children (i.e., parent-provider; parent-child; provider-child) were evaluated through video recordings of the home visits (n = 184). A researcher-developed observation system was used to measure these interactions (Olsen et al., 2012) and videos were coded by two independent observers who were trained to collect data from the videos. Analyses of the data showed significant differences in all but three of the observed categories of interaction for the in-person and virtual home visits. As expected, both methods of service delivery addressed strategies to promote children's development. However, during in-person home visits, teaching and modeling; parent engagement in the implementation of strategies with their children; child engagement in strategies with the parent and/or provider; parent-provider discussions about non-programmatic topics; and provider attempts to engage children with conversation were observed to occur more often than in VHV. During VHV, coaching; parent-provider discussions about early intervention program topics (e.g., children's health and technology, not specific strategies to promote development); and parent discussion about strategies with providers were observed to occur more often than in-person home visits.

The cost of providing services for the IDEA Part C program during the project study period were calculated per visit according to type of service area (e.g., urban, rural, and frontier). VHV afforded the Part C program with cost savings and increased availability of services from EI providers. Cost savings were modest for families living in urban areas, but substantial for families living in frontier areas. Table 2 provides a snapshot of cost savings for the provision of EI services by the Part C program for one month during the project.

Table 2

Average Cost Savings for Providing EI Services Using Virtual Home Visits to 18 Families in September 2010 (Olsen et al., 2012, p. 272)

	Urban	Rural	Frontier
Time Savings	10 minutes	43 minutes	200 minutes
Personnel Costs	\$14.33	\$39.40	\$112.50
Mileage reimbursement	\$10.20	\$13.60	\$122.45

Olsen et al. (2012) identified the following factors as challenges to providing high-quality, consistent services to children with exceptionalities living in rural and frontier areas: distance, weather, geographic terrain (e.g., mountainous roads and canyons), and shortages of pediatric early interventionists. Additionally, the lack of local resources make it challenging to stay in compliance with regulations associated with providing services in the natural environment, timelines, personnel standards, and conditions for participation. EI programs must explore other ways to ensure that families with children with exceptionalities are receiving appropriate and equitable services. The use of VHV (e.g., telepractice, teleintervention) has been shown to reduce travel, lessen scheduling challenges, and result in cost savings and increased program compliance with state and federal regulations.

Telepractice/Teleintervention in Early Intervention for Children with Sensory Impairment

The pioneering works of Kelso et al. (2009) and Olsen et al. (2012) incited more research in the use of telecommunication technologies to provide specialized EI services to families of children with sensory impairment. Studies in the field of deaf and hard-of-

hearing (DHH) have been generating promising evidence for the use of telepractice/teleintervention service delivery models to provide specialized EI services to families of children with sensory impairment.

Blaiser et al. (2013) conducted a study to measure the cost and outcomes of using teleintervention (TI) to provide specialized EI services to families with children who are deaf or hard-of-hearing (DHH). A randomized control trial was utilized in this study to compare services delivered to families through in-person and TI home visits. Thirty-five families enrolled in a statewide EI program for the DHH participated in the study and were randomly assigned to receive services in either the in-person or TI home visit formats. The children in each group were matched according to age (all were under the age of 36 months), degree of hearing loss; geographic location (urban or rural); and communication modality (American Sign Language or Listening and Spoken Language). Additionally, nine service providers for the statewide EI program for DHH participated in the study and provided EI services to families in both the in-person and TI home visit groups. During the study, families maintained their regularly scheduled in-person home visits with their service providers and received an additional visit in the service delivery format in which they were assigned (in-person or TI). Families in the TI group and the service providers were provided with laptops pre-programmed with videoconferencing software. Pre- and post-test data were collected over a six-month period to determine child outcomes, caregiver and provider perceptions of TI, home visit quality, and costs. A variety of methods were used to collect the data and included the following: a criterion-referenced language developmental scale for child outcomes; researcher-developed self-report surveys for caregiver and provider perceptions of TI; a quality of

home visits rating scale for home visit quality; and a researcher-developed cost form for costs. Although, 35 families participated in the study, only 27 families had complete data for the final analysis.

The results of the study demonstrated that TI has the potential to help families of children who are DHH access specialized EI services, regardless of their geographic location. Child outcome data revealed that children in the TI group collectively scored higher in receptive and expressive language skills than children in the in-person group. Survey data provided insight on caregiver and service provider perceptions of and satisfaction with TI. Caregivers expressed satisfaction with TI in that it helped reduce the number of visits missed due to illness or bad weather; did not interfere with caregiver/family interactions and relationships with service providers; facilitated family and caregiver engagement during visits; and empowered caregivers to learn and implement strategies with their children. Issues with connectivity, ability to keep children engaged during visits, and feelings that visits were not as personal as in-person visits impacted caregiver satisfaction with TI. Service providers expressed satisfaction with TI in that it helped them to feel more comfortable with coaching, shift the focus of interactions during visits from provider-child interactions to parent-child interactions; reduce travel time to provide services to families who live a far distance away; and avoid exposure to family members who are ill. Personal (i.e., in person) contact with families and the provision of services that support natural environments were factors that impacted service provider satisfaction with TI. Notably, Blaiser et al. did not report whether issues with connectivity or technology influenced service provider satisfaction

with TI, just that the use of TI during the study increased service providers' use of videoconferencing in their personal lives.

Video recordings of the home visits for four families in the TI group and four families in the in-person group were used to evaluate the quality of home visits during the study. The videos were independently scored by the author of the home visiting rating scales. Analyses of the data show that the TI group had higher scores in the following areas: home visitor responsiveness to family; home visitor relationship with family; home visitor facilitation of parent-child interaction; home visitor non-intrusiveness; parent-child interaction during home visit; and parent engagement during home visit. The in-person group scored higher in the area of child engagement during home visit. The only factor that was found to be statistically significant ($p < .05$) was parent engagement during home visit, indicating that parents were more engaged during TI home visits than in-person home visits.

Costs of providing services were calculated for both service delivery models (i.e., in-person and TI). Estimates of the amount of time it took to provide services to families, prepare for visits, and document data/keep records were similar for both groups. In comparison to TI visits, in-person home visits cost an average of \$77 more in provider time (salary and benefits) and expenses (driving expenses) per home visit. However, additional costs for the TI group included enhanced internet service and software licensing for the service provider (\$60/month); technology (e.g., computer, microphone, camera, and monitor), enhanced internet service, and software costs for the families (\$1,000 one time cost for technology and \$60/month for internet and software per family; and technical support personnel for both the families and service providers (\$50 per

month per family). Using these figures, Blaiser et al. estimated the cost of providing services over a two-year period for 15 families, which is assumed to be the number of families on an “average” caseload for a single service provider in the study’s partnering statewide EI program for the DHH. Blaiser et al. estimated that if every child received an average of one visit per month, in-person home visits would be less expensive than TI home visits. However, if every child were to receive an average of three to four visits per month, TI home visits would result in substantial cost savings over in-person visits (e.g., between \$56,000 and \$87,000 over a two-year period).

Blaiser et al. (2013) state that even though it has been demonstrated that children who are DHH benefit from EI services, many of them are not receiving appropriate services. Factors that contribute to the challenges that families face in accessing appropriate services include the following (Blaiser et al., 2013): the severe shortage of professionals who are trained and knowledgeable about current methods for educating children who are DHH effectively; the low incidence of childhood hearing loss, which may make it difficult for children who are DHH to access/receive the specialized services they need if they live far away from the organization or agency that provides these services; the lack of a concentrated number of children who are DHH in a given area (e.g., rural areas), which may make it challenging to find appropriately trained EI service providers to serve in that area; and constraints associated with the geographic dispersion of children who are DHH, scheduling, and transportation. Blaiser et al.’s (2013) comprehensive investigation of the costs and outcomes of providing specialized EI services for families of children who are DHH provides a preliminary glimpse into the

viability of using distance technologies to provide specialized services for families of children with sensory impairment.

Behl et al. (2017) expanded on Blaiser et al.'s (2013) research and conducted a similar study to compare the delivery of EI services via in-person and telepractice (i.e., virtual) home visits to 48 families of children who are DHH in five EI programs across the United States. In addition to the families, 15 EI service providers from these EI programs participated in the study. The participants originated from EI programs who were already utilizing telepractice to provide services to families in their programs. Each EI program was responsible for recruiting families and providers, administering the research protocols, and providing their own technology for telepractice home visits and ensuring that families and providers had adequate internet connectivity. The children who participated in the study were match for chronological age, degree of hearing loss, other exceptionalities/conditions, number of prescribed EI visits, and their EI service provider and then randomly assigned to the in-person or telepractice home visit groups. Total random assignment could not be employed during this study, as the researchers needed to accommodate the needs of families based on logistical considerations, such as personal life circumstances. The children were an average age of 19-20 months at the start of the study and received at least four home visits for EI services each month.

The EI service providers who participated in the study included educators of the DHH, speech-language pathologists, and auditory verbal therapists. All the providers had experience working with children who were DHH in EI, but variable experience in conducting home visits via telepractice (e.g., from no experience or more than two years). During the study, all the EI service providers provided services to families in both the in-

person and telepractice groups. While participating in the study, families maintained the number of home visits that had been prescribed according to their Individualized Family Service Plan (IFSP). Families in the telepractice group received most of their EI services via telepractice (90%) and the remainder in person (10%). Families in the in-person group received all their EI services in person. Telepractice home visits were conducted using a variety of equipment (e.g., iPads, laptops, or whatever hardware the families decided to use) and video conferencing software (e.g., FaceTime, Zoom, MOVI, Vidyo), as each EI program site was responsible for fulfilling the technology requirements for the study.

Video recordings of the home visits and a variety of assessment tools were used to collect data over a period of six months. Data collected during the study were used to determine child, family, and service delivery outcomes. Child outcomes were measured using a standardized, norm-referenced language development test; a criterion-referenced auditory skills checklist; and a communication developmental inventory. Family outcomes were assessed using a nationally recognized family outcomes survey and a quality of home visits rating scale. Service delivery outcomes were examined using a researcher-developed self-report monthly time and activity form. Data collected from each EI program site were sent to the researchers for analysis.

Results of the study showed positive outcomes for the use of telepractice as a service delivery model for providing specialized EI services to families of children who are DHH and supporting their children's development. Analyses of the data for child outcomes showed no statistically significant differences in pre-test scores for the children in the in-person and telepractice groups. However, post-test scores revealed significant

gains in age equivalent scores for the children in both groups on the standardized, norm-referenced language development test, with between group differences favoring the telepractice group in receptive communication and total language scores. Data analyses for the other measures indicated that the two groups were not statistically different.

Analyses of the data for family outcomes revealed no significant differences in pre- and post-test scores for the family outcomes survey between the in-person and telepractice groups and significant differences in the areas of provider responsiveness to the caregiver and caregiver engagement, favoring the telepractice group, for the quality of home visits rating scales. Similar to Blaiser et al.'s (2013) study, video recordings of the participants' home visits were used to evaluate the quality of home visits. During the study, one video recording of a home visit was attempted for each family, and videos for 17 participants in the telepractice group and 19 participants in the in-person group were used in the final analysis. The videos were independently scored by one of the authors of the home visiting rating scales and the results showed that both groups performed better than average in home visiting practices.

Analyses of the data for service delivery outcomes showed that preparation, coordination, and intervention time for visits (12 to 13 minutes to prepare for a home visit session and 14 to 15 minutes to coordinate with other EI team members) and the number of cancelled visits were similar for both groups. Contrary to what has been reported in previous studies, cancellations seemed to have minimal impact on the service providers, in both groups, participating in this study. The primary reasons for cancellations were illness for both groups, weather for the in-person group, computer or internet issues for the telepractice group; and family scheduling problems and no-shows for the telepractice

group. Based on the nature of conducting home visits in-person or via telepractice, each group had its own unique set of circumstances for service delivery. Since travel was required for the service providers in the in-person group, the average drive time and distance traveled were calculated at 61 minutes and 39 miles. Since technology use was required for telepractice visits, the time it took to set up for visits and troubleshoot problems when they arose averaged about 11 minutes.

Behl et al. (2017) acknowledged that even though the use of telepractice did not seem to dramatically reduce the number of cancelled visits or reduce the negative impact on provider schedules as “an often-theorized consequence of in-person visits” (p. 158), it did positively impact outcomes for children who are DHH (gains in standardized assessment measures); service delivery for families (increased number of visits and minutes of intervention received); and costs for programs (reduced travel time for service providers). As it has been observed in previous studies that evaluated virtual home visits in EI, telepractice continues to promote the use of coaching with families within the context of natural environments; which is best practice in EI, but reportedly a common challenge in real-world practice for service providers during in-person home visits. Behl et al.’s (2017) systematic study of the differences in outcomes for providing specialized services to families of children who are DHH in EI generated more evidence that using distance technologies to provide specialized services for families of children with sensory impairment is viable.

Stredler-Brown (2015) conducted an exploratory study to investigate provider attributes and provider use of family-centered EI provider behaviors in the provision of specialized services to families of children who are DHH in EI via telepractice. The

participants of the study included 16 EI providers who worked for eight different EI programs that provided Auditory-Verbal Therapy (ATV) services nationwide. Survey data and digitally-recorded video of the telepractice intervention sessions were used to collect data for the study. Survey data were used to characterize provider attributes, and one video recording of a telepractice intervention session for each participant was used to examine the frequency in which family-centered early intervention (FCEI) occurred during the session. Each telepractice intervention session included the provider (i.e., participant), the mother, and the child who was DHH (age 36 months old or younger). Data from this study were compared with data reported for face-to-face intervention sessions in the literature.

Results of the study indicated that the demonstration of FCEI provider behaviors by providers occurred more frequently in telepractice intervention sessions than in face-to-face intervention sessions. Although, providers in both the telepractice and face-to-face intervention session groups utilized similar amounts of direct instruction (a strategy that is more provider-focused than family-focused) during intervention time, the providers in the telepractice group utilized observation, parent practice with feedback, and child behavior with provider feedback (strategies that are more family-focused) more frequently during intervention time than the face-to-face group. The results of the study also revealed that there was a statistically significant relationship between provider attributes (specifically, experience in using FCEI measured in years) and the use of telepractice; suggesting that providers who had more years of experience in providing FCEI had more engagement with telepractice in practice (i.e., there were more willing to try and use it).

Stredler-Brown's (2015) study was exciting, as it examined telepractice as it was actually applied in practice; in comparison to previous studies that implemented telepractice as part of an investigation to evaluate feasibility. The results of Stredler-Brown's study contributes to the body of evidence that supports telepractice as an effective way to enhance the implementation of FCEI in providing specialized EI services to families of children with sensory impairment.

Summary

Although there is a history of using technology to successfully provide healthcare and therapeutic assessment and intervention (Behl et al., 2010; Boisvert et al., 2010), there are no previous research studies that address the use of teleintervention in providing any specialized instruction/services to young children with BVI and their families in the EI system in the United States. Additionally, other areas of EI (e.g., the fields of DHH and speech-language pathology) have used telecommunication technologies (i.e., telepractice or teleintervention) to successfully provide services to families with limited personnel in rural and remote areas. The use of teleintervention supports provides a viable method of best practice in EI (Olsen et al., 2012), which includes coaching. Coaching from a distance supports a philosophy of building the capacity and enhancing the strengths and resources of families (Dunst & Trivette, 2009; Hadders-Algra, 2011; Rush & Shelden, 2011). Coaching is defined as "professional guidance aiming to empower caregivers so that they can make their own decisions during daily care activities. This implies that coaching differs largely from instruction" (Dirks & Hadders-Algra, 2011, p. 66). With teleintervention, EI providers are required to improve their communication and modeling skills so parents become fully engaged and confident in

their ability to work with their child. Research investigating teleintervention models demonstrated an increased use of the family-centered coaching model of intervention (Behl et al., 2017; Blaiser et al., 2013; Heimerl & Rasch, 2009; Kelso et al., 2009; Olsen et al., 2012; Stredler-Brown, 2015).

With other fields paving the way to address concerns with personnel shortages, access to EI services in rural and remote areas, and cost efficiency with teleintervention, the field of BVI in the United States has not yet utilized this service delivery model to address its own concerns with personnel shortages, access to EI services in rural and remote areas, and cost efficiency. As the technology for teleintervention becomes more available and reliable and the use of teleintervention becomes a more viable way to provide educational services in the EI system, additional research is needed to determine the potential that teleintervention has for increasing the availability of O&M support services for very young children with BVI and their families in EI programs.

CHAPTER III

METHODOLOGY

Teleintervention has been shown to be an effective method of providing early intervention (EI) services to very young children and their families in the sensory impairment field of deaf and hard of hearing (Behl et al., 2017; Blaiser et al., 2013). The purpose of this study was to show that teleintervention can also be used to provide EI services, specifically orientation and mobility (O&M) support services, to very young children and their families in the sensory impairment field of blindness and visual impairment (BVI). The use of teleintervention to provide O&M support services in the EI system successfully would not only help children with BVI and their families access O&M support services with qualified personnel that would otherwise not be typically available to them, but it would also encourage the field of BVI to use teleintervention as a viable option to address concerns related to personnel shortages and access to EI services, and may result in more cost-efficient service delivery in the future.

The following research questions guided this study:

- Q1. How do caregiver perceptions of O&M support services differ when services are provided via teleintervention and in-person service delivery models?
- Q2. How do home visiting practices differ between teleintervention and in-person service delivery models?
- Q3. How do the costs of providing O&M support services differ between teleintervention and in-person service delivery models?

Research Design

Research in the field of sensory impairments can be challenging due to the nature and prevalence of sensory impairments. According to data collected during the 2000 Census, the number of individuals who had sensory impairments (blindness/visual impairment (BVI), deafness/hard of hearing (DHH), deaf-blindness) was approximately 3.6% of the total population of the United States (Waldrop & Stern, 2003). Data from the 2017 Disability Statistics Annual Report revealed that 3.5% of individuals in the United States had hearing impairment in 2016, with 0.5% of those individuals being ages 5 and under, and 2.4% of individuals in the United States had vision impairment in 2016, with 0.4% of those individuals being ages 5 and under (Kraus, Lauer, Coleman, & Houtenville, 2018). The relatively low number of individuals with sensory impairments within the general population categorizes sensory impairments as low-prevalence exceptionalities (Ferrell, 2011).

The constraints of working with and studying such small, heterogeneous populations have compelled researchers in the field of sensory impairments to explore and use various research methods, outside those that are conventionally used to study larger populations of individuals with or without exceptionalities, to produce evidence-based research to support educational methodologies and practices within the field. Since there have been no studies conducted thus far to investigate the use of teleintervention in delivering specialized services to children and their families in the field of BVI in EI, the nature of this research study was preliminary and exploratory.

Qualitative Research and the Case Study Approach

Qualitative research is a process of inquiry that focuses on “understanding the meaning of experience” (Merriam & Tisdell, 2016, p. 21). The purpose of this method of inquiry is to gather in-depth information about the phenomena under study in its natural context and attempt to make sense of it “in terms of the meanings people bring to them” (Denzin & Lincoln, 2018, p. 10; Creswell & Poth, 2018; Merriam & Tisdell, 2016). In qualitative research, “the researcher is the primary instrument in data collection and analysis, the process is inductive, and rich description characterizes the end product” (Merriam & Tisdell, 2016, p. 21).

A case study approach was selected for this research study because as the researcher, I wanted to know how O&M support services delivered via teleintervention would compare to in-person visits for families of children with BVI in EI. Based on my success with O&M support services via teleintervention (from this point forward, I will be referencing this term as “tele-O&M”) with Gabriel and JoAnn, I was curious to see how it would work for the BVI-specific EI program in my state. A case study is described as “an in-depth description and analysis of a bounded system” (Merriam & Tisdell, 2016, p. 37), where the unit of analysis characterizes the study (Merriam & Tisdell, 2016). The approach allows the researcher to examine and understand a phenomenon in-depth, within its real-life context, using multiple sources of evidence (Creswell & Poth, 2018; Merriam & Tisdell, 2016; Stake, 1995, 2006; Yin, 2014). Case studies are adept at answering research questions that want to know “how” or “why” (Yin, 2014). For my research, the provision of O&M support services to a child with BVI and his or her family using two service delivery models for home visits (the unit of

analysis or “case”) within a BVI-specific EI program in my state (bounded system) was studied. Information about the home visit experience via tele-O&M and the traditional in-person visit were collected through multiple data sources: interviews, personal reflections, artifacts, and video-recordings. I synthesized this trove of information to help answer my research questions:

- Q1. How do caregiver perceptions of O&M support services differ when services are provided via teleintervention and in-person service delivery models?
- Q2. How do home visiting practices differ between teleintervention and in-person service delivery models?
- Q3. How do the costs of providing O&M support services differ between teleintervention and in-person service delivery models?

In my study, I examined multiple cases to gain further understanding of O&M support services as they are currently delivered to families in the EI system (in person during home visits) and through teleintervention (during home visits with the support of a teacher of students with visual impairments who specializes in early intervention (EI-TSVI) in my state. A case study where multiple cases are used is generally referred to as a multi-case (Stake, 1995, 2006), multiple-case (Yin, 2014), or comparative (Merriam & Tisdell, 2016) study. In a multiple case approach, the researcher studies each individual case and then makes comparisons across cases, yielding evidence that is more compelling and a study that is more robust (Yin, 2014). The multiple case approach has been favored as a common strategy to increase the variation across cases; enhance the external validity, or generalization, of the outcomes of the study; and make the interpretations more compelling (Merriam & Tisdell, 2016).

The researcher and the researcher perspective. The perspective of the researcher is an integral part of the research process in qualitative research (Merriam & Tisdell, 2016). “Qualitative researchers are interested in understanding how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences” (Merriam & Tisdell, 2016, p. 6). My perspective as researcher made a unique contribution to this research as I was the certified O&M specialist (COMS) who provided O&M support services to the families participating in this study. I was deeply invested in this project as the outcomes will impact how O&M support services are delivered to the families who are receiving BVI-specific services in EI in the state in which I live and work. I have been working as an O&M specialist for 15 years, and I have experienced firsthand the lack of EI O&M support services for families of children with BVI in my state. I have always had the belief, as an O&M specialist, that we should be providing O&M support to children with BVI at a younger age than what has typically been done in our field (i.e., preschool-age and older). Since I have a background in exercise and sport science, I felt that many of the issues related to gross motor development that I observed in older children with BVI would have been mitigated if they had received O&M support services earlier in life.

During my doctoral studies, I had the opportunity to experiment with providing O&M support services using distance technology (Skype) to a child with BVI in EI in another state with one of my doctoral colleagues who was an EI-TSVI at the time. She was frustrated that her access to O&M support services for this family was limited. She knew the child needed O&M support and reached out to me to help him as part of a research project for one of her doctoral courses. The success of our research project

made me think about the need for O&M support services for infants and toddlers with BVI in my state and how I could help advocate for and increase the presence of O&M support services for them. Luckily for me, the director of BVI-specific services in EI for the organization that I work for was very interested in increasing the presence of O&M support services for the families enrolled in her program. For the past five years, she and I have been working together with her team of EI-TSVIs to assess the need for EI O&M support services in our state and make O&M support services more visible and available for families receiving BVI-specific EI services. I have been coordinating and providing EI O&M support services since then and the number of families being referred for and receiving services is starting to outpace my ability to provide the level of services I want to provide for families. My ultimate goal is to have more of my O&M colleagues at my organization help me with providing O&M support services to families of children with BVI in EI. However, this will take some time as some of them are not trained well in working with families within the parameters of Part C of IDEA (e.g., understanding and implementing family-centered practices) and the number of students on my and my O&M colleagues' school-age caseload are growing. I am thrilled that the number of families and children with BVI who are being referred for and receiving O&M support services in EI is increasing, but being the only O&M specialist to see and work with them all is not a sustainable practice. I am hoping that teleintervention will be a viable option for me to use as a service delivery model to continue making O&M support services available for families of children with BVI in EI.

Interpretive framework and philosophical lens. The effort to make O&M support services more available to young children with BVI and their families in EI is the

primary driving force behind this research. The process of finding what will work, understanding how it works, and evaluating if it truly does work is, in essence, a very pragmatic approach to finding solutions to a problem. The philosophical tradition of pragmatism embraces this worldview of problem-solving through human experiences (Creswell, 2014; Creswell & Poth, 2018; Morgan, 2014) and encapsulates the nature of this research. Based on these views, the interpretive framework and philosophical lens that governed my research is rooted in methodological pragmatism.

An interpretive framework is defined as “the paradigms, or the beliefs that the researcher brings to the process of research, or . . . the theories or theoretical orientations that guide the practice of research” (Creswell & Poth, 2018, p. 22). An interpretive framework based on pragmatism focuses on the “outcomes of the research – the actions, situations, and consequences of inquiry – rather than the antecedent conditions” (Creswell & Poth, 2018, p. 26). Researchers who are pragmatists “look to the ‘what’ and ‘how’ of research based on its intended consequences” (Creswell & Poth, 2018, p. 27). They will do the following (Creswell & Poth, 2018): use multiple methods of data collection to best answer the research questions; employ multiple sources of data collection; focus on the practical implications of research; and emphasize the importance of conducting research that best addresses the research problem. The procedures, or methodology, of qualitative research are “characterized as inductive, emerging, and shaped by the researcher’s experience in collecting and analyzing the data” (Creswell & Poth, 2018, p. 21). The research process that the qualitative researcher follows is inductive, from the ground up, rather than handed down entirely from a theory or from the perspectives of the inquirer. . . . During the data analysis, the researcher

follows a path of analyzing the data to develop an increasingly detailed knowledge of the topic being studied. (Creswell & Poth, 2018, p. 21).

The vision that I had for my research, the answers I sought for my research questions, and the impact of the outcomes of my study aligned well within the interpretive framework of methodological pragmatism. Learning about the tele-O&M experience through a variety of data sources, particularly through the perspectives of the people involved, and being able to compare it to the traditional experience of in-person home visits provided me with a deeper understanding of its practicality and utility.

Research Methods

Over a period of four months, three case studies were conducted with three families of children with BVI participating in EI services provided by a BVI-specific EI program located in a state in the western United States. The service provider who provided BVI-specific EI services to each family, referred to as a teacher of students with visual impairments who specializes in EI (EI-TSVI), also participated in the study. The name of the organization and the program that provided BVI-specific EI services to families of children with BVI in the state in which this study was conducted and the names of the participants have all been changed to protect the identity of all who were involved in the study.

Participants

The selection of who is to be studied is an important part of the process in qualitative research, as this type of research seeks to understand the meaning of experiences. The unit of analysis (i.e., the sample) varies, depending on the researcher and the type of sampling strategy that is employed for the study (Creswell & Poth, 2018;

Merriam & Tisdell, 2016). In research, there are two basic types of sampling: probabilistic and non-probabilistic (Merriam & Tisdell, 2016). Probabilistic sampling (e.g., random selection) allows the investigator to “generalize the results of the study from the sample to the population from which it was drawn” (Merriam & Tisdell, 2016, p. 96). Since the generalization of results, in a statistical sense, is not a goal of qualitative research, non-probabilistic sampling is the preferred method of sampling for qualitative researchers (Merriam & Tisdell, 2016).

The most common form of non-probabilistic sampling is purposive sampling, where the investigator selects a sample that he or she can learn from the most based on the assumption that he or she wants to discover, understand, and gain insight (Creswell & Poth, 2018; Merriam & Tisdell, 2016). The participants who participated in this study were deliberately selected to diversify the cases being studied and to provide a snapshot of the families and EI-TSVIs with whom I work in my role as an O&M specialist.

Recruitment. After the University of Northern Colorado’s Institutional Review Board (IRB) approved my research in December 2018 (see Appendix A), I first requested permission to conduct the study with staff and families involved with the BVI-specific EI program (EIP) at an organization that provides statewide BVI-specific services to children with BVI ages birth to 22 (BVIO) via email. The Director of EIP supported my research and granted me permission to conduct the study with the program’s staff and the families it served.

In my recruitment of participants, I initiated contact with six EI-TSVIs by email to invite them to participate in the study and to see if they had any families whose children met the criteria for the study. Children in the study met the following criteria:

(a) between 12 and 30 months of age; (b) currently receiving EI-TSVI services; and (c) qualified for O&M support services after referral and evaluation. Since the EI-TSVIs and I were employed by BVIO, and I have worked with most of them in providing services to families in EI for at least a year or more, I contacted these specific six EI-TSVIs based on my knowledge of the geographical areas they covered. I employed this recruitment strategy because in my current position as the only O&M specialist at BVIO to provide EI O&M support services in my state, I travel all over the state to evaluate and work with families, and I wanted this study to be representative of my caseload in EI. All of the EI-TSVIs I contacted expressed their interest in and willingness to participate in my research; however, only three of the six had families who met the criteria for the study. The EI-TSVIs who participated in the study all had at least one year of experience working for BVIO.

Once the qualifying families were identified, I provided the EI-TSVIs with information about the study (electronically by email and/or paper copy in person) to give to their respective families and scheduled O&M evaluation sessions with each family to ensure their child qualified for O&M support services. Information about the study included the consent form to participate in the research study and a demographics information form – the same information was provided to the EI-TSVIs once they agreed to participate in the study. Once the O&M evaluations were complete, O&M support services were added to each family's Individualized Family Service Plan (IFSP) to establish and commence services. The recruitment of all participants for the study was completed by the start of January 2019. A copy of the participants' consent forms can be found in Appendix A.

Family and child participants. The families who participated in the study were recruited by their respective participating EI-TSVIs with whom they were currently receiving BVI-specific EI services. Additionally, their children had been referred and deemed eligible for O&M support services prior to the start of the study. The participants included children with varying levels of vision impairment (i.e., the continuum of “good vision” with restricted visual fields, to low vision, to severely impaired vision, to no vision), and were all within the chronological age range of 12 months and 30 months at the start of the study. Since children in the EI system in this state transition out of the system at the age of 36 months, the maximum age at which children could be included in this study was 30 months. Although additional exceptionality is known to impact the development of children with BVI (Ferrell, 1998), the exploratory nature of this study did not preclude children with BVI and additional exceptionalities from participating in this study. A total of three families participated in this study, with two completing the study and one partially completing the study.

Information about the participants of this study were collected from a researcher-developed demographics information form (see Appendices B and C) and researcher-participant interviews. For the families, additional information about service time and family outcomes in the area of O&M were attained through a review of records.

Context of the Study

The setting for this study initially started in the homes of the families who lived in various communities around the state. Two families lived in communities located in suburban areas that were approximately 20 miles and 300 miles away from the BVIO campus where my office is located. One family lived in a community located in a rural

area approximately 100 miles away from the BVIO. The BVIO is located in a major metropolitan city in the state. All three of the families lived in ranch-style homes, and home visits for EI were mainly conducted in their living rooms and front and/or back yards. As the families became more comfortable with me and O&M support services, and when the weather permitted, the setting moved out to community spaces that included the neighborhood they resided in, outdoor parks, and the BVIO campus. Regardless of where families live in the state, or the distance and time required to travel there, EI O&M support services are provided to all families who have children who need them.

Current service delivery model for orientation and mobility support services in early intervention. Children with BVI and their families currently receive EI O&M support services (i.e., evaluation, monitoring, consultation) during home visits with an EIP EI-TSVI in the state in which this study was conducted. The effort to introduce and increase the presence of EI O&M support services in this state has only been in progress for about five years. Before then, EI O&M support services in this state were very sporadic and almost non-existent. Since then, processes have been established to facilitate the referral and evaluation of children with BVI for EI O&M support services. Referrals for O&M support evaluations are initiated by the EI-TSVIs. Reasons for referral can range from children who seem to exhibit fear or extreme hesitation in exploring and moving about in the immediate environment, to family concerns with safety while traveling independently in familiar and/or unfamiliar areas.

Once O&M evaluations are completed, recommendations for O&M support services are presented and the delivery of services begin shortly thereafter for children

who have been deemed eligible for services. O&M support services are currently delivered during home visits with the EI-TSVIs for the comfort of the family and availability of personnel to provide services (at present, there is only one O&M specialist providing O&M support services in EI in this state and that O&M specialist is the researcher). Based on my anecdotal experience working with families with children with BVI in EI for the past five years, families often prefer, and request, that I, the O&M specialist, complete home visits cooperatively with the EI-TSVIs. Reinforcement of O&M concepts and skills with children with BVI and their families by the EIP EI-TSVIs between O&M support visits has been a benefit of O&M specialist-EI-TSVI co-home visits.

Research service delivery model for orientation and mobility support services in early intervention. O&M support services for this study were provided by the investigator, a certified orientation and mobility specialist (COMS). Since I am the only COMS providing O&M support services to children receiving BVI-specific services from an EI-TSVI in the state in which this research study was conducted, I was the sole provider of O&M support services for in-person and teleintervention visits for the families participating in this research study. Families participating in this research study received O&M support service visits from me in accordance with their IFSP: one 45-minute visit per month. During the study period, each family received one additional visit per month to provide them with the opportunity to receive services in both in-person and teleintervention formats.

In-person visits were conducted with families in their home with their respective EI-TSVI and me, which is the traditional model of service delivery for O&M support

services in this state at present. Teleintervention visits were conducted with families in their home with their EI-TSVI, with me participating via videoconference (i.e., teleintervention). The teleintervention visit was facilitated by the EI-TSVI during an in-home visit. During the teleintervention in-home visit, the family and EI-TSVI connected with me using the following technologies: a wireless internet connection or mobile hotspot, a tablet or laptop, and videoconferencing software (e.g., Zoom or FaceTime). The EI-TSVI used her or his work-assigned tablet or laptop to connect to the internet, initiate the videoconferencing software, connect with me via the videoconferencing software, and end the session at the conclusion of the visit. The wireless internet connection was provided by the family (with their permission) or by the EI-TSVI via a mobile hotspot. I used a laptop, with a high-speed wireless internet connection, to connect with the family and EI-TSVI. I recorded each in-person and teleintervention home visit and used the video for data analysis after each session.

The home visit experience. During a typical in-person home visit, the EI-TSVI and I arrive at the family's home and go through our greeting routine: say "hello," move into the area of the home where the family would like to conduct the visit (e.g., living room or front room), situate ourselves (either on the floor or on the couch or a chair, but it is usually the floor), catch up on what has been going on since our last visit, and share any exciting news or developments. Once we are settled, we continue on with what the EI-TSVI and I have planned for the visit, making sure to follow the lead of the parent(s)/caregiver(s) and child and focusing on what they are interested in working on that day. Throughout the visit, the EI-TSVI and I intersperse our areas of knowledge to help the families and children learn and practice strategies that are relevant and useful to

them (e.g., the EI-TSVI would introduce pre-braille skills, such as sorting objects by texture to develop tactile discrimination, and I would introduce basic cane techniques, such as learning to sweep a cane tip from shoulder to shoulder, for a child who has no functional vision). Depending on what families are working on in the area of O&M, we will go outside for part of the visit to focus on O&M-related skills. Towards the end of the home visit, we usually return back to the area we started in to review the strategies we worked on; answer any questions or concerns that the family may have; write visit notes to leave with the family to help them remember what to work on until the next visit; schedule our next visit; sign our visit logs, and say our goodbyes.

During, the teleintervention home visit, we usually follow the same routine as the in-person home visit, with the exception of the EI-TSVI connecting me via videoconferencing software after she or he arrives at the family's home, facilitating the visit by being the camera person and clarifying communication lines if they are unclear, and disconnecting me after we conclude the visit. Occasionally, everyone at the house will forget that I am connected with them via technology when I am quiet for a few minutes at a time. In fact, I have startled them sometimes when I start speaking to comment about what is going on after being quiet for a period of time.

Overall, home visit sessions with O&M support focused on the following: (a) coaching caregivers to enhance their children's awareness and development of basic O&M skills, and (b) empowering caregivers to help their children learn about and explore the environment around them. O&M support session activities reflected families' routines within their natural environments and family priorities for O&M skill development.

Data Sources

Information about the home visit experience via tele-O&M and the traditional in-person visit were collected through multiple data sources over a period of four months. The data sources I relied on to corroborate the information I gathered for my research included interviews, field notes (i.e., reflective journal entries), video-recorded sessions of home visits, and documents (i.e., demographics information forms and cost form). The collection of data through multiple sources is important in case study research because it helps the investigator to do the following: (a) obtain an in-depth look at what is being studied through multiple perspectives, and (b) triangulate emerging results (Merriam & Tisdell, 2016). The triangulation of data involves comparing and cross-checking data that has been collected using more than one data collection method, multiple sources of data (e.g., observations, interviews, documents), multiple investigators, or multiple theories (Merriam & Tisdell, 2016). Triangulation is a powerful strategy used in qualitative research to substantiate the investigator's findings and increase the credibility (i.e., internal validity) of his or her research (Merriam & Tisdell, 2016).

Interviews. In qualitative research, interviews allow the researcher to “explore in detail the experiences, motives, and opinions of others and learn to see the world from perspectives other than their own” (Rubin & Rubin, 2012). Interviews are conversations with a purpose and are widely used in qualitative research for data collection (Merriam & Tisdell, 2016). In my research, I used interviews to assess caregiver perceptions of O&M support sessions and to corroborate home visiting practices with the EI-TSVIs.

Before I started my first O&M support sessions with the families, I interviewed each of their EI-TSVIs to gather information about their views on O&M support for young children with BVI in EI, some of the challenges they and their families faced in relation to O&M needs, and potentially using teleintervention to provide O&M support services to families in EI. At the end of the study, I interviewed the EI-TSVIs again to gather information about their thoughts on using teleintervention as a service delivery model to provide O&M support services to families in EI and their opinions on the value of utilizing such a model for O&M support services in EI. After my first and last in-person and teleintervention home visits with the families, I interviewed the caregivers to gather information about how they felt about the O&M support services they received during their home visit sessions (e.g., what went well, what concerned them, was it what they expected, etc.).

The interviews followed a semi-structured format, where the interview was guided by a list of questions that allowed the researcher to respond to the following (Merriam & Tisdell, 2016): the situation at hand, the emerging worldview of the respondent; and new ideas on the topic. Each interview was audio-recorded, with the length of each interview varying by respondent. The initial interviews for both the EI-TSVIs and caregivers were about five to ten minutes in length, and the end of study interviews were about fifteen to thirty minutes in length. All the interviews were transcribed by a transcription service and verified for accuracy by me (once I received the transcripts, I reviewed each transcript while listening to its corresponding interview). The finalized interview transcripts were then uploaded to my university sponsored cloud-based file-sharing application and shared with an independent evaluator who had more

than five years of experience with qualitative research methods. The independent evaluator and I collaborated with each other throughout the study in an effort to enhance the rigor of the results (Campbell, Quincy, Osserman, & Pedersen, 2013). We did this by coding the interviews and developing categories and themes independent of each other and then working together to come to a consensus on the themes that emerged from the data. The independent evaluator generously volunteered her time to be the second coder for this study. A copy of the interview questions for the caregivers and EI-TSVIs can be found in Appendices D and E.

Field notes. Observations are a common source of data for qualitative studies, such as case studies (Merriam & Tisdell, 2016). They “take place in the setting where the phenomenon of interest naturally occurs . . . and observational data represent a firsthand encounter with the phenomenon of interest” (Merriam & Tisdell, 2016, p. 137). Field notes are written accounts of observations, which are essential in providing “raw data from which the study’s findings [will] eventually emerge” (Merriam & Tisdell, 2016, p. 149). Field notes should be highly descriptive and reflective, with the reflective component capturing the observer’s commentary about feelings, reactions, hunches, initial interpretations, speculations, and working hypotheses (Merriam & Tisdell, 2016).

During the study, I observed home visits as a participant observer, where the identity of the researcher and his or her research activities are known (Merriam & Tisdell, 2016). Collecting data as a participant observer requires the researcher to be present at, involved in, and recording the activities with people in the field setting, while maintaining her or his role as an active participant (Merriam & Tisdell, 2016). Since I was providing O&M support services to families during the home visits, I was an active

participant in each session and all my participants knew about my role as a researcher and the activities associated with my research. I recorded each session on video and kept field notes in the form of a reflective journal. Reflectively journaling about what occurred during the home visits, after each visit, allowed me to think more deeply about my experiences during each visit and document my observations, feelings, impressions, concerns, hypotheses, and plans for the next visit. Additionally, these reflective journal entries helped me generate comparison data for the responses recorded during my interviews with the caregivers and EI-TSVIs. Each month, I shared my reflective journal entries with the independent evaluator via a web-based word processing application so we could collaborate with each other to code the data and develop categories and themes independent of each other. We then worked together to come to a consensus on the themes that emerged from the data. A copy of the guidance questions for my reflective journal can be found in Appendix F.

Video-recorded sessions of the home visits. Video-recorded sessions of the home visits were used to collect data about home visiting practices, which are paramount in working with families in EI. Best practices in EI emphasize a transdisciplinary approach that focuses on family-centered practices to help families build capacity to understand the unique needs of their children and how to help support and boost their development (Ferrell, 2011; NICHCY, 2014). Therefore, it is important that home visiting practices are effective in helping families identify their needs and desires and fostering their capacity to grow and attain their goals. The studies conducted by Blaiser et al. (2013) and Behl et al. (2017) inspired me to gather information on home visit practices for this study since interactions among the home visitor, parents/caregiver, and

children are an important component of home visits. Although the measure I used to collect this information is more quantitative than qualitative in nature, I thought it would be helpful in generating more comparative data for in-person and teleintervention O&M support home visits.

Information on home visiting practices demonstrated during the in-person and teleintervention O&M support home visits was collected using the *Home Visit Rating Scales – Adapted and Extended* (HOVRS-A+; Roggman et al., 2012). The HOVRS-A+ was designed to measure the level of “excellence” (Roggman et al., 2012) of home visiting practices in programs that provide EI services to families and their very young children. The scales for HOVRS-A+ were developed based on evidence-based practices for home visits with families of very young children and emphasize a developmental parenting support approach that respects the strengths and culture of individual families (Roggman et al., 2012). The scales include four scales that evaluate quality indicators for home visit practices and three scales that evaluate indicators for family engagement. Scores for the scales are derived from direct observation of home visit sessions, either in-person or via video. The quality of home visit practices is measured by observing the home visitor (i.e., service provider) and her or his responsiveness to family, relationship with family, facilitation of parent-child interaction, and non-intrusiveness and collaboration during home visit sessions. Family engagement is measured by observing parent-child interaction, parent engagement, and child engagement during home visit sessions. Ratings of “excellence” for the two overarching categories for home visits (home visit practices and family engagement) are obtained through overall scores calculated for the individual scales associated with each of these categories. The overall

score for each individual scale is comprised of the average of scores calculated for the items (i.e., indicators) that make up each scale. Each item is scored using a Likert rating scale, with scoring options that range from 1 to 7. The scoring options are: 1 – *needs training*, 3 – *adequate*, 5 – *good*, and 7 – *excellent*. A higher number on the individual scale indicates a better score. A description of each scale for the HOVRS-A+ can be found in Table 3.

Table 3

A Description of the HOVRS-A+ Scales (Roggman et al., 2012, pp. 9-10)

Scale #	Scale Name	Description
1	Home Visitor Responsiveness to Family	This scale assesses the extent to which the home visitor is (1) prepared for the home visit, (2) attempts to get needed information from the parent, (3) observes and responds to the parent and child during the home visit, and (4) elicits input on the content and activities of the home visit from the parent. A high rating on this scale suggests that the home visitor is frequently engaging in responsive behaviors during the home visit.
2	Home Visitor-Family Relationship	This scale examines the nature of the relationship between the home visitor and the family, as observed during the home visit. It focuses on (1) warmth between the home visitor and parent, (2) parent comfort with the home visitor, positive interactions of the home visitor with the child and other members of the family, and (4) the home visitor's respect and understanding of the family as a whole. A high rating on this scale suggests that the home visitor and family are frequently engaging in warm, positive behaviors during the home visit.
3	Home Visitor Facilitation of Parent-Child Interaction	This scale assesses the effectiveness of the home visitor at facilitating and promoting positive parent-child interactions during the home visit. It reflects how much the home visitor

Table 3 (continued)

Scale #	Scale Name	Description
	Home Visitor Non-Intrusiveness/ Collaboration with Family	(1) encourages the parent's leadership when guiding parent-child interactions, (2) involves and responds to both the parent and the child during interactions, and (3) uses materials available in the home for promoting parent-child interactions. A high rating on this scale suggests that the home visitor is frequently engaging in facilitative behaviors during the home visit.
4	Home Visitor Non-Intrusiveness/ Collaboration with Family	This scale focuses on the lack of intrusiveness by the home visitor on parent behavior and parent-child interactions during the visit. It assesses (1) home visitor control and (2) home visitor flexibility and responsiveness. A high rating on this scale suggests that the home visitor rarely engages in intrusive behaviors during the home visit and that he or she uses effective strategies to collaborate with the parent. A high rating on this scale means the home visitor is non-intrusive in a manner that promotes collaboration with the parent as a partner in supporting the child's development.
5	Parent-Child Interactions During Home Visit	This scale examines the nature of the parent-child relationship, as observed during the home visit. It assesses (1) parent-child warmth and physical closeness, (2) parent attentiveness to the child, (3) parent responsiveness to the child, and (4) parent-child joint attention. A high rating on this scale suggests that the parent and child are frequently engaging in warm, positive behaviors during the home visit.
6	Parent Engagement During Home Visit	This scale examines the engagement of the parent and the activities of the home visit. It focuses on (1) parent interest, (2) parent involvement and initiative, and (3) the parent's physical closeness to the home visitor and child. A high rating on

Table 3 (continued)

Scale #	Scale Name	Description
		this scale suggests that the parent is frequently displaying behaviors that indicate interest and engagement in the home visit activities and discussions.
7	Child Engagement During Home Visit	This scale focuses on the child's engagement in the activities of the home visit. It focuses on (1) child involvement and (2) child interest. A high rating on this scale suggests that the child is frequently displaying behaviors that indicate engagement and interest in the home visit.

Strong internal consistency has been reported for the HOVRS-A+ scales (Roggman et al., 2012), with each scale having a *Cronbach's alpha* value of 0.70 or greater. Additionally, the "HOVRS-A+ scales have been used reliably, with inter-rater agreement within one point for all scales" (Roggman et al., 2012, p. 10). High internal consistency is important as it is an indicator that the measure has adequate reliability (Barchard, 2010). A brief summary of the scales and their *Cronbach's alpha* values (Roggman et al., 2012) can be found in Table 4.

Table 4

Cronbach's Alpha Values for HOVR-A+ Scales (Roggman et al., 2012, p. 10)

Scale	<i>Cronbach's Alpha Value</i> (α)
HOVRS-A+ as a whole (7 scales)	.88
<i>Home Visit Practices</i> (4 scales)	.84
<i>Family Engagement</i> (3 scales)	.74

Video recordings of the O&M support home visits for both the in-person and teleintervention sessions were scored using the HOVRS-A+. Videos for all of the home visits were recorded by me, the COMS. In-person home visits were recorded using a tablet computer. Teleintervention home visits were recorded on a laptop using video recording software (e.g., QuickTime or Zoom). The recorded videos were uploaded to and stored in my university sponsored cloud-based file-sharing application that had been certified HIPAA and FERPA compliant by the university's Information Management and Technology Department.

The videos were shared with and scored independently by two EI providers who had the following qualifications: (a) more than 10 years of experience in working with children with BVI in EI; (b) expert knowledge in best-practices in EI (e.g., family-centeredness and home visiting practices in EI); (c) trained in using the HOVRS-A+; and (d) experienced in using the HOVRS-A+ to evaluate home visits in EI. The two EI providers resided in a state outside of the state in which this study was conducted, in cities that were almost a few hundred miles away from each other. Prior to the start of the study, the two independent observers independently watched and scored three training videos of O&M support home visits. The HOVRS-A+ data collected from these training sessions were used to determine interobserver agreement (IOA) between the two observers. IOA is the degree to which independent observers agree on the occurrence and non-occurrence of a behavior. Utilizing Roggman et al.'s (2012) definition of agreement (\pm one point), IOA was calculated using the following formula: $IOA = [\# \text{ agreements} / (\# \text{ agreements} + \# \text{ disagreements})] * 100$. A mean IOA level of at least 80% had to be established between the two observers during the training sessions to ensure the

reliability of their scores. The following is a summary of the observers' IOA scores for the training videos: 85% for training video one; 100% for training video two; and 100% for training video three. The two observers achieved a mean IOA level of 95% during the training sessions, indicating that their observations and corresponding scores were reliable.

During the research study period, the observers were randomly assigned to score three videos monthly using the HOVRS-A+. Additionally, one video was randomly selected each month to spot check IOA and assigned to one of the observers, such that each observer scored a total of 14 videos during the study period. Randomly checking IOA each month helped to ensure that IOA was maintained between the observers. If an IOA level of at least 80% was not achieved during the spot check each month, the observers were asked to meet with each other to discuss their disagreements in scores for the IOA video prior to scoring the videos for the next month.

Each month, the two observers submitted the scores for their assigned videos to the investigator electronically at the end of the month. The two observers were offered monetary compensation for their time scoring/coding videos for data analysis.

Documents. Documents are also another source of data for qualitative research. They include a wide range of written, visual, digital, and physical material that are relevant to the study and can either be already present in the research setting or developed for research purposes (i.e., researcher-generated) (Merriam & Tisdell, 2016). “The specific purpose for generating documents is to learn more about the situation, person, or event being investigated” (Merriam & Tisdell, 2016, p. 174). For this study, I generated

documents to collect demographic data from the participants and costs data related to the provision of O&M support services in EI.

The demographic information forms provided me with a general history of the families and EI-TSVIs who participated in this study and their experiences in EI. A copy of the demographics form for the families and EI-TSVIs can be found in Appendices B and C. The costs form provided me with information about the costs associated with delivering O&M support services to the families during the study and included the following: service delivery time; travel time and expenses; service provider compensation (e.g., salary); and equipment and internet service costs. Technical support time, additional technology costs, and reasons for missed home visits were also included to account for these conditions if they arose during the study. As the COMS, I filled out the cost forms after each visit during the four-month research study period. Data from the costs forms helped me generate comparison data for the costs of providing O&M support services delivered through in-person and teleintervention home visits. A copy of the researcher-developed cost form can be found in Appendix G.

Data Analysis

Data analysis is a process in which the researcher makes sense of the data. In qualitative research, the collection and analysis of data is a simultaneous process, with the analysis becoming more intensive as the study progresses and once the collection of data is complete (Merriam & Tisdell, 2016). Qualitative data analysis is best described as being “primarily inductive and comparative” (Merriam & Tisdell, 2016, p. 201).

Case Studies

Although there are basic strategies commonly used for analyzing qualitative data, the analysis approach for case studies is more particular due to the unique features of case studies (Merriam & Tisdell, 2016). Since a case study is in-depth, all-encompassing description and analysis of a single, bounded unit, it is important to convey an understanding of the case through data derived from the data sources (i.e., usually interviews, field observations, and documents) during data analysis (Creswell & Poth, 2018; Merriam & Tisdell, 2016; Yin, 2014). For case studies with multiple cases, there are two stages of analysis: the within-case analysis and the cross-case analysis (Creswell & Poth, 2018; Merriam & Tisdell, 2016; Yin, 2014).

Within-case analysis. Within-case analysis involves treating each case in a case study as “a comprehensive case in and of itself” (Merriam & Tisdell, 2016, p. 234). The researcher gathers the data so she or he can “learn as much as possible about the contextual variables that might have a bearing on the case” (Merriam & Tisdell, 2016, p. 234). As part of the within-case analysis, I synthesized the data from the interviews and reflective journal entries using the constant comparative method of data analysis to uncover the participants’ (i.e., caregiver, EI-TSVI, and COMS) perceptions of O&M support services when they were delivered in-person or via teleintervention for each case. The participants’ perceptions of O&M support services delivered in the two service delivery models were reported in the form of themes.

Development of themes. In qualitative research, the constant comparative method of data analysis is widely used to generate study results because the process is inductive and comparative (Merriam & Tisdell, 2016). The constant comparative method involves

systematically transforming the raw data (e.g., interview transcripts and reflective journal entries) into meaning units through the process of coding (Merriam & Tisdell, 2016). Coding is analogous to having a conversation with the data: asking it questions, making comments about it, and determining if bits of it (e.g., specific incidents, phrases, sentences, paragraphs, etc.) are potentially relevant in answering the research questions (Merriam & Tisdell, 2016). Once the meaning units have been coded, each one is compared to the next to search for “recurring regularities in the data” (Merriam & Tisdell, 2016, p. 203). The recurring patterns that emerge from the coded data provide the researcher with the necessary information to begin constructing and refining categories or themes, which are essentially the answers to the research questions (Merriam & Tisdell, 2016).

For this study, the data were coded by me, the investigator, and an independent coder who had more than five years of experience with qualitative research methods. The independent coder and I coded data from the interviews with the caregivers and EI-TSVIs and the reflective journal entries. Coding was conducted independently of each other and compared for consistency through all phases of the data analysis process. Coding occurred at the beginning of the study (mid-February), after the transcripts of the interviews with the caregivers and EI-TSVIs were verified, uploaded to my university sponsored cloud-based file-sharing application, and shared with the independent coder; at the end of the study (mid-May), after the transcripts of the interviews with the caregivers and EI-TSVIs were verified, uploaded to my university sponsored cloud-based file-sharing application, and shared with the independent coder; and at the end of each month (January, February, March, and April), after I shared my reflective journal entries via a

web-based word processing application with the independent coder. Constant comparison of the coded data allowed the two coders to identify and establish common categories derived from the units of meaning found in the data. Categories drawn from meaning units across all participants in each case (i.e., caregiver, EI-TSVI, and COMS), in more than one interview question, and/or journal entry were retained. Categories that did not appear as meaning units from all participants in each case, across several questions, or across several journal entries were discarded for lack of support. Categories were then clustered together into themes based on similarity of content. Salient statements made by the participants that distinguished each theme were also recorded to be used for support in reporting results. The independent coder and I developed categories and themes independently of each other and then shared our information with each other via word processing files uploaded to a cloud-based file-sharing application. The categories and themes we each developed individually were reviewed and discussed until agreement was determined to enhance category and theme integrity (Johnson & LaMontagne, 1993; Olson, McAllister, Grinnell, Walters, & Appunn, 2016) for each case for the within-case analysis and, later, for the cross-case analysis. A total of 12 themes were identified by the independent coder and me for the within-case analysis, which will be discussed further in the next chapter.

Results from the within-case analysis identified common themes related to O&M support services delivered via in-person and teleintervention service models from the perspective of the caregivers, the EI-TSVIs, and me, the COMS, which in turn provided answers for research question Q1 of the study. Within-case analysis of the three cases in

this study helped me become familiar with each case, providing me with opportunity to understand them better for the cross-case analysis.

Cross-case analysis. Cross-cases analysis occurs once the within-case analysis is complete.

Cross-case analysis differs little from analysis of data in a single qualitative case study. The level of analysis can result in a unified description across cases; it can lead to categories, themes, or typologies that conceptualize the data from all the cases. (Merriam & Tisdell, 2016, p. 234)

Although the details of single cases may vary, cross-case analysis attempts to build a general explanation that embodies all the individual cases (Merriam & Tisdell, 2016; Yin, 2014). The ability to make comparisons between two or more cases through cross-case analysis not only strengthens the findings of a case study, it makes the study more robust (Yin, 2014). As part of the cross-case analysis, I synthesized the data from the interviews, reflective journal entries, and within-case analysis using the constant comparative method of data analysis to further examine the participants' (i.e., caregiver, EI-TSVI, and COMS) perceptions of O&M support services when they were delivered in-person or via teleintervention across the three cases. The participants' perceptions of O&M support services delivered in the two service delivery models were reported in the form of themes.

Development of themes. Similar to the within-case analysis, constant comparison of the coded data allowed me and the other coder to identify and establish common categories derived from the units of meaning found in the data. Categories drawn from meaning units across all participants, in more than one interview question, and/or journal

entry were retained. Categories that did not appear as meaning units from all participants, across several questions, or across several journal entries were discarded for lack of support. Categories were then clustered together into themes based on similarity of content. Salient statements made by the participants, including me, that distinguished each theme were also recorded to be used for support in the report of results. The independent coder and I developed categories and themes independently of each other and then shared our information with each other via word processing files uploaded to a cloud-based file-sharing application. The categories and themes we each developed individually were reviewed and discussed until agreement was determined to enhance category and theme integrity (Johnson & LaMontagne, 1993; Olson et al., 2016) for the cross-case analysis. A total of 5 themes were identified by the independent coder and me for the cross-case analysis, which will be discussed further in the next chapter.

The information from the cross-case analysis of the three cases in this study helped me to understand the EI O&M support services home visit experience for families and providers in both service delivery formats (i.e., in-person and teleintervention). Conducting a cross-case analysis allowed me to identify differences and common characteristics among the cases and create new categories and themes that comprised all the data sets to further answer research Q1 for this study.

Demographics. Researcher review of documents was used to describe and summarize the demographic data collected for the families and EI-TSVIs participating in this study. Analysis of the researcher-developed demographics information forms provided me with background information on the participants to help me construct pictures of their individual cases.

Home visiting practices. Since all the participants received services in both in-person and teleintervention formats throughout the study, a multivariate analysis of variance (MANOVA) was conducted to generate comparison data for the “excellence” of home visiting practices over the four-month study period. For the MANOVA, the independent variable was service type (in-person service delivery model and teleintervention service delivery model) and the dependent variables were the quality indicators for home visit practices (home visitor/service provider responsiveness to family, relationship with family, facilitation of parent-child interaction, non-intrusiveness, and collaboration) and indicators for family engagement (parent-child interaction, parent engagement, and child engagement). By examining the relationship between the independent and dependent variables, this data analysis helped me to determine if there was a difference in, and to what extent, home visiting practices when they were delivered in person and through teleintervention and to answer research questions Q2.

Cost of providing orientation and mobility support services in early intervention. Researcher review of documents was used to calculate and summarize the costs associated with the provision of EI O&M support services for the families who participated in this study over a period of four months. Analysis of the data collected from the researcher-developed costs forms provided me with descriptive information to answer research question Q3.

Research Trustworthiness

“All research is concerned with producing valid and reliable knowledge in an ethical manner. Being able to trust research results is especially important to

professionals in applied fields because practitioners intervene in people's lives" (Merriam & Tisdell, 2016, p. 237). The standards for rigor in qualitative research naturally differ from those in quantitative research; this difference is attributed to the fact that qualitative research is based on assumptions about reality that are different than those for quantitative research (Merriam & Tisdell, 2016). Conducting an investigation in an ethical manner is critical in ensuring validity and credibility in qualitative research. Additionally, accuracy in the collection and interpretation of data is necessary to merit the validity of results (Creswell & Poth, 2018; Stake, 1995). In qualitative research, various strategies are used to promote the credibility, reliability, and validity of the research being conducted. As a researcher, I want to ensure that my research is credible, reliable, and valid, so for this study, I utilized the strategies of triangulation, member checks, audit trail, and researcher position to support the trustworthiness of my research.

Triangulation

Triangulation is the process of corroborating evidence from different sources (e.g., methods of collecting data, sources of data, investigators, theories, etc.) to better understand what is being investigated and to increase the credibility of research outcomes (Creswell & Poth, 2018; Merriam & Tisdell, 2016). In this study, I used multiple sources of data (interviews, observations, video recordings, field notes, and documents) to develop a better understanding of the information and results that emerged from the study.

Member Checks

Member checks are also referred to as "respondent validation" (Merriam & Tisdell, 2016, p. 246). During member checks, the researcher returns the data, along with

any preliminary or emerging interpretations, to the people who were interviewed to ask for their feedback and to verify that the meaning behind what they said, did, and/or observed was not misinterpreted by the researcher (Merriam & Tisdell, 2016).

“Participants should be able to recognize their experience in [the researcher’s] interpretation or suggest some fine-tuning to better capture their perspectives” (Merriam & Tisdell, 2016, p. 246). For this study, I sent the transcripts of my interviews with each participant to the corresponding participant after they were transcribed. I asked each participant to review the transcripts to ensure they captured what we discussed during the interviews accurately and to provide me with any additional feedback.

Audit Trail

An audit trail describes “in detail how the study was conducted and how the findings were derived from the data” (Merriam & Tisdell, 2016, p. 265). The purpose behind an audit trail is to help independent readers authenticate the results of the study by following the trail of the researcher in how she or he arrived at her or his results (Merriam & Tisdell, 2016). Another way to think about an audit trail is to think about it as a project history. In this study, I used the transcripts of my interviews, my field notes, the video-recordings of the home visits, and the data I recorded on my researcher-developed documents to construct my audit trail. Additionally, descriptions of how I collected and analyzed my data were included in this chapter.

Researcher Position

The integrity of the researcher plays a role in evaluating the validity and credibility of a study to the extent that the researcher’s position (or reflexivity) can influence the research process (Merriam & Tisdell, 2016). Researchers need to

articulate and clarify their assumptions, experiences, worldview, and theoretical orientation to the study at hand. . . . Such a clarification allows the reader to better understand how the individual researcher might arrive at the particular interpretation of the data. (Merriam & Tisdell, 2016, p. 249)

In this chapter, I have disclosed my involvement in this study as researcher and practitioner, my worldview on what I am investigating, and the interpretive framework and philosophical lens in which this study is based. Although I have my own perspective and interpretations of the research process and results of the study, I believe it added value and strength to my study.

Researcher Bias

Although I believe my role as researcher and practitioner added strength and value to this study, it also added bias that needs to be acknowledged and addressed. As I mentioned previously, I am passionate about O&M support services for young children with BVI and their families in EI. I was deeply involved and invested in this study and its outcomes as both researcher and practitioner. Based on my prior success with providing O&M support services in EI via teleintervention, I was expecting the experiences of this research and its outcomes to be similar to those I experienced before.

Since I was the one conducting the interviews and home visits with the participants, the excitement I felt for teleintervention could have inadvertently introduced bias into my interactions with the data sources. I tried to minimize the impact of my biases on this study and its participants by taking great care to not ask questions that may be leading to the participants during the interviews; conducting member checks regularly; and taking precautions to ensure that the participants were not influenced in their

behavior during home visits and answers to interview questions by my biases for the study's outcomes (e.g., I refrained from discussing my previous experiences with teleintervention and expressing my thoughts, opinions, and/or preference for one service delivery model over the other). Additionally, I enlisted two independent observers to score the videos of my home visits with the participants and an independent evaluator to code the interview transcripts and my reflective journal entries and to verify themes, so I could receive objective feedback for analysis and comparison. Although I employed several safeguards to minimize my bias on this study and its participants, the possibility exists that I will misinterpret or overgeneralize the study results simply because of my involvement.

Summary

Currently, no research has been conducted to investigate the use of teleintervention to provide specialized services to children and their families in the field of BVI. Through qualitative research methods associated with a multiple case studies approach and systematic collection of data through a variety of sources, I endeavored to experience providing specialized services, specifically O&M support services, to young children with BVI in the EI system through teleintervention out in the field, and to find answers to my research questions. I believe the outcomes of this study will contribute to a better understanding of the practicality and utility of providing O&M support services via teleintervention to families of children with BVI in EI.

CHAPTER IV

ANALYSIS

In this chapter, I will introduce you to Emma, Greyson, and Marie, the three cases for this study. Each case includes the following: background information for the child and family, the etiology of the child's visual impairment, early intervention (EI) service history for the family, an introduction to the family's teacher of students with visual impairments who specializes in EI (EI-TSVI), information related to orientation and mobility (O&M) support services (e.g., reason for referral, Individualized Family Service Plan (IFSP) goal); and snapshots of what EI O&M support home visits looked like for each family in the in-person and teleintervention service delivery formats. The participants' perceptions of O&M support services when they were delivered in person or via teleintervention (tele-O&M) for each case are presented in the form of themes, supported by direct quotes from the interviews and reflective journal entries.

Later in the chapter, results from the cross-case analysis, observations of home visiting practices, and cost analyses of service provision will be presented. Information from these analyses were used to answer the research questions for this study.

The Early Intervention Orientation and Mobility Explorers

Emma

Emma is a gorgeous girl with fair skin; spunky, short, blonde hair that always seems to be tied up in a half pony tail on the top of her head; and a mesmerizing blue eye.

She may be petite, but she definitely does make it known that she does have opinions and a stubborn streak. At the start of the study, she was 1 year and 5 months old. She was born at 41 weeks gestation and is the youngest of seven children. She has two sisters and four brothers, ranging from the ages of 3 years old to 15 years old. Emma's parents, Jane and Austin, were 35 and 33 years old when Emma was born. Jane is a homemaker and Austin works in the technology sector. Both parents have completed some schooling beyond high school: two and a half years of college for Jane and four years for Austin.

Emma and her family live in an urbanized area, which is defined as a geographic area that has a population of 50,000 or more by the U.S. Census Bureau. The neighborhood they live in is fairly typical for a suburb of a large metropolitan city, with homes nestled in residential areas with sidewalks and local schools and parks nearby. Mid-sized commercial areas within a few minutes' drive provide access to chain-recognized grocery stores, restaurants, gas stations, and shops. Emma and her family live in a community that is about 20 miles away from the BVIO campus where my office is located. The BVIO is an organization that provides statewide BVI-specific services to children with BVI ages birth to 22 in the state in which this study is being conducted.

Etiology of visual impairment. The etiology of Emma's visual impairment is unilateral microphthalmia and colobomas in the right eye and nystagmus caused by optic nerve hypoplasia (ONH) in the left eye. Microphthalmia is an eye condition where one or both eyes are abnormally small. A coloboma is an eye condition where normal tissue in or around the eye is missing; this can occur in one structure or many structures of the eye. Both microphthalmia and colobomas usually occur before birth, during pregnancy. Nystagmus is an eye condition that is neurological in nature and presents itself as rapid,

involuntary movements of the eyes. ONH is an eye condition where the optic nerve is under-developed, pale, or missing.

Emma was diagnosed with microphthalmia and colobomas in her right eye at 5 days old and ONH and nystagmus at 4 months old. In her right eye, the eyeball was so malformed that she did not have any vision in that eye at birth. She is currently in the process of having a prosthetic eye made for structural and aesthetic reasons. In her “good” eye (the left eye), her vision is described to be normal or near normal in functioning. Unrelated to her vision, but relevant to her health history, Emma has also been diagnosed with bilateral hip dysplasia.

Early intervention services history. Emma had been receiving general EI services (e.g., service coordination, physical therapy, occupational therapy, developmental specialist) from the local agency that provides EI services to families in the area in which her family lives for seven months at the start of this study. She had been receiving BVI-specific EI services from her BVIO EIP EI-TSVI for seven months prior to the start of the study. The EIP is the BVI-specific EI program that is run through the BVIO.

Emma’s teacher of students with visual impairments who specializes in early intervention (EI-TSVI): Carol. Carol has worked with children with blindness or visual impairment (BVI) and their families in EI for about 4 years. She is licensed in the state as an early childhood special educator with an endorsement in early childhood BVI. She has about 20 families on her caseload and provides services to families mainly located in the large metropolitan city where the BVIO is located.

In supporting families of young children with BVI in EI in the area of O&M, she received pre-service training in O&M as part of her coursework for the university program she completed to obtain her endorsement in early childhood BVI. Carol reported that she felt like she had sufficient training through her university program and through me (the certified orientation and mobility specialist, or COMS) to support the families she works with in the area of O&M. On her demographics form, she noted: “I have worked with an excellent O&M [specialist] who has taught me the skills to help support families and young children with VI.”

Prior to the study, she did not receive any type of pre-service education or professional development training to conduct home visits using distance consultation service delivery models. However, she has used distance consultation service delivery models to conduct home visits in the past, approximately eight times over the past four years prior to the study.

Referral for orientation and mobility and Individualized Family Service Plan (IFSP) outcomes. Emma was referred for an O&M evaluation due to concerns about her not crawling yet at the age of one year. At the time of referral, it was reported that Emma was just beginning to reach out for objects on all sides of her body while in a seated position, but would not crawl to obtain objects that were out of reach. The O&M evaluation confirmed that she would benefit from some basic O&M training to help her develop and practice skills that would help her move out into her surrounding environment more on her own. O&M support services were added to Emma’s IFSP after it was determined that she was eligible for services. The following outcomes were developed for her IFSP:

- Emma will gain independence in her surroundings by fully scanning her environment and moving towards her toys, foods, and other objects.
- During daily routines, including but not limited to play and transitioning from room to room, Emma will trail a 25-foot length of wall to increase her independence and safety in traveling using her vision. We will know she has met this goal when she is able to trail the length of wall three times in a day over 3 days.

Orientation and mobility for Emma. In-person O&M support home visits with Emma mainly took place at home, with her mother, Jane. The living room was our primary work space and during our visits, two or three of Emma's siblings would rotate in and out of the room to see what we were doing, occasionally joining us to be part of an activity or to help motivate Emma to learn and practice the skills and strategies we were trialing and implementing. When the weather permitted us to do so, we ventured outside to give Emma a chance to practice walking in her metal rear-walker around the neighborhood with her family. During our in-person O&M support home visits, we focused on brainstorming ideas and employing strategies to encourage Emma to reach out and explore the surrounding environment more on her own and to help her build the confidence in utilizing self-initiated locomotion to explore and navigate the environment. When I first met Emma, she was able to sit up on her own without any assistance and used rolling as her main method of traveling short distances to explore the room she was in or to locate items (e.g., toys or books) of interest. She had just turned a year old and was not yet creeping (i.e., crawling on hands and knees); this was a major concern for Jane.

As we advanced through the next few months of O&M support visits, Emma learned to creep and mastered the skill within weeks of doing so; inherited a rear-walker from another family and gained confidence in her own ability to use it to walk around her house and in the places where her family went on outings; and developed a love for going up and down stairs (first, by crawling and then, standing up with support from an adult or older sibling). We were fortunate enough to be able to do some O&M support visits out in the community at the BVIO campus where my office was located. The BVIO campus was a great place for us to do an O&M support visit because it is a school setting that provided us with access to a variety of indoor and outdoor environments that were unfamiliar to Emma. Additionally, Emma and Jane attended a weekly toddler group for children with BVI and their families enrolled in the EIP at the BVIO campus so it was a convenient place to meet them for an O&M visit out in the community before or after toddler group. During a visit at the BVIO campus, Emma demonstrated that she could crawl up and down the long staircases in the building, which surprised us all since Jane said they had not yet worked on going up or down the stairs in their home. Jane has been hesitant to introduce Emma to stair work because she was fearful of her falling down the stairs. After that visit at the BVIO campus, Jane proudly told us in subsequent visits that they have been doing stair work with Emma whenever they had the chance to do so and, as result, Emma was gaining more strength in her lower body. At the conclusion of the study, Emma was walking around confidently in her metal rear-walker to keep up with her brothers and sisters at home and while out on family outings. She was also learning about common environmental features found in residential areas (e.g., houses, mailboxes, driveways, fire hydrants, etc.) and traffic safety associated with driveways and streets

while she and her family were out on evening walks. Jane texted me the other day to tell me some exciting news: Emma had just taken a few steps in the living room on her own! The joy I felt was so great that I just had to clap my hands for Emma, even though we were miles apart at the time. I am so glad I have the opportunity to revel in these moments with the families I work with and that they share these moments with me as they happen.

Themes for in-person orientation and mobility support visits. The themes that emerged for Emma for in-person O&M support visits were (a) O&M support services are helpful, (b) progress, and (c) the human touch. The themes encompassed the various aspects of EI O&M support services that Jane and Carol found distinctive to in-person home visits.

Orientation and mobility support services are helpful. Jane and Carol both expressed positive feelings about O&M support services. Carol felt that O&M support services were

A service that's not often thought of. When you first think of O&M, you think of teaching someone to walk with a cane, and the population we work with aren't walking, necessarily, yet. But there's so much that goes on prior to walking that can provide such a great foundation and provide those foundational skills for these students, that I feel like it's a service that may have been overlooked originally. But, it's very needed.

Carol's thoughts seemed to be reflective of the knowledge and experience she had gained through working with families in EI over the past several years and their need for O&M support services.

Jane found our in-person O&M support visits helpful. After our first in-person visit, Jane said, “I felt good being able to bounce ideas off. If I mention a concern, or sometimes you guys see things that I don't, you guys always have suggestions for how to help with that.” During the in-person visit where we went for a walk outside, Jane indicated that not only did Emma learn and practice skills related to O&M during that visit, so did she: “taking her out for a walk worked really well. I learned the driveways and how to teach her to cross the road and how to help her experience that.”

Although Jane and Carol found O&M support services to be helpful, Carol brought up a common misconception about who can benefit from O&M support services when she said,

Sometimes I feel that parents will say, “Well, my child's not walking yet, how can they benefit from orientation and mobility services?” But teaching them that there's so much more that can be built upon that as far as recognizing body parts, positions, things like that. Once you kind of educate the parents, they tend to kind of overcome that challenge.

According to federal regulations (i.e., IDEA), every child with BVI has the right to be evaluated for O&M support services and to receive services if he or she needs them.

Progress. The progress that Emma made in learning and demonstrating skills related to O&M was evident in the video recordings of her home visits; Jane's, Carol's, and my observations and discussions during our home visits (documented in my reflective journal entries); and Jane's interview responses. Jane commented, “I think we're good, we're making good progress.” I observed,

It was great seeing all the fun things Emma is doing. I swear, each time I see her, she progresses more and more. She is definitely becoming more confident in independently moving her body and moving around in the space around her.

Over a four-month time period, Emma made great strides in the area of self-initiating locomotion to travel short routes within her home and in the places her family frequented; to locate items and people of interest in her environment; and to strengthen her body in preparation for walking independently. She was timid at first about moving her body through space to go where she wanted to go, frequently requesting help from Jane; but now, she exudes confidence and goes wherever she pleases on her own using various of modes of locomotion.

The human touch. Overall, Jane and Carol preferred O&M support home visits conducted in person. Jane mentioned that she liked the “hands-on” aspect of in-person visits for demonstrating and referencing skills:

One thing that is easier about the in-person visit is you can be hands on. You can show me "hold her like this," or "move her like this." And that is the one thing that makes the in-person visits easier.

During our O&M support home visits, there were several occasions where I attempted to guide Jane through a strategy we were trying to implement with Emma by just giving her verbal directions in how to manipulate Emma’s body to execute a skill or movement (e.g., teaching Emma how to orient her body in a chair so she could get off of it on her own safely). However, after several attempts that did not quite yield the results we both wanted, it was just easier for me to show Jane what I was trying to direct her to do with

Emma. Within seconds, Jane was able to see what I was trying to explain to her and replicate my movements immediately afterwards.

The interactions among Jane, Emma, Carol, and me during our in-person home visits were very comfortable. We talked easily with each other and enjoyed our time together. I felt “good about being a part of the group,” and Carol made me blush when she said, “I think I would always prefer you to be around [in person], just because I enjoy you.” Jane’s comment about the connection with another person through physical contact was insightful: “from a functionality standpoint, not necessarily but it's ... more fun sounds really shallow. It's easier to talk to somebody when you can see their face. Yeah, it's that connection.”

Tele-Orientation and Mobility for Emma. Tele-O&M visits with Emma felt very similar to our in-person home visits, with the exception of Carol connecting/disconnecting me via her iPad and hotspot at the start/end of the visit and me participating remotely. Carol demonstrated her proficiency in managing the technology to facilitate my tele-O&M visits with them. She seemed to instinctually know where to place the iPad so I had a good view of Jane and Emma during our visits and how to move the camera so I could keep up with them and see what was going on when moving from one location to another location was involved. During the study, we were able to conduct one tele-O&M visit out in the community, at the BVIO campus after toddler group. I was unsure about how this visit would go since it was our first tele-O&M visit away from Jane and Emma’s home. I was concerned about the audio quality since we would be moving around in a big building with tall ceilings. Would I be able to hear everyone? Would they be able to hear me? Would we be able to have conversations without

shouting or having to ask what was said to be repeated as we moved around the building? Surprisingly, the visit went fairly smoothly and felt quite similar to our previous visit (in person) at the BVIO campus. The only technology issue that we encountered was the internet connection. Initially, Carol tried connecting me via her mobile phone using her cellular data plan. However, her cellular signal in the building was not stable and we had many moments of pixelated video and frozen picture frames for the first 10 minutes of our visit. The BVIO campus had a wireless internet network, but neither Carol nor I knew the password, so Carol set off to find technical assistance. When Carol returned, the visit continued on without any more technical difficulties since she was connected to the building's wireless network. Our tele-O&M visit out in the community was as comfortable, routine, and informative as it has been in the home.

Themes for tele-orientation and mobility visits. The themes that emerged for Emma for tele-O&M visits were (a) almost the same, (b) satisfied with the tele-O&M experience, and (c) teamwork. The themes indicated that tele-O&M visits were perceived to be successful and almost comparable to in-person O&M support home visits by Jane, Carol, and me (the COMS).

Almost the same. Tele-O&M visits with Jane, Emma, and Carol were fairly similar to our in-person visits. Although Jane and Carol expressed their preference in-person visits, they seemed to feel like our tele-O&M visits were comparable to our in-person visits. Jane made the following statements about our tele-O&M visits: "it was essentially as close as we could have without having you here; it was very similar to our previous visits; other than being hands on, it was pretty well the same thing as having you here." She felt our tele-O&M visits "[worked] really well" and "[made] it nice to be able

to have [me, the COMS] there even when [I couldn't] be there.” Additionally, “it was nice that even though [I, the COMS] couldn't be here, [I was] able to see what was going on and able to watch [Emma] moving and what she was doing and give some tips to fine tune things.”

When I asked Carol about the comparability of tele-O&M and in-person visits, she said,

I really did [feel that teleintervention visits were comparable to in-person visits], and I was actually kind of surprised that I did, because I thought, what if there was some sort of physical manipulation that I needed to do? Because I'm not really, well, I'm not very spatial in like, 'move them this way or make sure they're shifting their weight this way.' But you provided excellent direction, and I was able to implement everything you said really easily.

Further, “I felt like it was a minimal difference, whether you were there in person or not, because I feel like I learn enough from you through our in person visits that I can follow the directions you give me remotely.”

Through my own reflections of our tele-O&M visits, “I felt like our interactions were about the same as when we are doing an in-person visit. It seemed very natural and flowed as it usually does.” My agreement with both Jane and Carol that our tele-O&M visits varied only slightly from our in-person visits was unequivocal.

Satisfied with the tele-orientation and mobility experience. Jane and Carol seemed to be satisfied with our tele-O&M experience. After our first tele-O&M visit, Jane said, “I didn't have a lot of expectations because [this] being the first televisit, I wasn't a hundred percent sure of what we were doing.” However, “it worked really well. And I

could see this being really advantageous, especially for people who live in more rural areas.” After our last tele-O&M visit, Jane joked, “if I am smart enough to figure it out [how to utilize teleintervention for O&M support services in EI], it has potential to be a great tool!”

Carol was a bit surprised with how she felt about the tele-O&M visits when I asked her about them after our last visit for the study:

They were actually better than I expected. I expected a little bit more technical difficulty or a little bit more, maybe, hesitation from the family with their ability to communicate. You know how sometimes people, when they're being videoed, will kind of hold back a little bit? They were very open and upfront with everything. And so, it actually went better than I expected.

Carol also alleviated some of my anxieties about the quality of video and audio during tele-O&M visits when she said, “I think what worked well is just being able to hear you clearly. We did. There was never really any kind of technical difficulties, other than maybe me not angling the camera right sometimes.”

As I concluded my last tele-O&M visit with Emma, I thought to myself, “overall, [this] visit was a good one and our interactions were the same as usual: comfortable, friendly, and thought-provoking.” I was satisfied with my tele-O&M experience with Jane, Emma, and Carol, and I would not be surprised if we continued to do tele-O&M visits as needed in the future.

Teamwork. The positive tele-O&M experience with Emma seemed to stem from a family-provider relationship that was collaborative and mutually respectful. My tele-O&M visits with Jane, Emma, and Carol were usually relaxed – we had a tendency to go

with the flow – and filled with laughter. Jane mentioned that she liked “the co-visits” with me and Carol because we “work well together.” Carol attributed the success of our tele-O&M visits to the nature of the family and our work as a team:

I feel that it [tele-O&M visits] was very successful, especially because of the family that we worked with. They were very open, and it didn't seem to hinder their ability to ask questions or be open. And I was also able to implement the suggestions that you provided easily through the use of the teleconferencing.

Additionally, “I think that we work very well as a team, and so I think we kind of already had a natural rapport established that made this delivery model just a piece of cake.”

As I observed Jane and Carol during our tele-O&M visits, I felt the following about Jane:

Jane is a wonderful mother who is very hands-on with her child. She is proactive during home visits and a natural at learning and implementing strategies to help her child learn and grow. She engages Emma and knows what makes her go. I really liked how Jane showed me the many different aspects what of Emma can do, and I am looking forward to continuing to watch her progress; and the following about Carol: “Carol has a good sense of family-centered practices, as demonstrated by how she conducted herself during our visit.” Carol was receptive to the needs of the family during each visit and resourceful in helping them identify and practice strategies to address those needs. I learned a lot from Jane and Carol about how effective collaboration can be in the application of best practices in EI, and how it can carry over in several variations of family’s home visit.

Greyson

Greyson is a handsome boy with extremely fair skin; a mop of curly white hair; and pink-purple eyes. He is tall and lithe and somewhat introverted, preferring to move at his own pace and engage in tasks and activities that interest him. At the start of the study, he was 2 years and 6 months old. He was born at 37 weeks gestation and has a sister who is a fraternal twin. Jamie is a charming girl with medium-length brown hair, fair skin, and hazel eyes. She is more petite than Greyson, but she is more active and outgoing than him. She does not have visual impairment and seems to be developing within range of peers in her and Greyson's age group. Greyson's parents, Megan and Adam, were 30 and 31 years old when Greyson and his sister were born. Megan is an emergency room nurse and Adam works in manufacturing. Both parents have completed schooling beyond high school: a bachelor degree for Megan and a master's degree for Adam.

Greyson and his family live in an urbanized area, which is defined as a geographic area that has a population of 50,000 or more by the U.S. Census Bureau. The neighborhood they live in is fairly typical for a suburb of a large metropolitan city, with homes nestled in residential areas with sidewalks and local schools and parks nearby. Mid-sized commercial areas within a few minutes' drive provide access to chain-recognized grocery stores, restaurants, gas stations, and shops. Greyson and his family live in a community that is about 300 miles away from the BVIO campus where my office is located.

Etiology of visual impairment. The etiology of Greyson's visual impairment stems from oculocutaneous albinism. Oculocutaneous albinism is an inherited genetic

condition that reduces the amount of pigment in an individual's skin, hair, and eyes. Due to this lack of pigmentation in the skin and eyes, individuals with oculocutaneous albinism are typically very sensitive to sunlight and bright lighting conditions. Most individuals need to wear dark sunglasses to reduce light sensitivity (i.e., photophobia) and glare when they are outside in the sun or in rooms with bright lighting. Additionally, these individuals need to be diligent about taking precautions to prevent sunburns, such as wearing sunscreen, long-sleeved clothing, and hats, to decrease their risks of developing skin cancer. Greyson also has nystagmus, which is a common eye condition associated with individuals who have oculocutaneous albinism. Nystagmus is neurological in nature and presents itself as rapid, involuntary movements of the eyes.

Greyson was diagnosed with oculocutaneous albinism when he was 3 months old. His current level of visual functioning is described to be low vision, where his visual acuity (sharpness of vision) is reduced; however, he has not been prescribed glasses yet to help improve his visual acuity. When Greyson is looking at objects during near tasks, he usually has to look at them close up, at about two to four inches from his eyes, depending on the lighting conditions of the environment. The brighter the lighting, the closer he needs to bring the object up to his eyes to see it better. When Greyson is looking for objects or people outside, in sunny conditions, he is able to identify them from a distance of about 10 or less feet, depending on the lighting conditions of the environment. Again, the brighter the lighting conditions, the closer he has to be to the object or person to identify it. When Greyson is outdoors or in an unfamiliar area, he will use his senses of hearing and touch to learn about and explore his environment, and to

locate items and people of interest, before he uses his vision to supplement or verify what he is experiencing.

Early intervention services history. Greyson had been receiving general EI services (e.g., service coordination, physical therapy, occupational therapy, developmental specialist) from the local agency that provides EI services to families in the area in which his family lives for six months at the start of this study. He had been receiving BVI-specific EI services from his BVIO EIP EI-TSVI for six months prior to the start of the study. Although the time period in which Greyson has been receiving EI services in the area that he and his family currently resides seems short, he has been actually receiving services for much longer, as he and his family moved last summer from another area in the state to where they are now. Prior to moving, Greyson had been receiving general EI services from another local agency that provided EI services in the area where they lived and BVI-specific EI services from another BVIO EIP EI-TSVI for 20 months. In total, he has been receiving EI services for 26 months.

Greyson's teacher of students with visual impairments who specializes in early intervention (EI-TSVI): Linda. Linda has worked with children with BVI and their families in EI for about 19 years. She is licensed in the state as special educator (concentration in severe exceptionalities) with endorsements in early childhood education and BVI. She has about 15 families on her caseload and provides services to families located in the large metropolitan city in which she and Greyson's family lives and in other areas of the state that require some long distance travel (anywhere from 45 minutes to 5 hours one way by car).

In supporting families of young children with BVI in EI in the area of O&M, she received pre-service training in O&M as part of her coursework for the university program she completed to obtain her endorsement in BVI. Linda reported that she felt like she “did not have enough training” to support the families she works with in the area of O&M. During her interviews for this study and with my interactions with her during home visits, she mentions the lack of training and inability to help families more when it comes to O&M.

Prior to the study, she did not receive any type of pre-service education or professional development training to conduct home visits using distance consultation service delivery models. Nor has she used distance consultation service delivery models to conduct home visits in the past.

Referral for orientation and mobility and Individualized Family Service Plan (IFSP) outcomes. Greyson was referred for an O&M evaluation due to concerns about his not using his vision much to see where he was going when walking and moving around in his surrounding environments. He struggled with identifying and navigating changes in surface contrasts (would probe them with his feet to make sure there was not a depth difference before stepping on or over them) and changes in elevation (he would just walk off curbs or steps; he tripped a lot over lips or cracks in the sidewalk). The O&M evaluation confirmed that he would benefit from O&M training to help him learn the skills necessary to navigate a variety of environments better with his level of visual impairment. Training in basic white cane skills were recommended after the evaluation to help address the areas of concerns related to Greyson’s ability to identify and manage changes in contrasts and elevation and to travel safely through unfamiliar environments

independently. From the COMS perspective, as well as the EI-TSVI's, it was very apparent that Greyson needed training in using a white cane to help increase his safety for travel outside his home – he was not using his vision well to scan his environment while moving around and had a challenging time identifying and maneuvering around or avoiding obstacles. However, when the topic was brought up with Megan, she politely, but firmly, affirmed that he did not need cane training at this time. She felt that he would learn to move around better once he had more experiences with traveling in a variety of environments. Based on this response, I put a hold on the topic of Greyson learning to use a white cane for another time – the time was not quite right now. O&M support services were added to Greyson's IFSP after it was determined that he was eligible for services. The following outcome was developed for his IFSP:

- Greyson will scan his environment and follow single directions to find objects/people during daily routines 75% of the time. Goal achieved per parent report or therapist observation.

Orientation and mobility for Greyson. In-person O&M support home visits with Greyson mainly took place at home, with his mother, Megan, and his twin sister, Jamie. Although Jamie was not receiving EI services, she was an active participant during our visits as Greyson's sibling. The playroom was our primary work space and it provided us with a wide variety of toys and equipment to work with during our home visits. When the weather permitted us to do so, we split our visit time between the playroom and the backyard. The weather is generally mild throughout the year in the area where Megan and Greyson live so we had many more opportunities to conduct in-person O&M support visits outside than the other participants in this study. Even though

I had to drive about five hours one way to visit with Greyson, being able to work with him and his family outdoors in fair weather was great because it is in these conditions where he struggles the most in the area of O&M. When Linda first met Greyson, she rushed to send in a referral for an O&M evaluation for him because during one of their visits outside in the backyard, she witnessed him tripping and falling all over the stone pavers and running into a tree. She was alarmed at how poorly he was using his vision outside (in an area that should have been somewhat familiar to him since his family moved there a month or so ago) and told me in a phone conversation that I had with her prior to my first visit with Greyson that “Greyson needs a cane!” During our in-person O&M support home visits with Greyson, it was immediately apparent that Megan viewed our time with Greyson as “therapy time” and made an effort to minimize distractions from Jamie during our visits. Linda and I insisted that it was okay for Jamie to join in our activities with Greyson, but Megan felt like she needed to take Jamie out into the hallway just outside the playroom or into the other room (i.e., the living room) to entertain her so Greyson could concentrate on what Linda and I were doing with him. Although Megan was often out in the hallway or the living room with Jamie during the indoor portions of our in-person home visits, she was never too far away to listen to us, observe us from a distance, and offer feedback as necessary. Since Greyson moved at his own pace and engaged in tasks and activities that were of high interest to him, our in-person home visits focused on observing Greyson as he moved through his house and backyard; identifying areas that may be challenging for him as he navigated through the environment; and providing Megan with ideas on how to help him manage these areas on his own in the future and how to practice these strategies in different environments outside their home.

As we advanced through the next few months of O&M support visits, I gained a better understanding of why Megan was insistent on entertaining Jamie out in the other room during our time with Greyson: Jamie was the more dominant twin and since her vision was better than Greyson's, she was much quicker to complete the tasks and activities that Linda and I had planned for our visits (e.g., scanning for and locating objects around the room or outside in the yard; tracking moving objects in a game on the iPad). Megan was taking it upon herself to entertain Jamie out in another room to give Greyson a chance to attempt and complete activities at his own pace, with his level of visual impairment. I was relieved to note that after our first visit with Greyson, Megan began bringing herself and Jamie back into the area in which we were working with Greyson. The time they spent with us increased with each visit and at the conclusion of the study, Megan and Jamie were in the same area as us for about 80% of the time. We were fortunate enough to be able to do one in-person O&M support visit out in the community, at a local park that was unfamiliar to Greyson and his family. During this visit, I gained a lot of information about Greyson and how he was using his vision to move about in a new environment with many changes in elevation (e.g., curbs and stairs), changes in surface contrasts and terrain, and obstacles. The park was an ideal place for an O&M visit because it had a large playground area with playground equipment that could accommodate children of various ages and gross motor abilities. Additionally, the park had other features such as a small amphitheater with shallow concrete stairs, a small wash area lined with various sized rocks and boulders, a splash pad, and large grassy areas with trees for shade. As I observed Greyson moving about the various areas of the park with different people (i.e., Megan, Linda, and me), it was apparent that he was not

using his vision well to scan the environment for drop-offs and obstacles and that he did not fully trust his vision to help him navigate across uneven terrain or changes in surface contrasts when he was expected to do so on his own. Although Greyson was wearing dark sunglasses, the bright morning sun still overpowered his light sensitive eyes. My observations of him just reaffirmed my conviction that he needed to learn how to use a white cane to increase his safety while traveling independently. However, I knew Megan's feelings about the white cane so I am biding my time to have the discussion about the cane with her again when the time is right.

Unbeknownst to me, our time at the park that day provided me with insights about tele-O&M that were pivotal in making me rethink its use for visits out in the community in the typical scenario of telepractice/teleintervention, where services are provided with just the caregiver, child, and EI provider are present. The following is an excerpt from my reflective journal entry about an incident that occurred with Greyson that day that was a turning point for me:

The challenge today was filming on the move for scoring purposes. When I arrived at the park, Megan pulled in right after me. We were about 20 minutes early (yes, it is a rare occasion for me to actually be early for anything!) so we just got started. Jamie had a potty accident before Linda arrived at our originally scheduled time so she and Megan had to run off to the car for a change of clothes and then to the bathroom. Consequently, that left me having to manage the iPad and videoing that part of the visit, while working with Greyson, on my own — I had to apologize to my scorers about the camera perspective (i.e., first person and very narrow field of vision) and erratic filming of the video. When Linda arrived,

I handed off the iPad to her so she could record our visit and then went into instructor mode so I could follow Greyson around and make sure he was safe. As crazy as it was for me to have to video Greyson while working with him, I think the experience was valuable in teaching me about what it would be like if I had to do a tele-O&M visit with a family who had to manage the technology on their own, without another person to help facilitate the visit as I am doing for my study now. I don't think I would feel comfortable conducting this type of visit (i.e., out in the community, especially outdoors) using tele with a family if only one adult was available to manage the technology. My main concerns are related to safety and best practices in EI.

One, safety: safety was a huge concern for me while I was trying to video what I was doing with Greyson. Trying to fiddle with the iPad and making sure I was actually videoing what I wanted to video took much of my focus and concentration away from Greyson and my responsibility to keep him safe. Not only did the perspective of the video narrow even more with me having to video Greyson while we were moving about (I had many minutes of video that focused on the top of his head, the ground, the tree in the distance, etc.; although, you could hear me talking with him, and I think what I was saying was descriptive enough that a person viewing the video would have enough information to piece together a picture of what we were doing in his/her mind), my sense of distance was distorted while watching Greyson move about or perform a task. For instance, I felt really bad towards the end of our visit when we were done with the swings and Jamie had another potty accident and she and Megan had to run to the

car for a change of clothes. I was with Greyson, videoing that part of the visit because my iPad had ran out of memory however many minutes before and I had to record the remainder of the visit on my phone, when he realized that Megan was leaving him and he started running after her. I ran after him, but since I was trying to video what was going on, I totally misjudged the distance that was actually between me and him. Before I knew it, he went off the curb and fell to his hands and knees in the gutter in the parking lot — he was a lot further from me than what I was seeing in camera. Not only that, I should have been paying more attention to the environment around me, rather than focusing on what I was just seeing on my phone. I was so upset with and disappointed in myself that I let him get hurt during a visit with me! Safety is a priority for me when I am out on lessons with students — safety is what builds trust between me and my students. Luckily, Greyson did not sustain any injuries from going off the curb. Megan reassured me that all was okay, but I was not okay with what happened... what happened just brought to light with me how unsafe tele-O&M visits could be in these types of situations. It could compromise the safety of the child and/or whomever else is with the child (e.g., caregiver or sibling) if there is not another person there to help manage the technology during a visit. I guess it is like texting while driving: it is difficult to focus on being aware of your surroundings and staying safe while moving around in your environment if you are fiddling around with your technology.

Two, best practices in EI: if only one person (in this case, it would be the parent/caregiver) was present to manage the technology while the child moves

about during an tele-O&M visit, especially if it was during an outing in the community, his/her opportunity to work with the child dramatically decreases if s/he has to follow the child around with the iPad or phone so I can see what is going on during the visit. Coaching the parent to implement and practice strategies would be easy on my part because I would be doing the same thing I usually do during tele-O&M visits (i.e., sitting somewhere and talking with the people on the other side through my laptop or phone), but for the caregiver, that would not be the case if s/he had to be the camera person. Granted, the caregiver could set the device down to do an activity with the child, such as swinging on the swings, but how would our interactions with each other look like? Could we have a conversation well with each other? Could we hear and see each other well based on the distance the device has to be set so I can have an adequate picture of what is going on? I have so many things swirling in my head about this situation of not having another person there to help with the technology. If the caregiver has to double as the camera person, we may not be able to extend O&M visits out into the community because it would take away from his/her focus on working with his/her child. If I had to take a guess, many people would focus mainly on managing the technology and trying to listen to what I had to say rather than on their child. This would not be considered best practice in EI! Having said that, I wonder what it would be like if we used “mobile” technology, such as a Go Pro, in these cases for tele-O&M visits? Would the camera perspective be the same? Would using the technology be easier or more difficult? It would definitely be

more costly... can't require families to purchase this type of equipment. So many things to think about and work out with this tele stuff!

The incident provided me with a first-hand experience of what it would be like to conduct a tele-O&M visit out in the community in the role of the caregiver, and it effectively unraveled some of the thoughts I had established about the practicality and utility of teleintervention visits as a practitioner. I was left feeling uncertain about the future of tele-O&M visits and whether or not they could be implemented as documented in the EI telepractice and teleintervention literature.

At the conclusion of the study, Greyson seemed to be making significant progress in all areas of development. He was babbling a lot more and starting to say a few words in context. He was interacting and playing with Linda more than he had ever done in the past and enjoying it, as evidenced by the big smiles and giggles he gave her during their time together. He seemed to be moving around better in familiar outdoor areas. During our last in-person visit, I observed him walking around his backyard, deftly navigating over the areas that challenged him at the start of the study. Since Greyson will be transitioning out of EI this summer and starting preschool in the fall, the remainder of my time with him as his COMS is short. We have much to do in this time to help him prepare for his transition to preschool (e.g., orienting and familiarizing him to his new classroom and school campus), but I am confident he will fine once he is there – I am so excited for him to start this next adventure in life.

Themes for in-person orientation and mobility support visits. The themes that emerged for Greyson for in-person O&M support visits were (a) O&M support services are helpful, (b) progress, and (c) being present physically. The themes seemed to suggest

that Megan and Linda found our in-person home visits were more productive and conducive for Greyson and his learning style.

Orientation and mobility support services are helpful. Megan and Linda both expressed positive feelings about O&M support services. Linda felt that O&M support services were “beneficial” to young children with BVI and that waiting for them to receive services when they were older was “waiting too long.” When asked to expand on her comments further, Linda said, “well, they're learning to walk, they're learning to be mobile, they're learning to get around their environment at a really young age; and with that extra help, it just makes them more successful.” In reference to families being involved with helping their young children with BVI learn and develop concepts and skills related to O&M, Linda continued on to say, “I think just knowing how to help them [the children]. Knowing what do for them [the children]. The [orientation and] mobility instructor, they have that resource to help them figure that out, otherwise they're just winging it.”

Even though Linda has been working with children with BVI and their families for over 19 years, she admitted that she did not “have a lot of expertise in O&M” and that “anything you [I, as the COMS] offer is great.” Linda seems to value O&M support services for children with BVI and their families in EI and their need for it during the formative years of early childhood.

Megan found our in-person O&M support visits helpful. After our first visit, Megan said, “just having the feedback of him [Greyson] in his own environment and how he's adapting to it and [getting] pointers. [For example,] maybe removing the rose bush would be good idea so he doesn't run into it.” She continued on to say,

It's just nice to have a different perspective so I can pay attention to [more stuff]; to see if he's scanning so I can give you feedback like, “yes, he's doing this more when he's got this kind of lighting,” or, “he's doing this more when he has contrasting colors,” or something like that. So, that's why I'll pay attention more to what he's scanning for and how he's scanning. . . . Like I said, it gives you that different perspective, it points out things that I'm not strong in – this isn't my field of work. I see him, he's my son; but, as a mom, sometimes you look past things.

Since Greyson will be turning 3 years old this summer, Megan found our O&M support visits helpful in planning for his transition to preschool in the fall:

I think it just helped because it's the summer and [with] his new transition, we were kind of planning a little bit more for how we wanted to introduce him to the preschool so he could be successful when he goes and not be so intimidated with the new environment.

Progress. The progress that Greyson made in learning and demonstrating skills related to O&M was evident in the video recordings of his home visits; Megan's, Linda's, and my observations and discussions during our home visits (documented in my reflective journal entries); and Megan's interview responses. Megan commented, “I think the more we've worked with him [Greyson], the more independent he's [be]come to try exploring on his own instead of being hesitant because of his vision.” I observed,

I thought today's visit was great. Since meeting Megan, I have learned that she definitely has expectations for her kids when it comes to trying new things. She expects them to try new tasks, foods, etc. a few times even if they are hesitant or refuse to do so. I think this type of approach has really helped Greyson to move

around on his own more through the environments he and his family have encountered thus far because I noticed he definitely listens to Megan and the information/directions she is giving him at the moment, and he is understanding what she is saying to him. For instance, when he was over in the rocky area of the park with just me (Megan was over in the playground area talking with Linda and keeping her eye on Jamie), he sat down and scooted over the big rocks if I didn't offer a hand to help him step down or walk over the rocks. However, when Megan joined us, she was directing him to go slow and to step up, down, or over with her voice and he maneuvered through that area on his own like a champ! I was certainly impressed, and I learned a lot about how to help Greyson in the future from watching this interaction with Greyson and Megan on the rocks.

During another visit, Megan mentioned, "directional-wise, he's improving on that a ways from when before, he used to just ignore you." I observed,

We are still working on positional and directional concepts, and it was great seeing Greyson being able to play with the light-up blocks Linda brought more on his own this time than what we saw him doing last time during our visit. Since his attention for short tasks/activities is coming along, Linda and I were trying to think about some of the things that he may not have yet and what we can do with him. I was curious about the sorting piece so it was nice being able to work with him on that to help him work on scanning and using positional and directional words while doing so. Linda and I were both really surprised that he was able to sort the colored shapes into the corresponding colored bowls (on the light box) after observing how we did it for a little bit. We were so pleased! He did a great

job. I think it's great that Linda and Megan are incorporating more positional and directional language into their interactions with Greyson — and me.

Throughout the study, I found myself making statements such as “I feel like Greyson has made so much progress within the last few months — Linda has made the same observation and commented on it” frequently. Greyson was definitely showing us that he was making strides in learning. During our last visit for the study, Greyson continued to show us progress and I noted:

We had a good visit. It was so cool watching Greyson interact with Linda today. He was actually taking turns and playing with her! He was totally enjoying it because he was smiling and laughing the whole time and requesting that she play with him more. For as long as Linda and I have worked with him, we have not seen him take interest in playing with anyone other than himself or his mom — what a huge step for Greyson! Linda and I were so excited! Greyson has made so much progress, cognitively and socially, since I started seeing him in January. I am looking forward to seeing what other things he will do this summer.

Being present physically. Overall, Megan and Linda preferred O&M support home visits conducted in person. Megan mentioned that physically being there during our home visits helped facilitate my interactions with Greyson, which she felt was an important part of his learning. She felt that his visual impairment, in conjunction with his introverted disposition, impacted his ability to interact well with others. Therefore, she said,

I think it helps because when Greyson seen you in person, he now knows who you are. . . . I think he just interacts better with people when they're in person, but that's because of his vision.

When I asked Megan if she had any concerns about how we conducted our last tele-O&M visit, she half-jokingly said, “yeah, that it wasn't in person.” Even though I have to travel over 600 miles roundtrip to visit with Greyson, Megan knows I will continue to see him in person at least once a month until he transitions out of EI.

Linda understands the nature of being an itinerant EI provider and its challenges, but she still values in-person visits and having a provider who is local. She underscored this sentiment when she said, “I feel like the services here are okay for the needs that we have. I feel like it could be better with somebody here, somebody closer. . . . It's been hard not having somebody that is just here.” Despite the distance I have to travel to work with the families she serves, like Megan, Linda also knows I will travel the distance to provide O&M support services to any family that needs them in her area; that is, until we figure out an alternative and/or more permanent solution to the shortage of O&M specialists to provide EI O&M support in our state.

Tele-Orientation and Mobility for Greyson. Tele-O&M visits with Greyson all took place at home, mainly in his and Jamie’s playroom. Linda facilitated each visit by connecting/disconnecting me via her mobile phone or iPad and hotspot at the start/end of the visit. Although Linda was adept at managing the technology, I felt my view of what was going on during a tele-O&M visit was more limited with her because she frequently focused the camera on Greyson and what he was doing throughout the visit. She would move the camera out farther so I could see more of the room and its occupants when I

requested her to do so, but I had to initiate this type of request frequently. During our tele-O&M visits, Greyson predominately participated in the activities Linda had planned for him and O&M support time was more consultative, with me asking Megan about her observations of Greyson and her concerns in regard to O&M and then all of us (i.e., Megan, Linda, and me) strategizing on how to address those concerns. Similar to our in-person visits, Megan took herself and Jamie out of the room during our initial tele-O&M visits so Greyson could concentrate his attention on what Linda and I had planned for him. She gradually brought herself and Jamie back in the room for our latter visits and at the conclusion of the study, she and Jamie were in the same area as us for about 90% of the time, more than our in-person visits.

Unfortunately, we were only able to complete three out of four tele-O&M visits with Greyson during the course of the study. Due to inclement weather in the month of February, Linda had to reschedule our visit with Greyson so she could make up visits that were missed with her families located in an area of the state that was a five-hour drive by car, one way, from the city in which she lived. We rescheduled the visit with Greyson for later in the week, but ended up canceling the visit because Megan and Greyson were unavailable for a visit. We were unable to make up the visit during the course of the study due schedule conflicts with the family, Linda, and me.

Themes for tele-orientation and mobility visits. The themes that emerged for Greyson for tele-O&M visits were (a) technology helps, (b) better than nothing, and (c) technology constraints. The themes highlighted various aspects of tele-O&M visits that Megan and Linda found favorable and challenging. Although they seemed to be satisfied

with their tele-O&M visits during the study, they still expressed their preference for in-person home visits.

Technology helps. Megan and Linda both felt that tele-O&M visits were helpful in various ways. Megan felt that O&M visits were less intrusive when observing and getting to know Greyson:

I felt good that you could see him in his own environment, an environment that he's comfortable in, which helps you formulate a baseline for him. . . . I liked that we started in an environment that he's comfortable in.

She went on further to say,

Before, when we'd have Linda and then you and then maybe like a student with her [Linda], it's just a lot of people. And he's [Greyson] not gonna actually be like himself when he's got a bunch of people there. So, I think the technology helps sometimes because then, you can get a perspective of how he would act when there's not as many people directing him. I think it'll help doing the in-person visits, but it also helps using the technology because it gives him less people around him that he doesn't know. . . . He's gonna be more himself with the less crowd he's got watching him.

Megan also thought technology helped in bridging the distance gap for accessing O&M support services in the area in which they lived:

I think the advantage to tele is that you still get services from someone who is four hours away . . . [you] still get input and still have that as a service where if it [weren't] a service down here, it's still available in some way.

In the same vein, Linda felt that technology helped in connecting with families who lived a far distance away. She remarked, “I think they feel like they can talk to you and ask questions like you're in the room.”

Better than nothing. Although Megan and Linda both had positive views of tele-O&M, they both indicated that they preferred in-person visits and that tele-O&M would be the better alternative to no services at all. Megan emphasized this point when she said, “as an alternative to nothing, I'll take the technology,” as did Linda when she said, “I think it works if that's the only resource.” When asked about her thoughts about tele-O&M as an alternative to in-person visits, Megan said, “I think FaceTime is the best thing we got right now. You're long distance so we're doing what we can with what we've got.”

Technology constraints. Megan and Linda both identified constraints associated with the use of technology that influenced their views of tele-O&M visits. Megan provided the following insights during our interview at the conclusion of the study:

I felt like when we use the technology, we're kind of confined to be inside a little bit because it's a lot harder to do stuff outside because of the technology. You don't quite see things as well, and sometimes, we don't have the camera even facing him [Greyson] because he's in the other corner somewhere. So, it's a little harder than in person.

She continued on to say,

The disadvantage, I'd say, is just that you miss things. Like I said, you miss things because sometimes you're busy worrying about where the camera is; or

sometimes, you're trying to pay attention to where the camera is and you're looking at grass for ten minutes.

Related to the viewpoint of the camera during tele-O&M visits, Linda expressed her concerns about not being able to “see the big picture” from the start of the study. Her concerns were realized quickly as I conducted tele-O&M visits with all the participants and the limited point of view of the camera was reflected upon frequently as a hindrance during tele-O&M visits in my reflective journal entries. The limited point of view of the camera was also apparent in the videos recorded for the in-person home visits, which were used along with the tele-O&M visit videos to score home visiting practices in the two service delivery models.

I learned a lot from my tele-O&M experiences with Greyson, Megan, and Linda, especially the technological aspect of using teleintervention to deliver O&M support services in EI. I did not anticipate experiencing an event so profound as I did during my visit with Greyson at the park that would make me rethink my convictions about using teleintervention as a service delivery model for O&M support services in EI. My confidence in teleintervention was shaken to the core that day.

Marie

Marie is a delightful girl with fair skin; pixie short, blonde hair; and unique brown eyes. She is petite, outgoing, lovable, and stubborn at times. At the start of the study, she was 2 years and 2 months old. She was born at 40 weeks gestation and is the youngest of two children. She has one older brother who is 8 years old. Marie's parents, Amelia and Nicholas, were 25 and 28 years old when Marie was born. Amelia owns her own house

cleaning business and Nicholas works in manufacturing. Both parents completed their high school education.

Marie and her family live in an urban cluster, which is defined as a geographic area that has a population of at least 2,500 and less than 50,000 by the U.S. Census Bureau. The community they live in is closer to the population of 2,500 side of an urban cluster and is in the thick of farm and ranch country. The part of town they live in has houses spread out on sizeable plots of land, with manicured front lawns and open-space backyards. Sidewalks seem to have been reserved for the busy main street that runs through town and the part of town that is closer to the local elementary school. Small commercial areas along the main street, within a few minutes' drive, provide access to locally-owned grocery stores, restaurants, specialty shops, and one chain-recognized gas station. The community that Marie and her family live in is about 100 miles away from the BVIO campus where my office is located.

Etiology of visual impairment. The etiology of Marie's visual impairment is bilateral colobomas of the irises, retinae, and optic nerves and ectopia lentis (displaced lenses). A coloboma is an eye condition where normal tissue in or around the eye is missing; this can occur in one structure or many structures of the eye. In Marie's case, her colobomas involve multiple structures, extending from the irises in the front of her eyes all the way back to her optic nerves. The colobomas in the colored part of her eyes, the irises, are in the bottom portion of the colored rings, giving them a unique keyhole or cat-eye appearance. Since the colobomas prevent her irises from contracting fully to filter out light, Marie is extremely light sensitive (i.e., photophobic). When she is

outdoors, especially in bright sunlight, she will usually request sunglasses or close her eyes.

Marie was diagnosed with bilateral colobomas and ectopia lentis when she was 2 months old. Her current level of visual functioning is described to be low vision, where her visual acuity (sharpness of vision) is reduced. She has been prescribed glasses; however, since she does not like having them on her face, she is learning to wear them for extended periods of time. When Marie is looking at objects during near tasks, she usually has to look at them close up, at about one to two inches from her eyes, depending on the lighting conditions of the environment. The brighter the lighting, the closer she needs to bring the object up to her eyes to see it better. When Marie is looking for objects or people outside, in sunny conditions, she is able to identify them from a distance of about 6 feet or less, depending on the lighting conditions of the environment. Again, the brighter the lighting conditions, the closer she has to be to the object or person to identify it. When Marie is outdoors or in an unfamiliar area, she will use her senses of hearing and touch to learn about and explore his environment, and to locate items and people of interest, before she uses his vision to supplement or verify what she is experiencing.

Early intervention services history. Marie had been receiving general EI services (e.g., service coordination, physical therapy, occupational therapy, developmental specialist) from the local agency that provides EI services to families in the area in which her family lives for 24 months at the start of this study. She had been receiving BVI-specific EI services from her BVIO EIP EI-TSVI for 24 months prior to the start of the study.

Marie's teacher of students with visual impairments who specializes in early intervention (EI-TSVI): Holly. Holly has worked with children with BVI and their families in EI for more than 9 years. She is licensed in the state as an early childhood educator and a special educator (concentration in severe exceptionalities) with an endorsement in BVI. She has about 15 families on her caseload and provides services to families located in urban clusters and rural and remote areas around the area in which she lives (a rural area) and in other areas of the state that require some long distance travel (anywhere from 45 minutes to 4 hours one way by car).

In supporting families of young children with BVI in EI in the area of O&M, she received pre-service training in O&M as part of her coursework for a university level O&M program. Holly completed all of the coursework required for her O&M program; however, she did not complete the student teaching portion of her program to finish her degree to become an O&M specialist. Holly reported that "because of previous training" and "guidance of certified O&M instructors," she felt like she had sufficient training to support the families she works with in the area of O&M.

Prior to the study, she did not receive any type of pre-service education or professional development training to conduct home visits using distance consultation service delivery models. Nor has she used distance consultation service delivery models to conduct home visits in the past.

Referral for orientation and mobility and Individualized Family Service Plan (IFSP) outcomes. Marie was referred for an O&M evaluation due to concerns related to safe, independent travel with her level of visual functioning (i.e., low vision). She struggled with identifying and navigating changes in surface contrasts (she would drop

down to her knees to feel them with her hands or probe them with her feet to make sure there was not a depth difference before stepping on or over them) and changes in elevation (she would just walk off curbs or steps). The O&M evaluation confirmed that she would benefit from O&M training to help her learn the skills necessary to navigate a variety of environments better with her level of visual impairment. Training in basic white cane skills were recommended after the evaluation to help address the areas of concerns related to Marie's ability to identify and manage changes in contrasts and elevation and to travel safely through unfamiliar environments independently. From the COMS perspective, as well as the EI-TSVI's, it was very apparent that Marie needed training in using a white cane to help increase her safety for travel outside her home – she was not using her vision well to scan the environment while moving around, and she stepped right off a set of stairs and a curb during the O&M evaluation session. When the topic of a white cane was brought up, Amelia embraced the idea; she wanted to do whatever needed to be done to help her daughter be safe while traveling on her own. When I brought the cane to “test drive” during our first visit, I was really taken aback when Amelia started crying while Marie took her cane out for a spin. I had a moment of panic that this may have not been the right time to introduce the cane to Marie, but Amelia was elated and actually crying tears of joy. She told Holly and me that she “just can't believe how cute Marie is with her cane!”

O&M support services were added to Marie's IFSP after it was determined that she was eligible for services. The following outcome was developed for her IFSP:

- Marie will begin to practice safe travel behaviors by responding to commands, such as "stop," "slow down," "look up," "look down," when traveling about with her family.

Orientation and mobility for Marie. In-person O&M support home visits with Marie mainly took place at home, with her mother, Amelia, and her older brother, Ryan. The living room was our primary work space and, with the large kitchen area adjacent to it, provided us with ample room to move around and do activities during the cold weather months in which this study was conducted. Since Amelia owned her own business, her time for EI home visits were limited to late afternoons on her one day off in the week, Friday. Winter arrived late and persisted longer than usual this year so our opportunities to meet out in the community for O&M support home visits were limited. Additional factors, such as home visits scheduled for the late afternoon/early evening hours (the sun was setting by the time we started our visits and the temperatures outside were frigid) and residing in a small community where public buildings (e.g., library and post office) closed early on the weekends and shopping centers with chain-recognized stores were over 30 minutes away by car, also limited our opportunities to visit out in the community. During our in-person O&M support home visits, we focused on strategies and activities that encouraged Marie to strengthen her skills for visual scanning (for near distance and far distance tasks), following directions, and understanding and utilizing positional and directional concepts. Marie really enjoyed scavenger hunts so we did many of them around various areas of the house. Marie's brother, Ryan, really adored her and wanted to help out and be a part of the activities as much as possible during our visits. Holly and I recognized he was a motivator for Marie so we tried to include him whenever we could

by having him hide objects for her to find, using positional and directional words while giving her directions to find objects, allowing him to “test out” an activity or explore an object first if Marie was hesitant to do so initially, and so forth.

As we advanced through the next few months of O&M support visits, I observed that Amelia was not overly concerned about Marie’s need for O&M. I am unsure whether this was a natural consequence of only conducting O&M support home visits at home, where Marie was very familiar with the surrounding environment and was able to move around it comfortably, or if it was something else. Based on some of the conversations that Holly and I had with Amelia during our visits, I think it may have been the latter. Frequently, Amelia brought up concerns and anxieties related Marie’s current sleeping and eating patterns – Marie was not sleeping well through the night and it did not seem like she was consuming enough food during meals throughout the day. Holly and I did the best we could to help Amelia pinpoint the reasons behind these worries and to figure out strategies to try out, including contacting Marie’s pediatrician. At the conclusion of the study, Amelia must have felt Marie had improved in these areas as she did not bring up the topics during our last visit. However, when Holly and I asked how things were going in terms of sleep and eating, Amelia happily replied that things were better.

Unfortunately, we were only able to complete three out of four in-person O&M support home visits with Marie during the course of the study. Amelia had to cancel our visits in February (family was busy) and March (family was going out of town). We were able to reschedule the visit for March for a different day in the month, but due to conflicts with my schedule, we could not make up the visit for February. Additionally, I

was unable to interview Amelia after our last visit in April because she had to leave for a family event. I tried to contact her several times in the following weeks to schedule an interview by phone, but she did not return any of my calls or respond to my text messages.

Theme for in-person orientation and mobility support visits. The theme that emerged for Marie for in-person O&M support visits was the in-person connection. Since I was only able to conduct one interview with Amelia, the result was this one theme. The theme seems to suggest that connecting to other people in person is important in establishing and maintaining social relationships.

The in-person connection. Overall, Amelia and Holly preferred O&M support home visits conducted in person. Amelia felt that being able to connect with Marie in person helped facilitate my interactions with her at the start of the study. She said she “felt good about Marie interacting more” during our visit and that it was probably attributed to the fact that “you’re here.”

Holly understands the nature of being an itinerant EI provider in rural and remote service areas and the isolation one can feel when one has to travel long distances to work with families. She mentions this when she said,

I would still prefer in-person. . . . Especially here in [this state] where we're so isolated, I really like having that time to have another co-worker. . . . Especially with how much we travel and especially you since you serve more rural communities or families in rural communities than I do. I can see that's a lot of time in the car by yourself and being able to meet up with a colleague and just have chitchat for a little bit, it's a good thing to do.

Tele-Orientation and Mobility for Marie. Tele-O&M visits with Marie felt very similar to our in-person home visits, with the exception of Holly facilitating each visit by connecting/disconnecting me via her iPad or laptop and hotspot at the start/end of the visit. I could tell Holly was nervous about the technology aspect of our tele-O&M visits and that nervousness was compounded by the technology issues we experienced during our first tele-O&M visit. The following is an excerpt from my reflective journal entry after our visit that day:

I just finished my first tele-O&M visit with Marie. I have to say, that it was definitely more challenging in terms of technology than my other visits with Greyson and Emma earlier in the week. Holly and I had some issues connecting and staying connected. I am unsure what the deal was, but my internet connection kept going in and out, and I had to re-connect or wait for frames to catch up during this visit. There were quite a few times where the picture would freeze, but I could still hear the audio – this was very apparent when I was watching the video again later this evening. In comparison to my other two tele-O&M visits this week, it seems like Holly is not quite as versed in managing technology as the other two EIP EI-TSVIs. I had to coach her a little bit on where to put the iPad and adjust the view so I could see what was going on with Amelia and Marie during the visit. I think it will take some time to figure out how to position the iPad so we can record the visit and get a better view of what is going on. Interestingly, Amelia was the one who was adjusting the iPad and asking me if I was able to see them. I noticed during our visit, Marie was somewhat distracted by me being on the iPad versus being in the room. She kept checking in during

our visit to look at me or, as Amelia pointed out, would remember that I was there when I startled her with a burst of laughter after I had not said anything for a little while.

I think Holly did a great job adjusting the view of the iPad for when Marie was running around the house so I could see what she was doing. I think with more practice, Holly and I can work out how to adjust the iPad and position it so I can see what is going on in the room better. Again, I am unsure about what was going on with the technology today, but I am thinking that the amount of snow that we got during the last snowstorm may have impacted the cable and its connection. I think we are having the same issues with internet at home... I was at my parents' house this time (I was at home for the other two tele-O&M visits) and they were having quite a few issues with the internet connection. When the internet connection went out on my computer, I had to hop onto my cell phone and use it as a hotspot to continue the visit. I'm hoping that the internet connection will be better for our next tele-O&M visit. On the flipside, since Holly was using her hotspot, I wonder if the connection speed was good enough on it where she was in that part of the state. [Name of city where Amelia and Marie live], to me, seems to be more of a rural community than [name of the city where Emma lives] or [name of the city where Greyson lives].

I think my interactions with Amelia, Marie, and Holly were okay. I know I had a hard time hearing what they were saying because of the distance at which the iPad had to be put, and maybe angled, so I could see what was going on in the room. During some of the times I could not hear very well, Holly played

translator and repeated what Amelia had said for me. I missed one question and luckily for me, Holly re-asked the question a few minutes later so I did not leave Amelia hanging. I don't think our communication and interactions were strange or awkward during today's visit; however, it felt a touch off today because of the technology issues we were experiencing.

The technology issues we encountered during Marie's first tele-O&M visit (e.g., connectivity and audio and video quality) were common issues reported in the EI telepractice and teleintervention literature. Luckily for us, the second tele-O&M visit with Marie ran much more smoothly and we completed the visit without any technological glitches. During the second visit, Holly switched over from using her iPad to her laptop and that seemed to be more comfortable for her in utilizing and managing the technology.

During our tele-O&M visits, Marie predominately participated in the activities Holly had planned for her. However, since Holly had training in the area of O&M, she made sure the activities had an O&M component incorporated into them (e.g., scanning for and catching bubbles while using positional and directional words to help Marie know where to look for them). Interestingly, it was during our tele-O&M visits where we worked on long white cane skills – we did not work on white cane skills during our in-person visits. Since Marie was learning basic skills related to cane use (e.g., learning to grip the handle and push the cane tip out in front of her appropriately) and Holly had knowledge and experience in teaching white cane skills, it was not difficult for me to coach Amelia and Holly from a distance in how to help Marie in learning how to use her cane around the house. Similar to our in-person visits, Amelia did not express many

concerns related to O&M with Marie. We continued to have conversations about Marie's sleeping and eating patterns, and Holly and I tried to help Amelia explore potential solutions.

Unfortunately, we were only able to complete two out of four tele-O&M visits with Maire during the course of the study. Amelia cancelled our visits in March (family was busy) and April (family was busy). We were unable to reschedule the visit in March due to conflicts with my schedule, but we were able to reschedule the visit in April for a different day in the month. However, Amelia ended up cancelling our rescheduled visit (family was busy) and we were unable to make up that visit because it was scheduled for the last week in April, which was the last week I was collecting data for the study. Since we did not have a last tele-O&M visit in April, I did not have an opportunity to interview Amelia after our last visit. I attempted to contact her several times in the following weeks after the conclusion of the study to schedule an interview by phone, but she did not return any of my calls or respond to my text messages.

Themes for tele-orientation and mobility support visits. The themes that emerged for Marie for tele-O&M support visits were (a) normal, yet foreign and (b) technology challenges. The themes seem to reveal that the initial perception of tele-O&M and its challenges depends on the individual and his or her own confidence in consuming and managing technology. The more comfortable an individual is with the technology, the more open she or he is to making it work, despite the challenges.

Normal, yet foreign. The use of telecommunication technologies to deliver and consume O&M support services in EI was normal, yet foreign for Amelia and Holly. When Amelia was asked about how she felt about using the technology during our first

tele-O&M visit, she responded by saying, “well, I think that it's just in my generation to [use it]. . . .So I felt very normal!” However, Holly felt differently and said as much when she said, “I think I expressed it in our first interview that these types of visits just are very foreign to me.”

Even though we encountered issues with technology during our first visit, Amelia was not deterred by what happened. She made the following comments after our second visit,

I liked that it was a little easier this time. And, I'm sure that every single time will get easier. . . . Not that it wasn't comfortable last time, but I think that every time that we do [it], it'll get a little more comfortable. . . . It worked better having Holly here with her equipment [and] having all of us interact, it wasn't hard to do. It wasn't hard to just set up the iPad and do our thing.

Technology challenges. Since I experienced the most issues with technology during our tele-O&M visits with Marie, Amelia, and Holly, it was not unexpected that Amelia and Holly would comment on these issues during their interviews with me.

Amelia remarked,

I don't know if we could come up with a better system. Because, sometimes, I felt like you couldn't see us; but [with] you being here [in person,] we can [situate the iPad] and I can remember where we put that chair [with the iPad on it] and [where] we sat [so you could see us]. That'll help me.

She continued on to say,

I mean, we had a problem getting connected at first, but I don't know if that's how it will be every time. I mean, because I know that things don't just happen like

that sometimes, especially where you're clear up there [and] we're here, sometimes the internet gets in the way.

Holly's expressed her reservations about managing the technology during our tele-O&M visits when she said, "oh, it just feels awkward for me holding up an [iPad during a visit]." When she decided to switch over to her laptop to connect me for tele-O&M visits, she justified it by saying, "on my iPad, it seemed like Zoom really wasn't working."

Summary of the Within-Case Analysis

The cases of Emma, Greyson, and Marie comprised the within-case analysis for this study. Themes that emerged from the snapshots of each case's EI O&M support home visits in the in-person and teleintervention service delivery formats, responses from the participant interviews, and comments from the COMS's reflective journal entries revealed the participants' perceptions of O&M support services when they were delivered in the two service delivery formats. Figure 2 summarizes the themes developed from each of the cases.

Although it was not disclosed earlier in which service delivery format each case received O&M support home visits at the beginning of the study, the order in which each case received O&M support services did not seem to greatly impact the participants' perceptions of O&M support services when they were delivered in the two service delivery formats. Throughout the study, the participants' perceptions of O&M support services seemed to remain fairly consistent for the two service delivery formats.

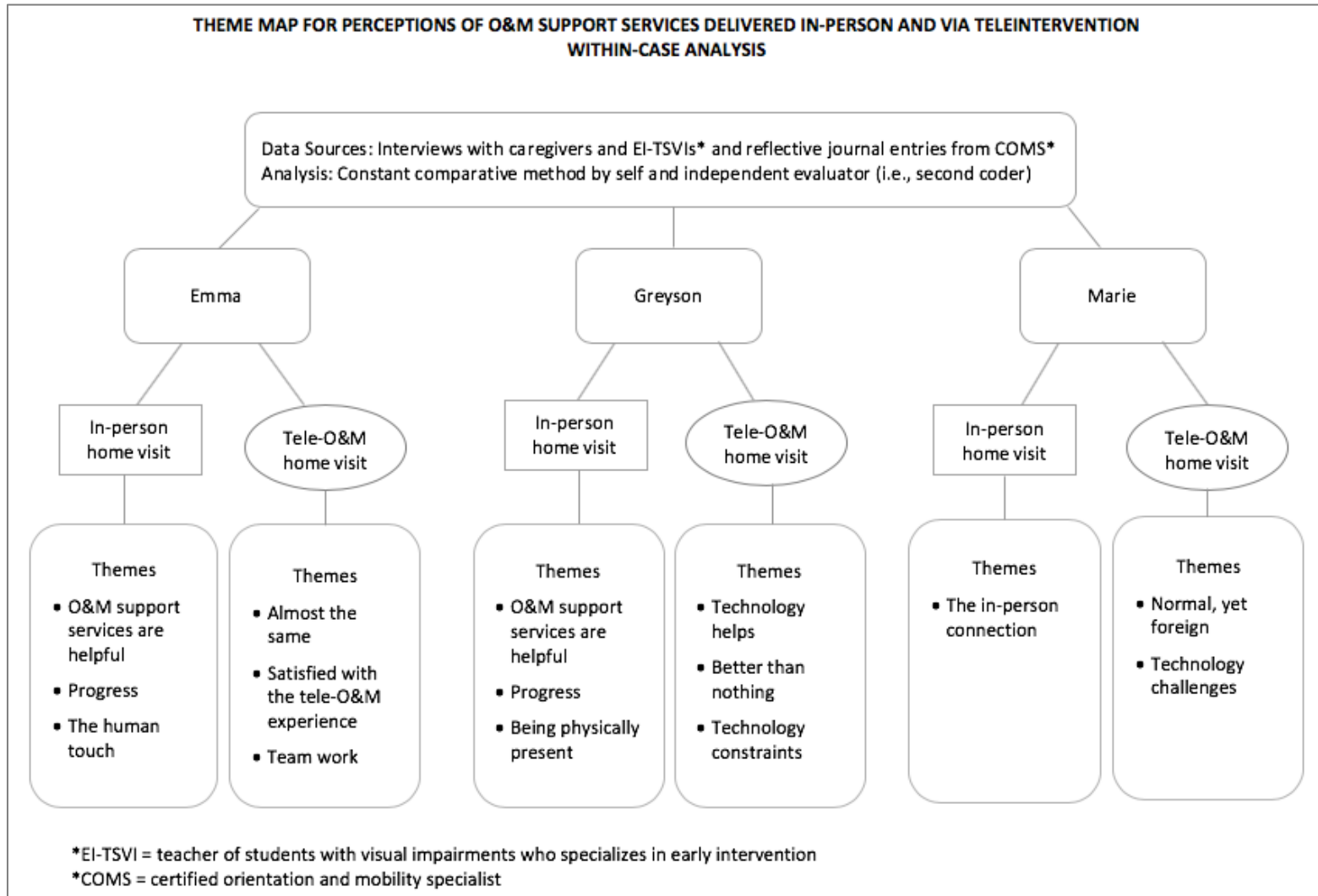


Figure 2. Theme map for perceptions of O&M support services delivered in-person and via teleintervention for the within-case analysis.

Overwhelmingly, all the participants indicated that they preferred in-person home visits and that persisted throughout the study. Interestingly, participants from the two cases that first received O&M support visits via teleintervention at the start of the study, Greyson and Marie, provided significant insights about the challenges and constraints of teleintervention as a service delivery format for O&M support services in EI. The within-case analysis of Emma, Greyson, and Marie helped me become familiar with each of their individual cases and provided me with opportunity to understand them better for the cross-case analysis.

Results for Research Questions

Analyses of the data collected for this study provided in-depth information related to the provision of O&M support services in EI for three cases utilizing the traditional service delivery model of in-person home visits and the investigational service delivery model of teleintervention home visits. The results of the data analyses were used to answer the following research questions, which will be discussed further in the next chapter:

- Q1. How do caregiver perceptions of O&M support services differ when services are provided via teleintervention and in-person service delivery models?
- Q2. How do home visiting practices differ between teleintervention and in-person service delivery models?
- Q3. How do the costs of providing O&M support services differ between teleintervention and in-person service delivery models?

Participant Perceptions of Orientation and Mobility Support Services Delivered via In-Person and Teleintervention Service Delivery Models

A cross-case analysis of the data collected through the interviews with the caregivers and EI-TSVIs and through the reflective journal entries of the COMS revealed several themes that were predominant in the perceptions of O&M support services and the formats in which O&M support services were delivered to families in EI during this study. The themes were organized into two broad themes that tried to encapsulate O&M support services as they were viewed by the participants in the two service delivery formats. The participants' perceptions of O&M support services when they were delivered in person or via teleintervention (tele-O&M) across all cases are presented in the form of themes, supported by direct quotes from the interviews and reflective journal entries.

Orientation and Mobility in Early Intervention Status Quo

The participants' perception of O&M support services when they were delivered in-person during the study seemed to be reflective and in favor of how they are currently being delivered in EI. The caregivers and EI-TSVIs expressed the importance of establishing and building a foundation of O&M skills and concepts early on in a child with BVI's life and felt that it was accomplished best in person. They felt that the physical, person-to-person contact during home visits was more conducive to learning, not only for the child but for the caregivers and EI-TSVIs as well. For example, the demonstration of specific skills related to O&M (e.g., use of a white cane) seemed to be more understandable and efficient when shown in person. Additionally, the caregivers

and EI-TSVIs felt that being physically present during home visits facilitated rapport building and interactions among team members, including the child.

The orientation and mobility foundation. The importance of establishing and building skills related to O&M early in a child with BVI's life was a common theme among the caregivers and EI-TSVIs. Many of the participants felt that the time for learning, practicing, and acquiring O&M concepts and skills was when children are young. They expressed consensus on having a foundation for O&M in place for when children are older so they can focus on other skills and life experiences rather than having to learn the basics.

Carol, Emma's EI-TSVI, said,

Orientation and mobility are skills that they're going to be using throughout their life. So, why not start early and as soon as possible to build those skills? Especially when you are working with the children in their natural environment, which is the home, an area that they're more comfortable with. They'll be more willing to work, and you get that parent buy-in with that extra support that they may not be able to familiarize themselves with once the school year starts. Their child is learning all these skills that they don't know anything about because they're not there with their child. So, being able to teach with the parents and kind of coach the parents on these skills that they'll be generalizing in the home is fantastic.

Linda, Greyson's EI-TSVI, reiterated the point of building the foundation for O&M skills early and not waiting until children were older: "I think it's [O&M support services in EI]

very beneficial to them. I think waiting until they're older is waiting too long.” When asked to expand on her thoughts further, Linda said,

I just feel like it's just something that you learn when you're younger. It's just in you, to make your life a lot easier as you're older, instead of having to learn it when you're older. . . . Well they're learning to walk, they're learning to be mobile, they're learning to get around their environment at a really young age, and with that extra help it just makes them more successful. . . . I think you just have more things to do [when children are older], and if you're just learning how to navigate around the world at an older age, there could be a lot of other things you should be doing.

Holly, Marie's EI-TSVI, agreed with Linda:

I think it's imperative [to receive O&M support services in EI]. Some of those basic early motor skills, if you have to wait until they're 5 or 6, or in kindergarten, there's so much that they're missing. And then, you're spending all that time maybe pulling them out of a class to get those basics that they could already have learned before they're into the school setting.

Megan, Greyson's mother, emphasized the points of the EI-TSVIs from the perspective of the caregiver:

I think that as a kiddo, they need that [O&M] foundation, just like they do when they're learning to talk and stuff. I mean, they're more willing to learn as [compared to] an older kid who's like, “well, I've been doing fine by myself without this.”

Preference for in-person home visits. The collective preference for O&M support services to be delivered through in-person home visits in EI was a strong, distinct theme that persisted throughout the study. The caregivers and EI-TSVIs affirmed that in-person home visits were more conducive for building rapport; fostering person-to-person contact and interactions; assessing O&M needs; and implementing O&M-related strategies.

Megan, Greyson's mother, felt that in-person O&M support services home visits allowed me, the COMS, to build rapport with her son and to get to know him and his needs for O&M better:

I think he just interacts better with people when they're in person than when they're on the camera. . . . I felt good that you could see him in his own environment, an environment that he's comfortable in, which helps you formulate a baseline for him. I just look forward to getting him out of an environment that he's used to and seeing how he does outside of that. But, I liked that we started in an environment that he's comfortable in.

Additionally, she felt that in-person home visits helped her support her son better in the area of O&M:

It's just nice to have a different perspective so I can pay attention to [more stuff]; to see if he's scanning so I can give you feedback like, "yes, he's doing this more when he's got this kind of lighting," or, "he's doing this more when he has contrasting colors," or something like that. So, that's why I'll pay attention more to what he's scanning for and how he's scanning.

Amelia, Marie's mother, also felt that in-person O&M support home visits helped me build rapport with her daughter: "I felt good about Marie interacting more, and maybe it's because you're, like, here."

The implementation of O&M strategies, especially the strategies that required physical body movements, seemed to be easier when they were executed in person. Jane, Emma's mother, really liked the hands-on aspect of in-person O&M support home visits:

I think the obvious advantage to in-person is you can get in there and you can show me what you're talking about. You can manipulate her body and I can look at it and go, "Oh that's what she means." Which that's hard to do over tele, but you're really good at explaining it.

Linda, Greyson's EI-TSVI, felt in-person home visits were more efficient in building rapport with families and assessing their needs for O&M. She expressed similar views related to rapport and assessment of O&M needs as Greyson's mother when asked why she preferred in-person home visits:

I guess just the interaction and the rapport you build with the parents. You can see the environment, you can see there's a street in front of them, there's trees, there's curbs, you know what I mean? On video, you might not see all of that.

You can kind of assess his environment and know the best way to help.

Holly, Amelia's EI-TSVI, captured the nature of being an itinerant educator and the importance of being able to connect with others in person:

I really like the one-on-one. . . . Especially with how much we travel, and especially you, since you serve more rural communities or families in rural communities than I do. I can see that's a lot of time in the car by yourself and

being able to meet up with a colleague and just have chit-chat for a little bit, it's a good thing to do.

Surprisingly, for me, as the COMS, the nuances of interacting with people in-person was what I looked forward to the most: “it felt good being there, being part of the group and being able to read everyone’s facial expressions and body language as we were conducting our visit.”

Orientation and Mobility in Early Intervention Supplement

The participants’ perception of O&M support services when they were delivered via teleintervention (tele-O&M) were positive, but seemed to strongly suggest that it would work best as a supplement to, not a replacement for, in-person home visits. The caregivers and EI-TSVIs expressed satisfaction with their tele-O&M experiences during the study, but factors related to overcoming the narrow view point of the technology; managing the technology during a visit; working in tandem as a team; and maintaining safety while conducting tele-O&M visits were areas of concern for many of the participants, including myself. Reviewing the literature on the implementation of telepractice and teleintervention in EI assisted me in anticipating some of the challenges encountered during the tele-O&M visits (e.g., connectivity and quality of audio and video); however, challenges related to specifically providing O&M support services via teleintervention arose and had unintended consequences.

Tele-Orientation and Mobility works, but. The tele-O&M experience seemed to be a positive one for the caregivers and EI-TSVIs who participated in this study. As a group, they felt that the provision of O&M support services in EI through teleintervention was workable, but only if the provision of services in person was not readily available.

Although the participants felt that tele-O&M was successfully implemented during this study, they still indicated their preference for in-person home visits, with tele-O&M being a good supplement or alternative if needed.

Carol, Emma's EI-TSVI, felt that tele-O&M was "a fantastic idea" and that it was "definitely workable." Jane, Emma's mother, said tele-O&M "worked really well" for them, and that she "could see [tele-O&M as] being really advantageous, especially for people who live in more rural areas." Jane elaborated by saying, "the obvious advantage to tele is you can help more kids. It cuts down on travel time, drive time, especially [for] those in more rural environments that may not get services as often due to the location."

Linda, Greyson's EI-TSVI, said that the use of tele-O&M "definitely [provided] more contact, if there's ever any situations where you [I, the COMS] couldn't be there" and "that [it] works." Megan, Greyson's mother, felt that the technology aspect of tele-O&M was beneficial for Greyson during co-visits:

I actually really liked it because before, when we'd have Linda and then you and then maybe like a student with her [Linda], it's just a lot of people. And he's [Greyson] not gonna actually be like himself when he's got a bunch of people there. So, I think the technology helps sometimes because then, you can get a perspective of how he would act when there's not as many people directing him."

Although Megan had positive views of tele-O&M, she also had additional thoughts about it:

I think FaceTime is the best thing we got right now. You're long distance so we're doing what we can with what we've got. . . . If tele is the only option, I think that it's still worth using just because even in rural communities where they don't have

such services regularly available, if people in rural communities or something can still have you counsel from their home, it's better than nothing because it's [O&M support services] important.

Further, she said,

I think in person works better. I think if he [Greyson] was a little older, I think tele would be a lot better, because I think as kids get older, they don't necessarily need you there, they just want more pointers than anything else. I think with the kids being so young, they need the interaction still so they know who you are, and know that your opinion kind of matters.

Holly, Marie's EI-TSVI, felt the tele-O&M visits were "actually a little better" than she expected because "these types of visits" were just "very foreign" to her. Amelia, Marie's mother, on the other hand, said that the tele-O&M sessions "felt very normal" because it was "just in [her] generation to" use videoconferencing technology to connect with other people. She also said that during our tele-O&M session, "just having all of us interact, it wasn't hard to do. It wasn't hard to just set up the iPad and do our thing."

After the study, the EI-TSVIs provided some additional thoughts about tele-O&M that were thought-provoking. In relation to tele-O&M being a supplement for in-person home visits, Carol said,

I think if I had never met you in person or ever had any work, like, any kind of co-visits with an orientation mobility specialist, I may not know what to expect or what you are working on. So, yeah, I do feel like that at least an initial visit would be beneficial.

On the same topic, Holly said,

I think it [tele-O&M] could have value on a personal basis. I still think [there is a need for] a physical, in-person, O&M experience at least once a month or whatever, but I think for any other supplemental visits, I think it [tele-O&M] will be just fine. For me, it was okay and it would have been fine either way, but I'm just trying to think maybe some people might not feel comfortable. I guess it could work. Well, I'm just thinking like if we're doing an actual mobility [visit] with the cane and stuff, I worry about that being a televisit. If the person's really unfamiliar [with O&M] and okay, now have them move their hand this way [using voice description] instead of physically being able to be there and show them how to first use the cane and stuff like that. . . . I just think certain skills for sure would benefit from a face-to-face visit, but definitely most of the carry through or the follow through or the keep practicing [could be done through a televisit] or even maybe [in the situation where] this is the first time, does this kid qualify or not, probably not, but I'd still like you to see him instead of you having to drive hours, with maybe just a little televisit, you could get a pretty good idea [of whether the kid needs O&M support services or not].

Although Holly preferred in-person home visits, she was surprised with how she felt about the tele-O&M visits in the end:

I like more of the hands-on, so even though there were a couple little glitches [with] keeping her [Marie] in frame and whatnot, still I think I was more comfortable with it. Like I said, I'm surprised with how easily we could all hear and how well you could see her [Marie] even if she was moving far away and

stuff like that. I was just pleasantly pleased that once we got the technology working, when it was those visits [tele-O&M visits], that you could pretty much see everything, for the most part, see and hear. I was a little worried if we'd be able to hear each other and see each other well enough.

During our last visit at the end of the study, Linda made a strong statement when she said that tele-O&M was “never as productive as being there in person.” Linda did not elaborate on this statement, but I assume she felt that during our in-person visits, it was easier to work in tandem to provide both BVI-specific EI services and O&M support services to the family during a co-visit. Holly may have felt the same way in that,

It was a little tiny bit harder at some points doing my thing and making sure your IFSP outcomes could be addressed as well [as mine] simply because I was the one running the video, so I had to focus sometimes on, “oh, she's out of the shot,” that type of thing. That was just a little disjointed.

Holly expanded on this further by saying,

It's [tele-O&M visits] going to be a little bit different because typically, I'm used to [us working] hand in hand, other vision skills and O&M; but, I feel like with the technology, using Zoom or FaceTime, it's going to have to be more of an “okay, this is definite O&M [time] right now. Can you see what the child's doing?” And I don't know that I can really... it would be weird for me to try and see another [vision] need come up and access that opportunity right then to work on that.

Linda and Holly both expressed concerns about their roles in managing the technology to facilitate the tele-O&M visits. They seemed to feel that having to manage the technology

piece of the tele-O&M visit disrupted the flow of the visit and potentially took away from their focus and time to work on their IFSP outcomes with the family. Since I was on the other side of the technology, I had some reflections of my own about this concern: “I feel like it somewhat disrupts the flow of the visit when I have to ask the person videoing to move the camera this way and that so I can see what is going on.”

The big picture. The ability to see the surrounding environment and what was going on during a home visit (i.e., “the big picture”) was identified as a common challenge for tele-O&M visits. Linda, Greyson’s EI-TSVI, mentioned from the beginning of the study that this would be a challenge with conducting visits from a distance via technology: “I just think it's hard to see everything that's going on in the home.” Additionally, she mentioned, “just that you're not there. . . . Not there to see the whole picture and to, you know, [see that] he's going to run into a tree.” Throughout the study, she maintained her stance:

Well, I just feel like videoing. . . . Sometimes, the video is in the wrong spot, or you're just not seeing everything going on with the room, or that kind of a thing. . . . [In person,] you can see the environment, you can see there's a street in front of them, there's trees, there's curbs, you know what I mean? On video, you might not see all of that.”

Megan, Greyson’s mother, mentioned the big picture as a disadvantage of tele-O&M:

The disadvantage, I'd say, is just that you miss things. Like I said, you miss things because sometimes you're busy worrying about where the camera is. Or

sometimes, you're trying to pay attention to where the camera is and you're looking at grass for 10 minutes.

When asked if the technology was a hinderance to the visit, Megan replied, "it was fine. You were able to get some perspective from what you could from the camera angles and stuff and seeing him interact with me and Linda."

As the COMS, I initially did not think that the big picture was going to be a concern during tele-O&M visits. However, the issues with not being able to see everything I wanted to see during a tele-O&M visit became more apparent with each session I conducted with families:

As I am gaining more experiences with these tele-O&M visits, I feel the video perspective thing is starting to concern me a little bit. I didn't realize it much until now, but as O&M specialist, I really do do a lot of environmental analysis when I am in a home visit or on a lesson. I also like to see how other people are reacting/feeling by looking at their facial expressions and body language as I am making recommendations or suggestions, talking, demonstrating a skill, watching the execution of a skill, etc. I feel like I don't have much of that here with such a narrow perspective of what is going on in a visit. During an in-person visit, I could usually take in most of this information with just a glance, but this was much more challenging during a tele-O&M visit because I could not just turn my head to look at what I wanted to look at; I had to rely on the person who had control of the device/camera. I feel like it somewhat disrupts the flow of the visit when I have to ask the person videoing to move the camera this way and that so I

can see what is going on. It's kind of like have a restricted visual field or field loss.

Even during in-person home visits, recording video of the home visits made me aware of issues with the big picture:

The only technology issue I felt I experienced today was trying to maneuver the iPad so I could capture what was going on during the visit for my scorers — still trying to work out those bugs. . . . Video recording home visits have been a lot more challenging than I thought it would be. After a month of this, I am unsure about how my having to deal with the iPad impacts my home visiting practices. I think it will be interesting to see what the outcomes are because fiddling around with technology to record video of a visit is not the norm when it comes to doing in-person home visits. I worry about whether or not my scorers will be able to hear what is going on during the home visits and if I am giving them enough perspective of the home visit to be able to score accurately.

Technology, movement, and orientation and mobility out in the community.

An unexpected theme that emerged from this study was the ability to conduct tele-O&M visits out in the community when children were ambulatory. Issues related to safety, the management of the technology, and potential of conducting tele-O&M visits with just the caregiver and COMS were of concern to the participants and the COMS.

Even though Megan, Greyson's mother, liked the tele-O&M visits, she felt like having to use technology to connect us hindered our opportunities to conduct O&M visits outside of the home:

I felt like when we use the technology, we're kind of confined to be inside a little bit, because it's a lot harder to do stuff outside because of the technology. You don't quite see things as well; and sometimes, we don't have the camera even facing him because he's in the other corner somewhere. And so, it's a little harder than in person.

Jane, Emma's mother, asked the question about doing tele-O&M visits without the EI-TSVI there to help facilitate the visit and manage the technology:

Yeah, I'm trying to figure out how you do that if it was just the parents. . . . It would be more prohibitive. . . . I don't think we would have been able to move about as freely if we were out in a community.

When asked if she would feel comfortable going outside her house for tele-O&M visits, Jane said,

At this point probably not, in that she's not stable or sturdy enough on her own that I could help her, hold the iPad, move around, do what needs to be done by myself. If we stayed in the house, I could totally set up an iPad on a chair or whatever and do that. I think when she is more independent physically, we could do it, but not at this stage.

Linda, expressed her concerns about conducting tele-O&M visits out in the community because "especially with O&M, the kids are on the move." She continued to say,

Well, it's the same thing when you are inside the room, being in a spot where you can set up the iPad. When you're outside it's a little bit harder because you're

moving around more often. I would be following the kid with the video, and not being able to do anything else.

When asked if tele-O&M visits could be conducted out in the community with just the child and caregiver, Linda responded,

it would be hard to instruct because mom would have to be on the kid the whole time, making sure they were safe and whoever [is] doing your Skype. You can't just do it with mom because you would be out in the community; unless, she's wearing a video or something.

Holly, Marie's EI-TSVI, recalls an occasion when we were visiting at a local elementary school for Marie's O&M evaluation and "it took all three of us [Amelia (Marie's mother), Holly, and me] to be able to run forward and save her" when she did not see several drop-offs and stepped right off of them. When asked if tele-O&M visits could be conducted out in the community with just the child and caregiver, Holly made a salient point: "Mom would have to hold the thing [iPad or cell phone] and then she's just an observer and not an active participant."

During the study, it was this part of the tele-O&M visits that made me have second thoughts about whether or not we could conduct tele-O&M visits out in the community with just me, the COMS, and families:

As I am working through this third month of tele-O&M visits, it is making me question whether it is truly feasible to do O&M visits virtually with kids who are ambulatory and if the O&M visit requires a lot of movement through an environment, especially if they are out in the community, in unfamiliar areas. I think having to manage the technology piece and trying to keep your child safe as

you look through the viewfinder of the camera to record the session may not be a good thing. Well, I can't say it is a good thing, but it can be a challenge for sure!

It makes me worry... worry about the safety of the child.

Summary of the Cross-Case Analysis

Results from the cross-case analysis helped to construct an understanding of O&M support services when they were delivered in-person or via teleintervention from the perspectives of the participants in this study. Several themes that were predominant in the perceptions of O&M support services and the formats in which O&M support services were delivered to families in EI during this study were organized into two broad themes that tried to capture O&M support services as they were viewed by the participants in the two service delivery formats. Figure 3 summarizes the themes emanating from the cross-case analysis.

The cross-case analysis revealed that the participants were united in their views that O&M support services as they were currently being provided in EI (i.e., the status quo: in person) was the best way to help them and/or help their children learn skills and concepts related to O&M. They felt that the person-to-person contact during in-person visits were more conducive to building the foundation for O&M skills and concepts during the early years of children's lives; developing and establishing rapport; and encouraging interactions between members of the EI team. Although the participants expressed that their experiences with O&M support home visits via teleintervention (tele-O&M) were positive, they still retained their preference for in-person home visits, with tele-O&M being a good supplement or alternative if needed. Concerns related to the technological aspects of tele-O&M (e.g., management of the technology; limited camera

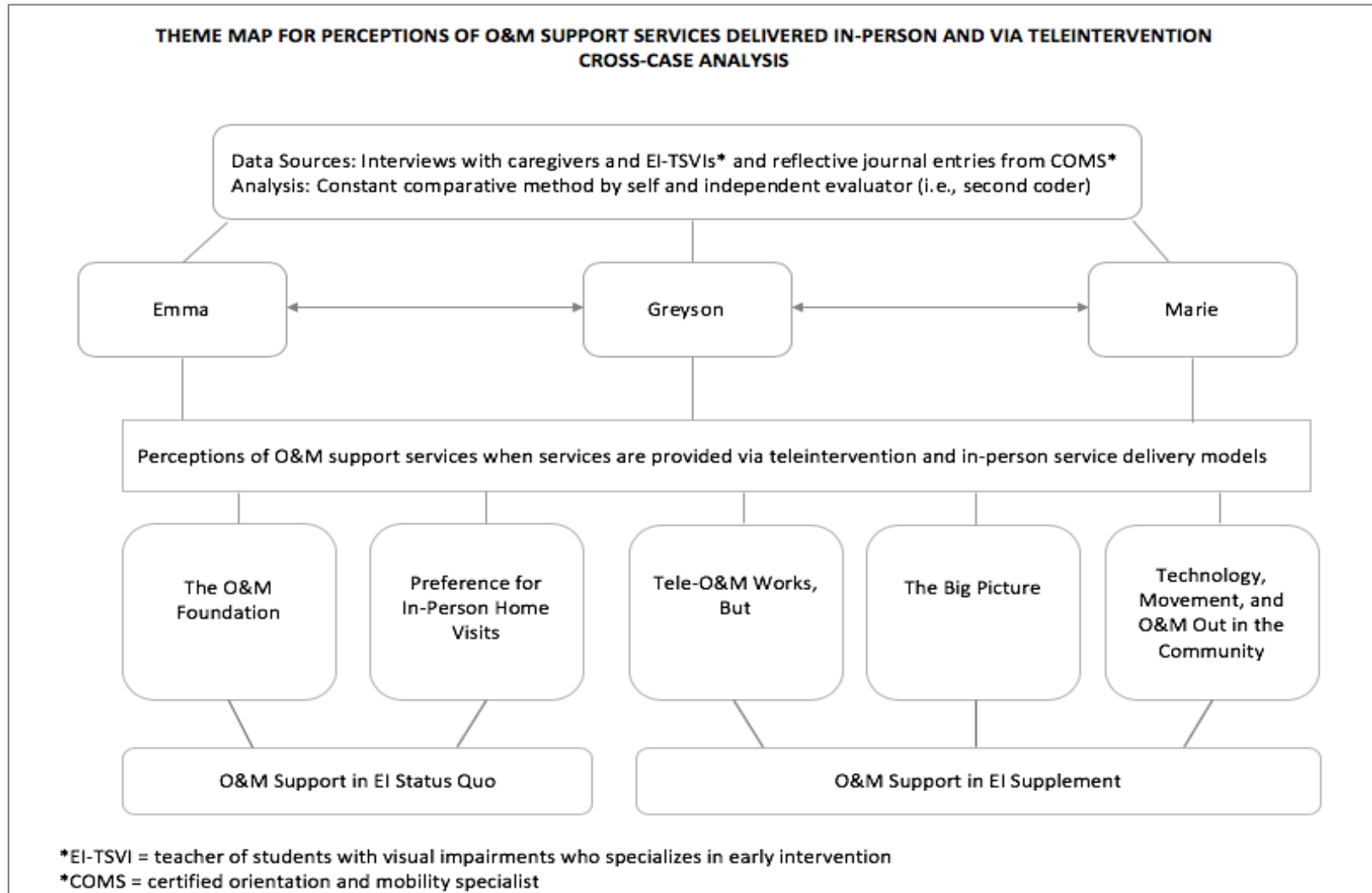


Figure 3. Theme map for perceptions of O&M support services delivered in-person and via teleintervention for the cross-case analysis.

angle views; and constraints of using technology to conduct O&M support visits out in the community) cast doubt and uncertainty on the participants' views of tele-O&M and whether it could be used exclusively as a service delivery model for O&M support services in EI. Overall, the results of the cross-case analysis indicated that the participants' perceptions of O&M support services differed when they were provided in the in-person and teleintervention service delivery formats.

Home Visiting Practices

A multivariate analysis of variance (MANOVA) was conducted to determine if there was a difference in home visiting practices when they were delivered in person and through teleintervention. Data for this analysis were comprised of the scores collected from the HOVRS-A+, which was used to rate the home visiting practices observed in the videos of all the home visits sessions recorded for this study. The independent variable was service visit type: in-person service delivery model or teleintervention service delivery model. The dependent variables were the scores for the quality indicators for home visit practices: home visitor/service provider responsiveness to family, relationship with family, facilitation of parent-child interaction, non-intrusiveness, and collaboration; and the indicators for family engagement: parent-child interaction, parent engagement, and child engagement. A standard alpha level of .05 was used in this analysis.

Results of the MANOVA found no significant multivariate effects on service visit type ($F < 1$). Mean scores generated for the dependent variables for each service type condition indicated generally "good" ratings, with scores ranging from 5.50 to 6.50 for six of the seven variables in both service type conditions. The lowest scores were seen in the area of "home visitor facilitation of parent-child interaction," with a score of 4.27 for

the in-person home visit condition and a score of 4.11 for the teleintervention home visit condition. Scores within this range were considered to be “adequate” ratings. The mean scores, with standard deviation values, for each service visit type are shown in Table 5.

Table 5

Means (Standard Deviations) for Home Visit Outcome Measures

	In-Person Home Visit (<i>n</i> = 11)	Teleintervention Home Visit (<i>n</i> = 9)
Home visitor responsiveness to family	5.82 (.87)	5.78 (1.64)
Home visitor relationship with family	6.45 (.52)	6.44 (.53)
Home visitor facilitation of parent-child interaction	4.27 (1.79)	4.11 (1.62)
Home visitor non-intrusiveness and collaboration	5.73 (1.42)	6.00(1.00)
Parent-child interaction	5.82 (1.40)	5.56(1.74)
Parent engagement	5.82 (1.40)	5.78(1.20)
Child engagement	5.73 (1.49)	5.44(1.70)

Note. HOVRS scores are as follows: 1 – needs training, 3 – adequate, 5 – good, 7 – excellent.

IOA levels were calculated manually each month to spot check the consistency of scores among the independent observers. Mean overall interobserver agreement during the course of the study on the HOVRS-A+ was 85.7%. IOA levels for the training videos and the randomly selected monthly IOA videos are shown in Figure 4. For the first three months of the study, interobserver agreement was high, at a mean 95.3%; during the last month, however, interobserver agreement dropped to 57.1% and did not meet the minimum threshold of 80%. Upon discussion with the observers and review of their scores for the video, the circumstances of the last home visit contributed to poor levels of

agreement. In April, the family had relatives visiting from out of town, so the caregiver was busy entertaining the guests and was absent for long periods of time during the visit. Differences in the observers' scores were mainly seen in the areas of parent-child interactions and parent engagement, which reflected the circumstances of the family during this visit. The observers scored the areas of "parent-child interactions" and "parent engagement" from different perspectives. One observer scored these areas based on the entirety of the visit, resulting in lower scores of three and four, while the other observer scored these areas based on the times the parent and child were engaged during the visit, resulting in higher scores of six and six. The other area of disagreement among observers was "home visitor responsiveness to the family," with observer scores of four and six.

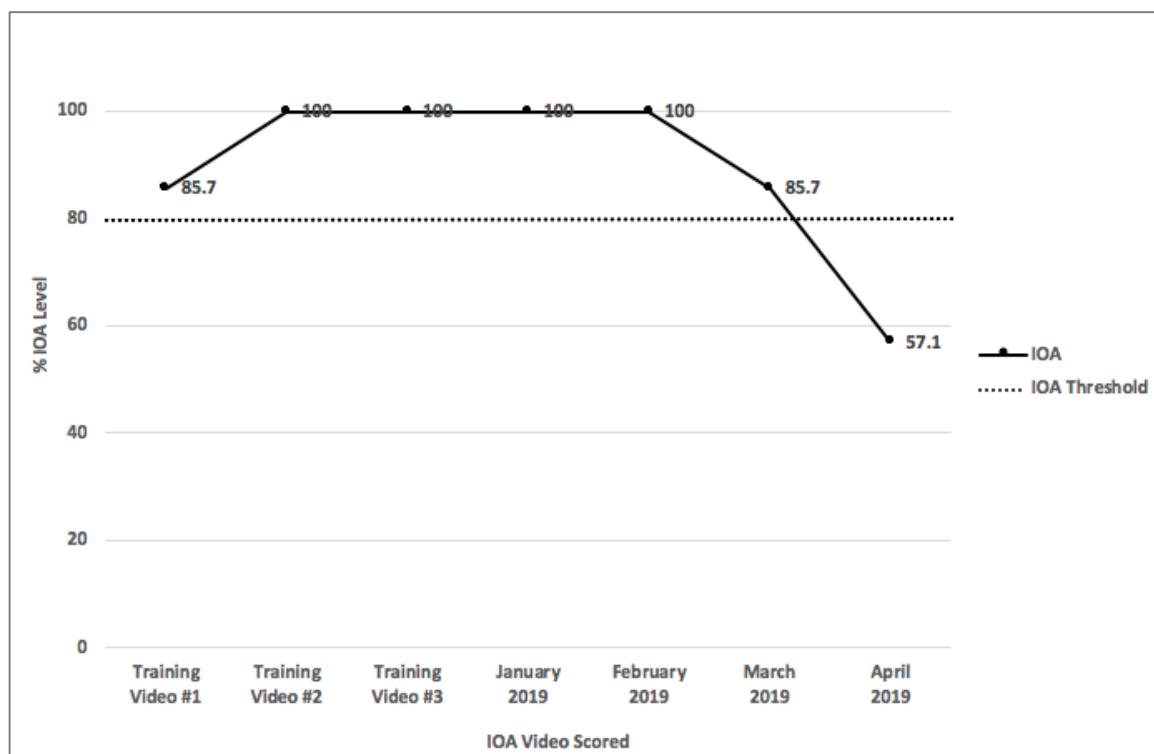


Figure 4. Monthly interobserver agreement levels for home visiting practices.

Since IOA among observers was not attained for this last visit, the reliability of scores for the other home visit videos this month could have been impacted. Given the high rate of agreement in previous months, however, and the unusual circumstances of this last visit, the investigator accepted these scores as valid and computed the overall mean at 85.7%.

The results of this analysis for home visiting practices indicate that there were no significant differences in home visiting practices when O&M support services were delivered in person and via teleintervention. Scores for all the quality indicators for home visiting practices were similar for both service delivery types.

Cost of Providing Orientation and Mobility Support Services in Early Intervention

The cost of providing O&M support services in EI for the three cases (Emma, Marie, and Greyson) were calculated using a researcher-developed cost form. The costs for providing O&M support services in person included the following: preparation time (minutes), visit time (in minutes), recordkeeping time (minutes), distance traveled (in miles by car, roundtrip from point of origin for the COMS), travel time (in minutes, roundtrip from point of origin for the COMS), cost of fuel (for distance traveled), cost of lodging (per overnight stay), per diem for meals (per overnight stay), and personnel costs (cost for COMS to provide O&M support for a visit, which included time for travel, service visit, and visit preparation and record keeping). Travel for in-person home visits originated from and ended at the BVIO, where the COMS had to pick up and return a BVIO-assigned vehicle. Table 6 summarizes the data collected for the average costs associated with providing O&M support services per visit, for each family, using the traditional service delivery model of in-person home visits.

Table 6

*Cost of Providing Early Intervention O&M Support Services in Person
(average per visit)*

	Emma	Marie	Greyson
Preparation Time (minutes)	15	15	15
Visit Time (minutes)	60	60	60
Recordkeeping Time (minutes)	15	15	15
Distance Traveled (roundtrip from BVIO, miles by car)	32	190	620
Travel Time (roundtrip from BVIO in minutes)	40	200	600
Cost of Fuel (for distance traveled)	\$4.26	\$25.30	\$85.82
Cost of Lodging (one overnight stay)	\$0.00	\$0.00	\$85.00
Per Diem for Meals (one overnight stay)	\$0.00	\$0.00	\$43.00
Personnel Costs (preparation, travel, home visit, and recordkeeping time)	\$100.40	\$223.97	\$532.91
Total Average Cost (per visit)	\$104.66	\$249.27	\$746.73

The costs for providing O&M support services via teleintervention included the following: preparation time (minutes), visit time (in minutes), recordkeeping time (minutes), distance traveled (in miles by car, roundtrip from point of origin for the COMS), travel time (in minutes, roundtrip from point of origin for the COMS), time troubleshooting technology (in minutes), cost for EI-TSVI hot spot (estimated cost of data for a 60-minute call via videoconference), and cost for COMS cellular data plan

(estimated cost of data per hour, based on an 8-hour work day), and personnel costs (cost for COMS to provide O&M support for a visit, which included time for travel, service visit, and visit preparation and record keeping). Travel for teleintervention home visits originated from and ended wherever the COMS was situated at the time of the visit (e.g., the BVIO, home, or public building in the community). Table 7 summarizes the data collected for the average costs associated with providing O&M support services per visit, for each family, using the investigational service delivery model of teleintervention home visits.

Since each service delivery format had its own distinctive requirements for the provision of services, an exact item to item comparison could not be made between both formats. For example, in-person home visits required fuel for the vehicle and for visits that necessitated an overnight stay in the city where the visit was being conducted, accommodations and per diem for meals. Teleintervention home visits did not utilize fuel for the vehicle, accommodations, and per diem for meals, but they did require time for troubleshooting issues that arose with technology and data usage for calls via videoconference. In calculating the costs for service provision, the variable cost of fuel week to week and ambiguity surrounding the costs of data and the amount of data allocated to providers via their organization-assigned devices monthly made it challenging to estimate the exact costs of service provision for this study. For example, the data plan for the EI-TSVIs' hotspots was a shared plan for the department that allotted so many gigabytes of data for a fixed price per hotspot per month, and the data plan for my organization-assigned device was a shared plan for the department that included unlimited data for a fixed price per device, per month. Additionally, estimating

how many gigabytes a typical 60-minute call via video conference added complexity to calculating costs. Depending on the month and the amount of data that was used to conduct a call via videoconference, costs varied across time.

Table 7

Cost of Providing Early Intervention O&M Support Services via Teleintervention (average per visit)

	Emma	Marie	Greyson
Preparation Time (minutes)	15	15	15
Visit Time (minutes)	60	60	60
Recordkeeping Time (minutes)	15	15	15
Distance Traveled (roundtrip from location, miles by car)	0	0	0
Travel Time (roundtrip from BVIO in minutes)	0	0	0
Time Troubleshooting Technology (minutes)	2	5	2
Cost for EI-TSVI Hot Spot (\$0.0017 per MB data, 195 MB per 60-minute call via videoconference)	\$3.27	\$3.27	\$3.27
Cost for COMS Cellular Data Plan (unlimited monthly data plan, about \$0.15 per hour of use based on an 8-hour work day)	\$0.15	\$0.15	\$0.15
Personnel Costs (preparation, home visit, and recordkeeping time)	\$69.34	\$69.34	\$69.34
Total Average Cost (per visit)	\$72.76	\$72.76	\$72.76

The results of this analysis of costs for the provision of O&M support services revealed that services delivered in-person cost more than when they were delivered via teleintervention for the participants in this study. The costs of providing O&M support services in person for all of the three cases (Emma, Greyson, and Marie) were generally higher due to costs associated with travel (e.g., cost of fuel and travel time) and compensation for personnel.

Summary

The three cases (Emma, Greyson, and Marie) for this study were introduced in this chapter. Analyses of the data collected for these three cases uncovered differences in O&M support services when they were delivered in person or via teleintervention in the areas of participant perceptions of O&M support services, home visiting practices, and cost of service provision. The results of the data analyses indicated that participants' perceptions of O&M support services differed when they were delivered in the in-person and teleintervention service delivery formats. Participants viewed O&M support services as they were currently being provided in EI (i.e., in person) as the best way to help them and their children learn skills and concepts related to O&M, with tele-O&M being a good supplement or alternative if needed. The results also showed that there were minimal differences in home visiting practices when O&M support services were delivered in person or via teleintervention. Scores for all the quality indicators for home visiting practices were similar for both service delivery types, with ratings generally in the "good" range for six of the quality indicators and "adequate" for the seventh one. The results found that the costs of in-person O&M support home visits were higher than the costs for teleintervention O&M support home visits. The costs for in-person home visits

grew exponentially with distance traveled, with travel-related expenditures attributing to the majority of the expenses. Costs for teleintervention home visits were calculated to be the same for each of the three cases. Further discussion of the results of this study and their implication for practice will be presented in the next chapter.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to show that teleintervention can be used to provide early intervention (EI) services, specifically orientation and mobility (O&M) support services, to very young children and their families in the sensory impairment field of blindness and visual impairment (BVI). Teleintervention has been shown to be an effective method of providing EI services to very young children and their families in the sensory impairment field of deaf and hard of hearing (DHH) (Behl et al., 2017; Blaiser et al., 2013). The main objective of this study was to examine O&M support services when they were delivered through in-person consultations and via teleintervention. An exploratory investigation using a multiple case approach was used to answer the following research questions:

- Q1. How do caregiver perceptions of O&M support services differ when services are provided via teleintervention and in-person service delivery models?
- Q2. How do home visiting practices differ between teleintervention and in-person service delivery models?
- Q3. How do the costs of providing O&M support services differ between teleintervention and in-person service delivery models?

Data collected from interviews, field notes (i.e., reflective journal entries), video-recorded sessions of home visits, and documents were analyzed to obtain the results for

this study. A discussion of the results, conclusions about what was unveiled through the study, implications for practice, and recommendations for future research will be presented in this chapter.

Discussion of the Results

The data for this study were collected through multiple sources and analyzed using multiple methods. Analyses of the data collected provided in-depth information related to the provision of O&M support services in EI for three cases utilizing the traditional service delivery model of in-person home visits and the investigational service delivery model of teleintervention home visits. The results of the data analyses were used to answer the research questions for this study.

Caregivers' Perceptions of Orientation and Mobility Support Services Delivered In Person and via Teleintervention

A within-case and cross-case analysis of the data revealed several themes that were predominant in the perceptions of O&M support services and the formats in which O&M support services were delivered to families in EI during this study. The results of these analyses were used to answer research question Q1: How do caregiver perceptions of O&M support services differ when services are provided via teleintervention and in-person service delivery models?

The within-case analysis showed that caregiver perceptions of O&M support services were similar when delivered in the in-person home visit format and differed when delivered in the teleintervention home visit format. Within the three cases, the families who participated in this study all indicated that they preferred O&M support home visits when they were delivered in person. They felt that O&M support services

were helpful in assisting them to identify their children's areas of strength and areas that needed improvement when it came to navigating environments that were familiar and unfamiliar to them; and to implement and trial strategies with their children to help them learn and develop concepts and skills related to O&M. The families reported that they saw their children make progress in the area of O&M during the study period and that in-person contact and interactions were important to them. When O&M support services were delivered via teleintervention (tele-O&M), only one family indicated that their tele-O&M home visit experience felt almost the same as their in-person home visit experience. Another family found their tele-O&M home visit experience acceptable due to the fact the certified orientation and mobility specialist (COMS) had to travel a long distance to visit with them in person; they expressed that they would rather receive O&M support services via teleintervention than have no services at all. The last family also conveyed that their tele-O&M experience was acceptable and did not find the use of technology to conduct a home visit as out of the ordinary. Although this family felt that they were part of a generation that was technology-oriented, they experienced the most issues with technology initially and this may have influenced their perceptions of their tele-O&M experience.

The cross-case analysis corroborated the caregiver perceptions of O&M support services when they were delivered in the in-person and teleintervention home visit formats across the three cases. The families continued to express a preference for in-person home visits, reiterating that physical, person-to-person contact and interactions were important to them. They all agreed that tele-O&M works, but only if the provision of services in person was not readily available. Although they all concurred that their

tele-O&M experiences were positive, and that tele-O&M was successfully implemented during this study, they still imparted their preference for in-person home visits, with tele-O&M being a good supplement or alternative if needed. Concerns related to the technological aspects of tele-O&M emerged in the cross-case analysis. During the tele-O&M sessions, the quality of the video and audio were the initial sources of anxiety with conducting home visits using a laptop, tablet computer, or mobile phone (device) and videoconferencing software. However, as the study progressed and more tele-O&M visits were conducted, the limited perspective of the device's camera emerged as a dominant hindrance. The inability to see "the big picture" during a home visit restricted the COMS's view of what was happening during the home visit (e.g., often, the focus of the camera was on the child rather than all the participants (i.e., caregiver, child, and EI provider) or the camera angle was off so the COMS could only see part of the task that was being performed rather than all of it) and what was in the surrounding environment. Additionally, the "flow" of a home visit was sometimes disrupted by device/camera adjustments when the family's teacher of students with visual impairments who specializes in EI (EI-TSVI) realized that the camera angle was off or the COMS had to request that the camera be adjusted.

The constraints of using technology to conduct O&M support home visits was also realized as the study progressed and more tele-O&M visits were conducted. The emergence of whether or not tele-O&M visits could be conducted out in the community when children were ambulatory was unexpected. Issues related to safety, the management of the technology, and potential of conducting tele-O&M visits with just the caregiver and COMS were of concern to the participants and the researcher.

The caregiver perceptions of O&M support services when delivered in two service delivery formats in the within-case and cross-case analyses were triangulated with information gathered through interviews with the EI-TSVIs and the reflective journal entries of the COMS. The results of this part of the study helped to construct an understanding of O&M support services from the perspectives of the participants. Overall, caregiver perceptions of O&M support services indicated that services differed when they were provided in the in-person and teleintervention service delivery formats.

Home Visiting Practices

A multivariate analysis of variance (MANOVA) was conducted to determine if there was a difference in home visiting practices when they were delivered in person and through teleintervention. Data for this analysis were comprised of the scores collected from the *Home Visit Rating Scales – Adapted and Extended* (HOVRS-A+; Roggman et al., 2012), which was used to rate the home visiting practices observed in the videos of all the home visits sessions recorded for this study. The independent variable was service visit type: in-person service delivery model or teleintervention service delivery model. The dependent variables were the scores for the quality indicators for home visit practices: home visitor/service provider responsiveness to family, relationship with family, facilitation of parent-child interaction, non-intrusiveness, and collaboration; and the indicators for family engagement: parent-child interaction, parent engagement, and child engagement. A standard alpha level of .05 was used in this analysis. The results of this analysis were used to answer research question Q2: How do home visiting practices differ between teleintervention and in-person service delivery models?

Results of the MANOVA found no significant multivariate effects on service visit type. HOVRS-A+ scores from 11 in-person home visits ($n = 11$) and nine teleintervention home visits ($n = 9$) were used in this analysis. Mean scores generated for the dependent variables for each service type condition indicated generally “good” ratings, with scores ranging from 5.50 to 6.50 for six of the seven variables in both service type conditions. The lowest scores were seen in the area of “home visitor facilitation of parent-child interaction,” with a score of 4.27 for the in-person home visit condition and a score of 4.11 for the teleintervention home visit condition. Scores within this range were considered to be “adequate” ratings. Low scores in the area of “home visitor facilitation of parent-child interaction” seem to suggest that practitioner use of coaching practices and strategies were lacking and need to be improved.

During the course of the study, interobserver agreement (IOA) levels were calculated manually each month to spot check the consistency of scores for the HOVRS-A+ among two independent observers. An overall IOA level of 85.7% was attained for the study. High IOA levels maintained until the last month of the study, combined with the unusual nature of the visits randomly selected for spot checking, provided the investigator with confidence that the scores recorded for HOVRS-A+ by the observers were reliable and valid.

Cost of Providing Orientation and Mobility Support Services in Early Intervention

The cost of providing O&M support services in EI for the three cases (Emma, Marie, and Greyson) were calculated using a researcher-developed cost form. The results of this analysis was used to answer research question Q3: How do the costs of providing

O&M support services differ between teleintervention and in-person service delivery models?

The differences in costs of providing O&M support services in EI for the Emma, Marie, and Greyson in person and via teleintervention were notable. The costs of providing O&M support services in person were generally higher for all of the three cases due to costs associated with travel (e.g., cost of fuel and travel time) and compensation for personnel (mainly to compensate for travel time). The costs grew exponentially with distance traveled; therefore, in-person visits with Greyson cost more than visits with Emma and Marie. The costs of providing O&M support services via teleintervention for all of the three cases were the same.

Conclusions

Research investigating the use of teleintervention to provide specialized services to children with sensory impairment and their families in EI have yielded very promising outcomes (Behl et al., 2017; Kelso et al., 2009; Olsen et al., 2012). The success with teleintervention in these research studies, as well as my own experience with JoAnn and Gabriel, was the impetus for this research study utilizing teleintervention to provide O&M support services for children with BVI and their families in EI in the state in which this study was conducted. The main objective of this study was to compare O&M support services when they were delivered through in-person consultations and via teleintervention.

The results of this study suggest that O&M support services provided via teleintervention in EI were comparable to in-person consultations according to caregiver perceptions and scores from the HOVRS-A+. Caregiver perceptions of tele-O&M and its

implementation during this study were generally positive, echoing the results that have been reported in the literature reviewed in Chapter 2 of this dissertation. Caregivers indicated they were very satisfied with telepractice in these studies and that it was feasible to use this service model to provide specialized services to children who were DHH in EI. However, in this study, caregivers still expressed their preference for in-person home visits despite their expressions of satisfaction. Common issues related to technology (e.g., stability of internet connection, quality of audio and video) during telepractice sessions reported in the literature were minor in this study. Participants averaged less than five minutes of troubleshooting glitches with technology over their tele-O&M visits. The most common issue that the participants experienced during their tele-O&M visits was related to the stability of the internet connection used to connect them to the COMS. Consequently, poor internet connections resulted in poor quality video, but did not seem to affect the quality of audio.

Since home visiting practices in EI are an important part of boosting the capacity of families to help their children learn and grow (Dunst et al., 2002; Ferrell, 2011; NICHCY, 2014; Trivette et al., 2010), home visiting practices were examined for O&M support services when they were delivered by in-person and teleintervention home visit formats. In this study, scores for all the quality indicators for home visiting practices were similar for the in-person and teleintervention home visit formats, suggesting that regardless of service delivery model, home visiting practices for O&M support services were consistent for the families who participated in this study. Overall, home visiting practices were rated as “good” in this study, with the exception of an “adequate” rating for home visitor facilitation of parent-child interaction. The results for this part of the

study were helpful in providing the information necessary to reflect on the home visiting practices of the COMS who provided services to the families who participated in this study. In the literature, it was reported that EI providers generally needed more training to utilize and apply best practices in EI in their practice when working with families; this was apparent for the COMS who does not have a strong background in early childhood special education. Additionally, provider use of coaching practices during home visits were reported to be better during telepractice sessions in the literature. However, that did not seem to be the case in this study with lower, but similar scores, for home visitor facilitation of parent-child interaction in both service visit formats.

Although the results of this study seem to suggest that O&M support services provided via teleintervention in EI were comparable to in-person consultations in terms of caregiver perceptions and home visiting practices, additional information gathered from the interviews with the caregivers and EI-TSVIs, field notes (i.e., reflective journal entries), and video-recorded sessions of home visits called into question whether O&M support visits could be conducted via teleintervention out in the community when children were ambulatory. Even though the visit was in person, the experience with Greyson at the park brought to the forefront issues associated with safety, the management of the technology, and the potential of conducting tele-O&M visits with just the caregiver and COMS that could be encountered if the visit was a tele-O&M visit. Studies investigating the use of telecommunications technologies to provide specialized services to children with exceptionalities in EI in the literature did not provide much detail about the nature of tasks and activities conducted with children and their families during “tele” visits and in what environmental conditions (e.g., indoor or outdoor). In an

attempt to identify research that investigated the application of televisits with pediatric populations in disciplines that concentrated on gross motor movements (e.g., physical therapy), no literature was available for review to examine the methods and strategies used to conduct such visits with children while they were on the move. Safety is paramount in the area of O&M training and this is an issue that must be addressed in the use of tele-O&M.

Unsurprisingly, the area that differed the most in the provision of O&M support services via in-person and teleintervention home visit formats was cost. The cost of providing O&M support services in person to families of children with BVI in EI was notably greater than when they were provided via teleintervention. The bulk of the costs of in-person home visits stemmed from costs related to travel (e.g., fuel and travel time) and compensation for personnel (mainly for travel time). The cost of service provision for in-person home visits grew exponentially with distance, with it being more costly to provide services to families who lived long distances away from the metropolitan area where the COMS was based. The result of this part of the study upheld what has been reported in the literature about cost-savings related to the use of telecommunications technologies to provide services to children with exceptionalities in EI.

Implications for Practice

Although there is a successful history of using technology to provide healthcare, therapeutic assessment, therapeutic intervention, and specialized services to families of children with exceptionalities in EI (Behl et al., 2010; Behl et al., 2017; Blaiser et al., 2013; Boisvert et al., 2010; Kelso et al., 2009; Olsen et al., 2012), there have been no previous empirical studies that have been conducted to explore the use of teleintervention

in providing any specialized instruction/services to young children with BVI and their families in the EI system until now.

The information presented from this research provides an introductory preview into using teleintervention to provide O&M support services to children with BVI and their families in EI. The results of the study suggest that teleintervention has the potential to be a successful and viable way to supplement, not replace, in-person O&M support home visits with families of children with BVI, particularly to increase the availability and frequency of services. However, guidelines need to be developed to help direct families and providers in successfully implementing teleintervention home visit sessions to accommodate the dynamic aspects of O&M support visits, such as travel out in the community. Concerns associated with maintaining the safety of the children and their caregivers while engaging in tele-O&M visits must be addressed as this model of service delivery is evaluated further. Typically, telepractice visits with families of children who are DHH are conducted with just the family (e.g., caregiver and child) and EI provider. In this study, the EI-TSVI was required to be present during tele-O&M visits to facilitate the visit and manage the technology. Based on the information gathered through the in-person and tele-O&M visits for this study, the question of whether or not it is feasible to conduct tele-O&M visits safely and effectively with just the family (specifically, with just one caregiver present) and COMS also needs to be evaluated further.

As evidenced in this study, EI providers may not be adequately trained in utilizing and applying best-practices in EI in their practice with families. Good home visiting practices are imperative in helping families build the capacity to understand the unique needs of their children and how to help support and boost their development (Ferrell,

2011; NICHCY, 2014). EI providers, particularly providers who have received little to no training in EI, need professional development and training opportunities to develop the knowledge and skills needed to effectively work with families in EI. In this study, it was me, the COMS, who needed more training to improve my practice with families in EI.

Although teleintervention may seem to be a cost-effective way to provide O&M support services in this study, it may not be the best medium to deliver services to families in certain situations and circumstances, as was discovered in this study when it came to trying to conduct O&M support visits out in the community. Until more studies are conducted to evaluate the use of teleintervention to provide educational services to children with BVI and guidelines developed and vetted for the successful implementation of tele-O&M visits, it is recommended that teleintervention visits be used as a supplement to in person visits to increase the availability and frequency of services to children with BVI and their families. Guidelines for tele-O&M may include the following: (a) detailing technology requirements; (b) requiring practitioners to complete training in how to conduct teleintervention home visits prior to starting visits with families; (c) initiating tele-O&M visits with one to two introductory in-person visits to familiarize families and other service providers with the O&M specialist and the purpose of O&M support services; (d) using a third person to help facilitate the visit and to manage the technology; (e) providing detailed descriptions of situations and circumstances in which tele-O&M can and cannot be used; and (f) recommending in-person follow-up visits to evaluate additional needs and/or progress or to demonstrate O&M-specific skills (e.g., proper cane technique). With this study, the field of BVI now

has another option to explore in addressing concerns with personnel shortages; family access to high quality, consistent EI services; and cost efficiency of delivering specialized services to families of children with BVI.

Limitations

The limitations of this research study that need to be considered in the interpretation of the results are the small sample size and generalizability to larger populations, discrepancies in IOA, and missing data. The primary limitation of this study is the small sample of participants. The outcomes for this sample of participants may not be diverse enough to be generalized to all young children with BVI as a whole. However, using a case study approach for this research allowed for an in-depth investigation of the provision of O&M support services, delivered through two service delivery models, to three families of children with BVI in a BVI-specific EI program. Although the generalizability of the outcomes of this research study may be limited, the results will make an initial contribution to the literature on research using teleintervention in the field of BVI.

Another limitation of this study was the failure to achieve an IOA level of at least 80% for the HOVRS-A+ during the last month of the study (April). Since IOA between observers was not attained for the last visit of the study, the reliability of scores for the other home visit videos for the month of April could also have been impacted. However, high IOA levels were achieved for the previous months (January, February, and March), and discussions with the observers about what may have caused the discrepancy in scores for the last IOA video assisted in preserving investigator confidence that the scores for the other videos in April were most likely reliable. Had more time been available, other

videos could have been checked to increase confidence in the results, or make-up visits might have been requested with the participants. Deadlines for completing the study and the unique nature of early intervention home visits made these alternatives unfeasible.

An additional limitation of the study was missing data for one of the cases. Marie did not complete the study because final caregiver interviews were not conducted due to the limited availability of Marie's mother, Amelia, and multiple unanswered requests for scheduling interviews made by the investigator. Amelia did not request to withdraw from the study. Consequently, valuable interview data were missing for Marie for the within-case and cross-case analysis, making it difficult to uncover additional themes that could have strengthened parts of the analysis. Additionally, this missing data could have contributed more information that might have changed my interpretation of the results.

Recommendations for Future Research

As the technology for teleintervention becomes more available and reliable, and the use of teleintervention becomes a more viable way to provide educational services in the EI system, additional research is needed to determine the potential that teleintervention has for increasing the availability of O&M support services for very young children with BVI and their families in EI programs. Further research in this area of study should examine different ways to implement practical and safe tele-O&M home visits with families of children with BVI to establish guidelines for a good standard of practice. For example, how would tele-O&M look/work if an organization that provided BVI-specific services to families of children with BVI in EI hired a person locally to facilitate tele-O&M visits and to manage the technology during visits? Also, since this study required the family's EI-TSVI to help facilitate tele-O&M visits, how would tele-

O&M look/work if the family's only provider of BVI-specific services was dually certified as an EI-TSVI and COMS?

Since families of children who are receiving EI services have a range of needs and expectations, future studies should also include a more diverse population of participants. Concerns about the feasibility of conducting tele-O&M visits out in the community safely with children who are ambulatory warrants a closer investigation of the stage of a child's development at which tele-O&M would be the most efficacious. Research in this area would provide further insight on whether tele-O&M would work better when children are younger and/or just developing ambulation skills. Additionally, how would families with children with significant support needs utilize O&M support services if they were provided via teleintervention?

Ideally, a comprehensive study that examines all aspects of providing O&M support services in EI to a large, diverse population of families of children with BVI across the United States needs to be conducted to truly evaluate tele-O&M and how it impacts current issues in the field, such as personnel shortages, availability of O&M support services for families in EI, intensity and frequency of service delivery, and cost-efficiency. Information from this type of study would make great contributions to the field, particularly in the area of making quality O&M support services more available to families of children with BVI not only in the United States, but around the world.

Summary

The purpose of this study was to show that teleintervention could be used to provide O&M support services to very young children with BVI and their families in EI. A qualitative investigation using a multiple case approach was used explore O&M

support services when they were delivered through in-person consultations and via teleintervention for three families. The results of the study revealed that participants perceived O&M support services in person, as they were currently being provided in EI, as the best way to help them and their children learn skills and concepts related to O&M, with teleintervention being a good supplement or alternative to in-person visits. Additionally, home visiting practices were observed to be similar when O&M support services were delivered in person or via teleintervention. The results of the study also found that the costs of in-person O&M support home visits were higher than the costs for teleintervention O&M support home visits.

Conclusions drawn from the study suggest that teleintervention has the potential to be a successful and viable way to supplement, not replace, in-person O&M support home visits with families of children with BVI, particularly to increase the availability and frequency of services. However, guidelines are needed to help direct families and providers in successfully implementing teleintervention home visit sessions to accommodate the dynamic aspects of O&M support visits, such as travel out in the community. Concerns associated with maintaining the safety of the children and their caregivers while engaging in teleintervention O&M support visits must be addressed as this model of service delivery is evaluated further.

When I first decided to study the use of teleintervention to provide O&M support services to families of children with BVI in EI, my expectations of the outcomes were set on complete success and feasibility based on my previous experiences and inspiration from studies conducted in fields of EI and deaf and hard-of-hearing (DHH). I was expecting tele-O&M to be an immediate, ready to use solution to addressing the issues

we are currently facing in the field of O&M, such as severe personnel shortages and availability of services for young children with BVI and their families in EI. However, this study made me realize that we are still in the infancy stages of utilizing teleintervention as an alternative service delivery model to traditional in-person consultations. Much still needs to be explored, evaluated, and developed before we can maximize the potential of teleintervention as it was intended to be used for the provision of services.

Although this study was small in scale, I had the opportunity to compare O&M support services as they were delivered in two service delivery models. I was able to identify and reflect on what worked and what did not work in each model and think about how I could make it work if I wanted to use teleintervention as service delivery model for O&M support services in EI in the future. The outcomes of this study have directed me towards using teleintervention as a supplement to in-person home visits, and I am excited to keep utilizing it as part of my practice as a COMS to further evaluate its potential. My hope is to share what I have learned through this research with my colleagues and make O&M support services more visible and available to families of children with BVI in EI.

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Appendix A

**Institutional Review Board Approval
Informed Consent Documents**



Institutional Review Board

DATE: December 7, 2018

TO: Hong Phangia Dewald, MA, COMS
FROM: University of Northern Colorado (UNCO) IRB

PROJECT TITLE: [1355454-2] Providing Orientation and Mobility Support via In-Person and Teleintervention Home Visits for Children with Visual Impairment in Early Intervention

SUBMISSION TYPE: Revision

ACTION: APPROVED

APPROVAL DATE: December 7, 2018

EXPIRATION DATE: December 7, 2019

REVIEW TYPE: Expedited Review

Thank you for your submission of Revision materials for this project. The University of Northern Colorado (UNCO) IRB has APPROVED your submission. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on applicable federal regulations.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of December 7, 2019.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Nicole Morse at 970-351-1910 or nicole.morse@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.



**CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
Families**

Project Title: *Providing Orientation and Mobility Support via In-Person and Teleintervention Home Visits for Children with Visual Impairment in Early Intervention*

Researcher: Hong Phangia Dewald, MA, COMS, Doctoral Candidate
Email: phan7116@bears.unco.edu Phone: 801-633-4307

Research Advisor: Kay Alicyn Ferrell, PhD
Email: kay.ferrell@unco.edu Phone: 970-351-1653

Purpose and Description: Teleintervention, the delivery of specialized instruction and services via distance technology, is increasingly used in medical and educational settings. However, it has not been used to provide services to families and children who are blind and visually impaired. This study is a preliminary examination of orientation and mobility support services provided in both the typical in-person manner and through teleintervention, where the orientation and mobility specialist is not physically present, but communicates with the early intervention team (teacher, caregiver, and child) through electronic means.

If you are willing to participate in this study with your child and sign this consent, you agree to:

1. Complete and submit the *Child and Family Information* form, attached.
2. Agree to schedule and participate in two home visits per month for four consecutive months with the orientation and mobility specialist (who is also the researcher), in conjunction with the early intervention vision specialist.

Page 1 of 3 _____
(Initial here)

3. Agree to having the eight home visits video-recorded and later viewed by independent observers not associated with the organization/agency that is providing you with early intervention vision services.
4. Agree to participate in four audio-recorded interviews with the researcher, two during the first month of the study and two during the last month of the study, at the conclusion of the home visit.

Risks and Benefits. Potential risks from participating in this study are minimal. Your participation is not likely to create any risks greater than those normally encountered during your regularly-scheduled home visits for early intervention services. Your participation is not expected to cause you or your child any harm or to benefit you or your child personally in any way. By participating in this study, you may experience some anxiety associated with being recorded on video. If you find that the study procedures take too much of your time or are too difficult to implement, the researcher will work with you to problem-solve any issues you may have.

The information gathered from this study is expected to add to our knowledge of early intervention home visiting practices in orientation and mobility. The benefits of your participation will be passed on to other families and early intervention service providers in your state and, hopefully, across the nation.

Confidentiality. Your privacy is respected and will be strictly enforced throughout this study. All identifying information associated with your participation will be numerically coded before analysis, and all data will be reported as anonymous case studies. Video recordings will be uploaded to a secure server at the University of Northern Colorado (UNC), coded by independent observers, then deleted from the server and stored on a password-protected external drive within a locked cabinet in the researcher's home office. Interview recordings will be uploaded to a secure server at UNC, transcribed, coded by the researcher and an independent observer, then deleted from the server and stored on a password-protected external drive within a locked cabinet in the researcher's home office. Excerpts from videos and interview transcripts may be used for educational purposes in conference presentations or professional development. All recordings and transcripts will be destroyed three years after the research project ends, along with this consent form.

Page 2 of 3 _____
(Initial here)

You will receive a copy of this form for your records.

Your participation is voluntary. You may decide not to participate in this study and if you begin participation, you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled.

Having read the above and having had an opportunity to ask any questions, please sign below and return the entire form to the researcher, Hong Phangia Dewald. A copy of this form will be returned to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Nicole Morse, IRB Administrator, Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

Thank you. I appreciate your help with this study!

Hong Phangia Dewald, MA, COMS
Doctoral Candidate

By signing this form, I agree to participate in the study described in this letter.

Participant's Signature

Date

Participant's Name (print)

Phone Number (preferred)

Researcher's Signature

Date

Page 3 of 3: _____
(initial here)

You will receive a copy of this form for your records.

Materials Release Form for Audio/Video Recordings

Project Title: *Providing Orientation and Mobility Support via In-Person and Teleintervention Home Visits for Children with Visual Impairment in Early Intervention*

Every month from January to May 2019, you and your child will be video-recorded so that your information may be used for data analysis during the study. We would also like to ask for your permission to use the videos for educational purposes in conference presentations and/or professional development for three years after the study ends in July 2019. All personal names will be removed from the audio track, and any identifying information related to the location of the video will be blurred.

You have two choices regarding the use of the videos of your monthly orientation and mobility home visits. The materials may be designated either **"for educational purposes"** or **"for research only."**

If you designate the materials **"for educational purposes,"** the video recordings will be accessible to other families, future students, current early intervention practitioners, and current educators and practitioners in the field of blindness and visual impairment through conference presentations and/or professional development.

If you designate the materials **"for research only,"** the video recordings will be analyzed by the research team and your information will only be used to complete the research study. Your information will be stored on a secure site and your materials will be destroyed after the study is complete.

If, in the future, you wish to change the status of your video recordings, you may contact the researcher, Hong Phangia Dewald.

* * * * *

_____ I hereby designate the materials as **for educational purposes** and give permission for my video recordings to be used by the researcher and the University of Northern Colorado in conference presentations and/or professional development until July 31, 2022. I understand that the video recordings will not identify me or my child by name. After that time, I understand that all recordings and this permission form will be destroyed.

_____ I hereby designate the video recordings **for research only** and give my permission for the research team to use my materials as part of the research study. I understand that the video recordings will be stored on a secure website until July 31, 2022. After that time, I understand that all recordings and this permission form will be destroyed.

_____ I would like a copy of my child's video recordings at the end of the project.

Parent's Signature: _____ Date: _____

Researcher's Signature: _____ Date: _____

You will receive a copy of this form for your records.



UNIVERSITY OF
NORTHERN COLORADO
 College of Education and Behavioral Sciences
 School of Special
 Education

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
Teachers of Students with Visual Impairment in Early Intervention

Project Title: *Providing Orientation and Mobility Support via In-Person and Teleintervention Home Visits for Children with Visual Impairment in Early Intervention*

Researcher: Hong Phangia Dewald, MA, COMS, Doctoral Candidate
 Email: phan7116@bears.unco.edu Phone: 801-633-4307

Research Advisor: Kay Alicyn Ferrell, PhD
 Email: kay.ferrell@unco.edu Phone: 970-351-1653

Purpose and Description: Teleintervention, the delivery of specialized instruction and services via distance technology, is increasingly used in medical and educational settings. However, it has not been used to provide services to families and children who are blind and visually impaired. This study is a preliminary examination of orientation and mobility support services provided in both the typical in-person manner and through teleintervention, where the orientation and mobility specialist is not physically present, but communicates with the early intervention team (teacher, caregiver, and child) through electronic means.

By signing this consent, you agree to:

1. Approach and secure consent from the parents of an infant between the ages of 12 and 30 months whom you have referred for orientation and mobility early intervention services, using the consent forms provided by the researcher.

Page 1 of 3 _____
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2. Complete and submit the *Teacher Information* form, attached.
3. Agree to schedule and participate in two home visits per month for four consecutive months with the family, in conjunction with the orientation and mobility specialist (who is the researcher), following your usual and customary home visiting practice.
4. Agree to having the eight home visits video-recorded and later viewed by independent observers not associated with your employment.

Risks and Benefits. Participating in this study may cause some hardship for you, as it will require an additional time commitment that is not compensated. While your participation is not expected to cause you any harm or to benefit you personally in any way, it is not likely to create any risks greater than those normally encountered during your regularly-scheduled home visits as part of your employment. By participating in this study, you may experience some anxiety associated with being recorded on video. If you find that the study procedures take too much of your time or are too difficult to implement, the researcher will work with you to problem-solve any issues you may have.

The additional home visit you provide will be beneficial to the family you serve, and the information gleaned from this study is expected to add to our knowledge of early intervention home visiting practices in orientation and mobility.

Confidentiality. Your privacy is respected and will be strictly enforced throughout this study. All identifying information associated with your participation will be numerically coded before analysis, and all data will be reported as anonymous case studies. Video recordings will be uploaded to a secure server at the University of Northern Colorado (UNC), coded by independent observers, then deleted from the server and stored on a password-protected external drive within a locked cabinet in the researcher's home office. Excerpts from videos may be used for educational purposes in conference presentations or professional development. All video recordings will be destroyed three years after the research project ends, along with this consent form.

Page 2 of 3: _____
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You will receive a copy of this form for your records.

Your participation is voluntary. You may decide not to participate in this study and if you begin participation, you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. The same is true for the family you serve.

Having read the above and having had an opportunity to ask any questions, please sign below and return the entire form to the researcher, Hong Phangia Dewald. A copy of this form will be returned to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Nicole Morse, IRB Administrator, Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

Thank you. I appreciate your help with this study!

Hong Phangia Dewald, MA, COMS
Doctoral Candidate

By signing this form, I agree to participate in the study described in this letter.

_____ Participant's Name (print)	_____ Participant's Signature
_____ Date	_____ Phone Number (preferred)
_____ Researcher's Signature	_____ Date

Page 3 of 3: _____
(initial here)

You will receive a copy of this form for your records.

Materials Release Form for Audio/Video Recordings

Project Title: *Providing Orientation and Mobility Support via In-Person and Teleintervention Home Visits for Children with Visual Impairment in Early Intervention*

Every month from January to May 2019, you and the family that you are providing services to will be video-recorded so that your information may be used for data analysis during the study. We would also like to ask for your permission to use the videos for educational purposes in conference presentations and/or professional development for three years after the project ends in July 2019. All personal names will be removed from the audio track, and any identifying information related to the location of the video will be blurred.

You have two choices regarding the use of the videos of your monthly orientation and mobility home visits. The materials may be designated either **"for educational purposes"** or **"for research only."**

If you designate the materials **"for educational purposes,"** the video recordings will be accessible to other families, future students, current early intervention practitioners, and current educators and practitioners in the field of blindness and visual impairment through conference presentations and/or professional development.

If you designate the materials **"for research only,"** the video recordings will be analyzed by the research team and your information will only be used to complete the research study. Your information will be stored on a secure site and your materials will be destroyed after the study is complete.

If, in the future, you wish to change the status of your video recordings, you may contact the researcher, Hong Phangia Dewald.

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_____ I hereby designate the materials as **for educational purposes** and give permission for my video recordings to be used by the researcher and the University of Northern Colorado in conference presentations and/or professional development until July 31, 2022. I understand that the video recordings will not identify me or my child by name. After that time, I understand that all recordings and this permission form will be destroyed.

_____ I hereby designate the video recordings **for research only** and give my permission for the research team to use my materials as part of the research study. I understand that the video recordings will be stored on a secure website until July 31, 2022. After that time, I understand that all recordings and this permission form will be destroyed.

_____ I would like a copy of my home visit video recordings at the end of the project.

Participant's Signature: _____ Date: _____

Researcher's Signature: _____ Date: _____

You will receive a copy of this form for your records.

Appendix B

Child and Family Demographics Form

Child & Family Information

Thank you for participating in this research study. Please tell us a little bit about yourself and your child.

1. Child's gender:

- Female
- Male

2. Child's age:

_____ year(s) _____ month(s)

3. Child's gestational age at birth (in weeks):

_____ weeks

4. What is this child's birth order in the family?

- First
- Second
- Third
- Fourth
- More than fourth
- Foster or adopted child

5. Is this child from a single or multiple birth? If a multiple birth, what type?

- Single birth
- Identical Twin
- Fraternal twin
- Twin (unknown classification)
- Monoamniotic twin
- Triplets or other multiple

6. Mother's age at birth of child:

- Age in years _____
- Unknown
- Declined to answer

7. How many years of education did Mother complete?

- Years _____
- Unknown
- Declined to answer

8. Father's age at birth of child:

- Age in years _____
- Unknown
- Declined to answer

9. How many years of education did Father complete?

- Years _____
- Unknown
- Declined to answer

10. Child's ethnicity:

- Hispanic, Latino, or Spanish Origin
- Not Hispanic, Latino, or Spanish Origin
- Declined to answer

11. Child's race (please use the Census Bureau definitions below and check all that apply):

- White (a person having origins in any of the original peoples of Europe, the Middle East, or North Africa)
- Black or African-American (a person having origins in any of the Black racial groups of Africa)
- American Indian and Alaska Native (a person having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment)
- Asian-American (a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam)
- Native Hawaiian and Other Pacific Islander (a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands)
- Some other race (please try to specify)
- _____
- Declined to answer

12. Family unit at start of the research study (please check all that apply):

- Single parent family
- Two-parent family
- Extended family in the home
- Unknown

13. Child's visual diagnosis:

14. Child's age when the visual diagnosis occurred:

Age in months _____

15. How would you describe the child's visual functioning:

- Normal or near normal visual functioning
- Low vision
- Meets the definition of blindness
- Functions at the definition of blindness

16. Has this child received a diagnosis of additional disability?

- No
- No, but additional disability is suspected by whom: _____
- Yes (please indicate diagnosis below)

17. Does this child have any other health or medical conditions?

- No
- Yes (please indicate the health or medical condition)

18. How long has the child been receiving early intervention services?

Service time in months _____

19. How long has the child been receiving services from a PIP vision specialist?

Service time in months _____

20. What geographic area does the child live in? (as defined by the U.S. Census Bureau)

- Urbanized Area (population of 50,000 or more)
- Urban Clusters (population of at least 2,500 and less than 50,000)
- Rural (any population, housing, or territory NOT in an urban area)
- Remote (rural areas that are sparsely populated and/or difficult to access)

Appendix C

EI-TSVI Demographics Form

**Teacher of Students of Visual Impairments in Early Intervention (EI-TSVI)
Information**

Thank you for participating in this research study. Please tell us a little bit about yourself.

1. Please tell us the title of your current position.

2. Please tell us the name of your current organization.

3. Do you have a state licensure, endorsement, or certification in Visual Impairment?

- If Yes, which state? _____
- No

4. Do you have a state licensure, endorsement, or certification in Early Intervention?

- If Yes, which state? _____
- No

5. Approximately how many years have you worked with young children with visual impairment (ages birth to three years) and their families?

- I have not worked with children with visual impairment (ages birth to three years) and their families.
- Number of years _____

6. Approximately how many children with visual impairment ages birth to three years are currently on your caseload? If you do not have a caseload at this time, please indicate "none."

7. Have you received any **specific type of pre-service education** around supporting families of young children with visual impairment with **orientation and mobility (O&M) skills**?

- If Yes, please tell us the name of the **Teacher Preparation Program**.
- _____
- No, I did not receive any pre-service training in this area.

8. Do you feel that you have sufficient experience/training to support families and young children with visual impairment in the area of orientation and mobility (O&M)?
- If Yes, why? _____
- If No, why not? _____
9. Have you received any **specific type of pre-service education or professional development training** around conducting home visits with families of young children with visual impairment using distance consultation service delivery models (example: using videoconferencing applications such as FaceTime, Skype, or Zoom)?
- If Yes, please tell us the name of the **Teacher Preparation Program or where you received the training.**
- _____
- No, I did not receive any pre-service education or training in this area.
10. Have you conducted any home visits with families of young children with visual impairment using distance consultation service delivery models (example: using videoconferencing applications such as FaceTime, Skype, or Zoom)?
- If Yes, please tell us the number of times, over how many years, you have conducted home visits using a distance consultation service delivery model.
- _____ times, over _____ years
- No, I have not conducted any home visits with families using a distance consultation service delivery model.

Appendix D

Interview Questions for Caregivers

Interview Questions for Caregivers

Interview Questions for In-Person Home Visit

1. What worked for you during our visit today? What did you feel good about?
2. What could I have done better?
3. Did you feel comfortable implementing the strategies we worked on or talked about today?
4. Do you feel what you learned today helped you improve your ability to help your child develop orientation and mobility (O&M) skills?
5. Do you have any concerns about how we conducted our visit today? (if need to be more specific, add “with me here in your home with you”)
6. Was today’s visit what you expected?

Interview Questions for Teleintervention Home Visit

1. What worked for you during our visit today? What did you feel good about?
2. What could I have done better?
3. Did you feel comfortable implementing the strategies we worked on or talked about today?
4. Do you feel what you learned today helped you improve your ability to help your child develop orientation and mobility (O&M) skills?
5. Do you have any concerns about how we conducted our visit today? (if need to be more specific, add “from a distance”)
6. Tell me about how you felt about using the technology today?
7. Was today’s visit what you expected?

Appendix E

EI-TSVI Interview Questions

Interview Questions for EI-TSVIs

Beginning of Study (Prior to the Start of O&M Home Visits)

1. What are your thoughts on providing O&M services to very young children with BVI in early intervention?
2. What are some of the greatest challenges your families face in regard to O&M needs during this time in their lives?
3. What are your thoughts on potentially providing O&M services to families in early intervention using a tablet computer (iPad) and a videoconferencing application (Zoom, Skype, FaceTime)?

End of Study

1. Now that we have experienced both service delivery models (in-person and teleintervention), what are your thoughts on potentially providing O&M services to families in early intervention using a tablet computer (iPad) and a videoconferencing application (Zoom, Skype, FaceTime)?
 - a. What worked for you during our visits? What did you feel good about?
 - b. Did you feel comfortable with how I interacted with the caregiver and family?
 - c. Did you feel comfortable with facilitating my interactions with the caregiver/family?
 - d. What could I have done better?
 - e. What were some of your concerns about our visits?
 - f. Were our visits what you expected?
 - g. Tell me about how you felt about using the technology?
2. Do you see a value in utilizing teleintervention as a service delivery model for O&M services in early intervention? Tell me about what you think?
 - a. If yes, what are some of the potential benefits?
 - b. If no, what are some of the disadvantages?

Appendix F

Reflective Journal Questions for O&M Specialist

Reflective Journal Questions for O&M Specialist

Participant #:

Date:

Type of home visit:

- In-person
 Teleintervention

Questions to think about when journaling:

1. How did I feel the home visit with the family went today?
2. Did I feel the caregiver was comfortable with our visit today?
3. Did I feel that the implementation of strategies was successful?
4. Did I use adult learning strategies?
5. Did I encourage the caregiver(s) to share her/his/their knowledge and experiences?
6. Did I conduct myself as a team member today?
7. Did the technology affect the way I needed to help the family implement strategies?
8. What, during the visit, affected the way I interacted with the caregiver(s)/family today?
9. What would I do differently next time? Either with this particular family or for any home visit?

Appendix G

Cost of Providing Orientation and Mobility Support Services Form

**Cost of Providing Orientation and Mobility Support Services Form
Orientation and Mobility Specialist**

Please fill out this form each month for each orientation and mobility (O&M) support in-person and teleintervention home visit.

Participant Information		Visit Information		
EI-TSVI ID #:		Date of visit:		
Family ID #:		Start time of visit:		am pm
Visit type:	in-person teleintervention	End time of visit:		am pm

Visit Travel Time		Visit Mileage	
Total # minutes from where you just left (your home base or another home visit) to get to this home visit:		Total # miles from where you just left (your home base or another home visit) to get to this home visit:	
Total # minutes from this home visit to where you have to go next (another home visit or back to your home base):		Total # miles from this home visit to where you have to go next (another home visit or back to your home base):	

Visit Cancellation Reasons (please check one)	Visit Cancellation Impact (please check one)
<input type="checkbox"/> Sick (please circle one): child, parent, family member, provider <input type="checkbox"/> Weather <input type="checkbox"/> Family scheduling conflict <input type="checkbox"/> Provider scheduling conflict <input type="checkbox"/> Family "no show" <input type="checkbox"/> Transportation issue <input type="checkbox"/> Technology (computer/internet problem)	<input type="checkbox"/> Minor - I did other work tasks most of the time. <input type="checkbox"/> Moderate - I did other work tasks some of the time. <input type="checkbox"/> Severe - I did not have other work tasks that I could do during this time.
Visit Reschedule Date (if visit was cancelled):	

<p>Visit Costs</p> <p><input type="checkbox"/> Internet connection (please circle one):</p> <ul style="list-style-type: none"> • family • provider personal mobile phone • USDB hotspot <p><input type="checkbox"/> Materials: \$</p> <p><input type="checkbox"/> Other (please describe): \$</p>		<p>Other</p> <p><input type="checkbox"/> Time spent dealing with technology: # minutes:</p> <p><input type="checkbox"/> Time spent for record keeping / documentation: # minutes:</p> <p><input type="checkbox"/> Other comments or notes:</p>
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<p>Travel Costs</p> <p><input type="checkbox"/> Transportation (please circle one):</p> <ul style="list-style-type: none"> • provider personal vehicle • USDB state vehicle <p style="padding-left: 40px;">price of gas:</p> <p><input type="checkbox"/> Hotel (total for trip): \$ # nights:</p> <p><input type="checkbox"/> Per diem (total for trip): \$</p>		<p>Personnel Costs</p> <p><input type="checkbox"/> O&M Specialist Salary (total for visit): \$ Hourly rate: \$ Hours related to visit:</p> <ul style="list-style-type: none"> • includes scheduling and prep time, roundtrip travel, and visit time
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