Applying the Foundational Concepts from Early Intervention to Services Provided to Young Children with Visual Impairments: A Literature Review

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Structured abstract: *Introduction:* The foundational concepts of early intervention are: family-centered and relationship-based practices, natural environments, child learning, adult learning, and quality team practices (Pletcher & Younggren, 2013). In this literature review, the authors consider the application of these concepts to services provided to families of infants and toddlers with visual impairments (that is, those with blindness or low vision) by vision professionals. *Methods:* Three databases (ERIC, ProQuest, and PsychINFO) were used to search for articles from 1997 to 2016, focusing specifically on infants and toddlers with visual impairments. Twenty-seven articles met the criteria for inclusion in the review. *Results:* Family-centered practices are valued by virtually all researchers in the field of visual impairment. Practices that promote parent-child relationships are especially important, given the specialized needs for early communication and the development of strong social relationships. Concerning the natural environment, commentators from the field of visual impairment are critical of federal definitions of natural environments; however, a broader definition of natural environments is supported. Child and adult learning are viewed as important for the promotion of positive outcomes for children and families who receive early intervention services, as is practice that promotes the formation of quality teams. *Discussion:* The foundational concepts of early intervention (Pletcher & Younggren, 2013) have applicability to professionals working with infants and toddlers with visual impairments and their families. Research supports these concepts as beneficial in achieving positive child and family outcomes. *Implications for practitioners:* Pre-service and in-service training programs for visual impairment should include early intervention principles and concepts in a manner that prepares the workforce to address the unique needs of this population.

Using data from a study known as Project PRISM that included 184 infants and toddlers with visual impairments who were receiving early intervention services, Hatton, Bailey, Burchinal, and Ferrell (1997) noted that lower developmental age was associated with more significant visual impairment (that is, blindness or low vision). Further, intellectual disabilities combined with a visual impairment had an additive negative effect on development (Ferrell, Shaw, & Deitz, 1998). Given the potential effect of visual impairment on development, early intervention that involves a professional trained in both visual impairment and early intervention is an important service that should be available to families (Dote-Kwan, Chen, & Hughes, 2001; Ferrell, 2011; Ferrell, Bruce, & Luckner, 2014; Pogrund & Fazzi, 2002). In fact, in the addition of "vision" to the law defining early intervention services, the Individuals with Disabilities Education Act (IDEA) Amendments (1997) underscored the need for state systems to include professionals trained in the unique needs of infants and toddlers with visual impairments and their families.

Yet defining such training has proven challenging. Dote-Kwan et al. (2001) surveyed 121 early interventionists and found that 90% of respondents believed professionals working with infants and toddlers with visual impairments should be certified in the area of visual impairments, while 79% indicated that it was important to be trained in early childhood special education. However, Anthony (2014) discussed the difficulties in finding personnel with both an early intervention and visual impairment background. Further, personnel preparation programs in visual impairments generally cover a wide age range (for example, birth to 21 years, 3 years to 21 years, or the life span), yet some teachers of students with visual impairments and orientation and mobility specialists work specifically with children aged birth to 3 years. For the purpose of this paper, these individuals are referred to as early intervention visual impairment professionals. Anthony argued that with such a broad training background, some of these personnel might not have the "knowledge and skills they need to adequately meet the needs of birth-through-5-aged learners and their families" (p. 516).

Leaders in the field of visual impairment recognize the importance of at least a basic understanding of the principles of early intervention for these professionals in addition to training in visual impairments (Anthony, 2014; Chen, Klein, & Minor, 2009; Dote-Kwan et al., 2001; Ferrell, 2011). This knowledge includes what Pletcher and Younggren (2013) identified as foundational concepts of early intervention: family-centered and relationship-based practices, natural environments, child learning, adult learning, and quality team practices. Pletcher and Younggren suggest that these concepts are critical for professionals in all disciplines as they work with infants and toddlers.

Description of the foundational concepts

Family-centered and relationship-based practices

An ultimate goal of family-centered practices is to support families in a manner that empowers them through the development of skills and confidence (Pletcher &

Younggren, 2013). In a review of the literature, Epley, Summers, and Turnbull (2010) described five components of family-centered practices: family as the unit of attention, family choice, family strengths, family-professional relationships, and individualized family services. For example, family-centered practices value family choice in identifying intervention goals and priorities (Epley et al., 2010). Similarly, relationships are highly valued. Parent-child relationships are key to the empowerment and competence of parents, and strong professional-parent relationships facilitate collaboration and trust, which lead to successful intervention outcomes. In a family-centered approach, parents are actively involved in intervention sessions as they work directly with their children and lead decision making about intervention strategies (Pletcher & Younggren, 2013).

Natural environments

IDEA promotes the delivery of early intervention services within natural environments, which include any setting in which children without disabilities would typically be found (Pletcher & Younggren, 2013; Pogrund & Fazzi, 2002). Natural environments are commonly believed to include homes, childcare programs, and community settings. Specifically, segregated centers for children with disabilities, therapy centers, and hospitals are not usually considered natural environments. Therefore, generally speaking, family-centered practices in natural environments are meant to help families accomplish everyday tasks through the provision of specialized supports so that young children with disabilities can be as independent as possible.

Child learning

Early intervention is most beneficial when service providers are knowledgeable and competent in the use of practices that meet the unique learning needs of the children they serve. According to Pletcher and Younggren (2013), very young children learn within the context of daily activities rather than in contrived settings while using drills developed by therapists. In addition, infants and toddlers learn best during play scenarios in which they are actively engaged and motivated. Experiences with familiar, trusted adults are important to promote engagement and learning (Pletcher & Younggren, 2013).

Adult learning

Early intervention service providers help parents learn to identify challenges in attaining their goals for their children and then identify adaptations and strategies to mediate those challenges. Toward this end, competency in understanding and meeting adult learning needs is critical. Typically, adults are self-directed, with a rich history of experiences on which to build new knowledge. They are motivated to learn which targeted skills are useful in meeting their own needs (Pletcher & Younggren, 2013).

Quality team practices

An early intervention team typically includes the family and a variety of professionals who work collaboratively across disciplines (Pletcher & Younggren, 2013). One team member often works more frequently with the family and is considered the primary provider. However, ideally professionals work closely as a team to share ideas that address individualized

child and family outcomes (Pletcher & Younggren, 2013).

These foundational concepts described by Pletcher and Younggren could provide a useful framework for evaluating the knowledge, skills, and information related to early intervention and visual impairment that experts in the field of visual impairment suggest are necessary for early intervention visual impairment professionals (Anthony, 2014; Chen et al., 2009; Dote-Kwan et al., 2001; Ferrell, 2011). Therefore, the purpose of this review is to apply the five early intervention foundational concepts to the visual impairment literature in an effort to investigate the extent to which they match the services provided by these professionals. Considerations for evaluating the resource and training needs to strengthen that workforce are then discussed.

Methods

Searches were conducted using ERIC, ProQuest, and PsychINFO databases with various combinations of the terms *visual impairment, infant, early intervention*, and *young children*. Based on both the initial publication of findings from Project PRISM (Ferrell et al., 1998; Hatton et al., 1997) and the inclusion of vision services in Part C of IDEA (1997), we chose to limit our search to the 20-year period from 1997 through 2016. A total of 278 peer-reviewed manuscripts were found. Duplicates were removed and inclusionary criteria were applied. First, the manuscript had to be a report of empirical research or a commentary with a focus on infants and toddlers (ages birth to 3 years) with visual impairments, their service providers, or caregivers. Second, the topic of the manuscript had to include early intervention services and service delivery, skill development, or the formation of relationships by infants and toddlers with visual impairments. The reference sections of the articles served as a means to locate additional relevant research. A total of 27 manuscripts met the inclusionary criteria and are included in this review (see Table 1). The review is organized into the five sections listed above that are based on the early intervention concepts identified by Pletcher and Younggren (2013). Literature from the field of visual impairment is categorized using these concepts.

Sixteen of the 27 articles pertained to family-centered and relationship-based practices. Several of those articles described investigations of parent-child relationships through the study of areas such as communication, behavior, relationships, or interactions (Baird & Mayfield, 1997; Chen, Klein, & Haney, 2007; Conti-Ramsden & Perez-Pereira, 1999; Dolendo, 1997; Rattray & Zeedyk, 2005; Sapp, 2001). Other research teams explored service delivery that promoted the involvement of families with their children (Dale & Salt, 2007; Erickson, Hatton, Roy, Fox, & Renne, 2007; Fazzi et al., 2002; Hatton, McWilliam, & Winton, 2002; Herrera, 2015; Lappin & Kretschmer, 2005; Metell, 2015; Murphy, Hatton, & Erickson, 2008; Smyth, Spicer, & Morgese, 2014; Troester, 2001) (see Table 1).

Only 7 articles were found that included a focus on natural environments. Of these, several were commentaries (Chen, 1999; Hatlen, 2004; Hatton et al., 2002; Richert, 2007). In addition, while Chen et al. (2007) promoted the benefits of fitting strategies into natural family routines,

Table 1
Summary of literature categorized using the five foundational concepts.

Author(s)	Type	*N*	FR	NE	CL	AL	T
Alfaro (2015)	Empirical quantitative	20 infants			X		
Baird and Mayfield (1997)	Empirical quantitative	7 dyads mother/infant	X			X	
Biggs (2014)	Empirical qualitative	7 mothers				X	
Bradley-Johnson, Johnson, Swanson, and Jackson (2004)	Empirical quantitative	12 infants with visual impairment, 12 infants sighted			X		
Chen (1999)	Commentary			X			
Chen, Klein, and Haney (2007)	Empirical quantitative	27 triads infant/parent/ professional	X	X	X	X	X
Chen, Klein, and Minor (2009)	Empirical survey	22 college students				X	X
Conti-Ramsden and Perez-Pereira (1999)	Empirical qualitative	3 dyads mother/infant	X				
Dale and Salt (2007)	Commentary		X		X		
Dolendo (1997)	Empirical quantitative	17 dyads caregiver/ infant	X		X		
Dote-Kwan, Chen, and Hughes (2001)	Empirical survey	121 early intervention professionals				X	
Dunnett (1999)	Empirical survey	28 respondents			X		
Erickson, Hatton, Roy, Fox, and Renne (2007)	Empirical qualitative	2 EIVI professionals	X		X	X	
Fazzi et al. (2002)	Empirical quantitative	20 children with vision loss	X		X		
Hatlen (2004)	Commentary			X			
Hatton, McWilliam, and Winton (2002)	Commentary		X	X	X	X	X
Herrera (2015)	Empirical quantitative	12 dyads mother/child	X		X		
Ihsen, Troester, and Brambring (2010)	Empirical quantitative	7 infants			X	X	
Jacko, Mayros, Brady-Simmons, Chica, and Moore (2013)	Commentary			X			
Lappin and Kretschmer (2005)	Empirical qualitative	1 mother and infant	X		X		
Metell (2015)	Empirical qualitative	10 dyads child/caregiver	X		X		
Murphy, Hatton, and Erickson (2008)	Empirical survey	192 early intervention professionals	X			X	
Rattray and Zeedyk (2005)	Empirical quantitative	5 dyads mother/infant	X		X		
Richert (2007)	Commentary			X			
Sapp (2001)	Empirical quantitative	16 mothers	X			X	
Smyth, Spicer, and Morgese (2014)	Empirical qualitative	30 families	X		X	X	X
Troester (2001)	Empirical study	51 caregivers	X	X			

AL = adult learning; CL = child learning; FR = family-centered and relationship-based practices; NE = natural environments; T = quality team practices.

Jacko, Mayros, Brady-Simmons, Chica, and Moore (2013) challenged strict definitions of *natural environments* by describing the successes achieved from playgroups for children with visual impairments.

Fifteen articles included in this review were research reports or commentaries related to the unique learning and development of infants and toddlers with visual impairments (Alfaro, 2015; Bradley-Johnson, Johnson, Swanson, & Jackson, 2004; Chen et al., 2007; Dale & Salt, 2007; Dolendo, 1997; Dunnett, 1999; Erickson et al., 2007; Fazzi et al., 2002; Hatton et al., 2002; Herrera, 2015; Ihsen, Troester, & Brambring, 2010; Lappin & Kretschmer, 2005; Metell, 2015; Rattray & Zeedyk, 2005; Smyth et al., 2014).

Eleven articles pertained to adult learning, including several that explored parents' involvement during early intervention sessions (Baird & Mayfield, 1997; Biggs, 2014; Chen et al., 2007; Dote-Kwan et al., 2001; Erickson et al., 2007; Ihsen et al., 2010; Murphy et al., 2008; Sapp, 2001; Smyth et al., 2014). In their commentary, Hatton et al. (2002) described the importance of considering parents' learning needs. In a survey of professionals, Chen et al. (2009) pointed out the importance of parents and professionals working together.

Only four articles were found related to the formation of teams. Chen et al. (2007) and Smyth et al. (2014) described studies that included professionals working together to meet parents' needs. Similarly, Chen et al. (2009) described an interdisciplinary online course that encouraged the formation of teams consisting of various professionals who focused on the needs of children with sensory impairments. In their commentary, Hatton et al. (2002) outlined the importance of quality teaming between early intervention professionals.

Foundational concepts in the visual impairment literature

Family-centered and relationship-based practices

Experts in the field of visual impairment have promoted family-centered practices for early intervention visual impairment professionals (Chen, 2001; Ferrell, 2011; Hatton et al., 2017; Hatton et al., 2002; Pogrund & Fazzi, 2002). In a white paper supported by the Council for Exceptional Children's Division on Visual Impairment and Deafblindness, Hatton et al. (2017) outlined the importance of family-centered practices for these professionals as a means to promote family and child outcomes. In addition, researchers have suggested that incorporating these strategies into daily routines may help mitigate the effect of vision loss (Chen, 2001; Ferrell, 2011; Hatton et al., 2002). Hatton et al. (2002) pointed out that when interventionists focus their efforts on family priorities, family members are more likely to integrate strategies into their daily life. Parent follow-through was found critical in all areas, including language and literacy (Erickson et al., 2007), mobility (Fazzi et al., 2002), and social development (Baird & Mayfield, 1997).

There appears to be strong evidence documenting the importance of parent-infant relationships on the development of children with visual impairments (Dolendo, 1997; Lappin & Kretschmer, 2005). However, research on this topic

has shifted in the past 20 years. Early studies focused on the effect of the caregiver on development, or differences between dyads that included infants and toddlers with visual impairments and dyads in which infants and toddlers had typical vision (Baird & Mayfield, 1997; Conti-Ramsden & Perez-Pereira, 1999; Dolendo, 1997; Sapp, 2001; Troester, 2001). More recently, researchers have focused on identifying factors that promote positive relationship outcomes for infants and toddlers with visual impairments. For example, Lappin and Kretschmer (2005) reported positive outcomes when a parent was taught infant massage techniques. Rattray and Zeedyk (2005) found evidence of sophisticated prelinguistic communication strategies between parents and their infants with visual impairments using nonvisual behaviors including touch, vocalizations, and facial orientations. In addition, shared book reading (Erickson et al., 2007), structured play (Herrera, 2015), and music therapy (Metell, 2015) have shown promise in promoting positive parent-child relationships. Chen et al. (2007) described the results from a study of their curriculum entitled *Promoting Learning Through Active Interaction: A Guide to Early Communication with Young Children Who Have Multiple Disabilities,* which is also known by the acronym PLAI. Twenty-seven parent-infant-provider triads were involved in the multiphase investigation. Outcomes showed positive changes in parent-infant interaction and communication. In addition, as a result of the curriculum, caregivers were more directly involved in intervention sessions as providers took on the roles of coach and mentor. Taken together, the literature shows a trend toward a family-centered approach that promotes the development of strong relationships between infants and toddlers with visual impairments and their caregivers.

Although researchers have suggested that early intervention visual impairment professionals value family-centered practices, it is unclear how widely this approach has been implemented. For example, Chen et al. (2007) found that early intervention providers seldom used an intervention model in which parents worked directly with their child before being trained in the PLAI curriculum. In addition, in a survey study of 192 teachers of children with visual impairments aged birth to 5 years, Murphy et al. (2008) found that the majority of practitioners believed parents should be involved in promoting their children's literacy development. However, only 60% of the participants indicated that they always or almost always encouraged parents to read to their children. The respondents also indicated a lack of access to adapted materials, low vision devices, and writing technologies, suggesting limited possibilities for literacy activities either during intervention sessions or within daily routines between sessions. However, in a qualitative study involving two of these professionals, Erickson et al. (2007) found that both interventionists had strong relationships with the parents they supported. These professionals promoted parent-child relationships through literacy by encouraging family members to make tactile books; they even provided the families with accessible literacy materials.

Natural environments

What is and is not considered a natural environment for infants and toddlers with

visual impairments has been debated in the literature (Richert, 2007). While virtually all researchers in the field of visual impairment promote family-centered practices, many have raised concerns about the strong language regarding early intervention within natural environments. Empirical evidence is not available comparing the benefits of center-based and home-based service delivery for infants and toddlers with visual impairments; however, professionals have argued against a limited definition of natural environments (Chen, 1999; Richert, 2007). They have cited a need for individualization and warned against the potential effect of social isolation for parents and their and toddlers with visual impairments when center-based services are restricted. Conversely, proponents of home-based services suggest the need for normalcy of visual impairment within daily living and family life.

Commentators offer success stories of playgroups for infants and toddlers with visual impairments that have provided parents with opportunities to learn from one another and develop a network for parent-to-parent support (Chen, 1999; Jacko et al., 2013). In a survey sent to parents of children with and without visual impairments, Troester (2001) found that mothers experienced less stress when they had access to support from social networks (Troester, 2001). The results from this study speak to the importance of parent supports such as parent-to-parent networks. Other proponents of centers for infants and toddlers with visual impairments have described the benefits of having children develop play skills alongside peers with similar perspectives and needs. Such interactions have supported the development of social skills that could be transferred to other settings (Hatlen, 2004; Richert, 2007).

Further, these proponents argued that limitations to definitions of the term *natural environment* have exacerbated personnel shortages and reduced the choices that are available to parents (Chen, 1999; Richert, 2007). Few professionals are trained in both early intervention and visual impairment (Anthony, 2014; Chen, 1999). In a home-based service approach, professionals must travel to work with families. Given the low incidence of visual impairments and the inevitably large geographic area that professionals must cover, this approach limits the number of families that each professional can serve. In a center-based program, families travel to a centrally located setting to interact with early intervention visual impairment professionals. This approach enables a single provider to serve more families. In addition, failing to offer center-based services limits options for families who may prefer center-based programming over home-based services for reasons that could include culture, socioeconomic status, beliefs, or other factors (Chen, 1999). Chen noted the inconsistency of a society that values cultural preferences and family choices with a law that limits options. Finally, Richert (2007) cautioned that there is no statutory reason that parents should be required to justify the need for specialized services based on their child's visual impairment.

Interestingly, no articles were found that opposed center-based early intervention programs as appropriate placement options on the continuum of services for infants and toddlers with visual impairments. In fact, Ferrell (2011) counseled her readers to become aware of the

controversy around natural environments, explaining that funding decisions can differ by state and that parents may need to make decisions regarding service options. She went on to describe natural environments in a manner that embodies the ideals of early intervention that go beyond physical descriptions of service delivery. For example, she explained that natural environments include interventions that allow children to practice skills within activities in which they typically participate such as mealtime and bathing. Similarly, Hatton et al. (2002), Petersen and Nielsen (2005), and Chen et al. (2007) have supported approaches that focus on daily routines and generalization rather than the place of service. This approach aligns with the broader view of natural environments from the field of early intervention and is believed to best meet the developmental needs of all young children in terms of generalization and learning (Pletcher & Younggren, 2013).

Child learning

Although most researchers agree that visual impairments affect the development of infants and toddlers (for example, Ferrell et al., 1998), the basic tenets of child learning as described by Pletcher and Younggren (2013) are applicable to the work of early intervention visual impairment professionals. Several researchers from the field of visual impairment have emphasized the importance of learning within daily activities that are facilitated by trusted caregivers (Dale & Salt, 2007; Erickson et al., 2007; Ferrell, 2011; Hatton et al., 2002; Petersen & Nielsen, 2005; Smyth et al., 2014). Adaptations to the environment in a manner that motivates the child, encourages exploration, builds experiences, and meets the child's visual needs are key to the development of infants and toddlers with visual impairments, especially in the areas of motor skills, cognition, communication, and social interactions (Alfaro, 2015; Chen et al., 2007; Dunnett, 1999; Erickson et al., 2007; Fazzi et al., 2002; Herrera, 2015; Ihsen et al., 2010; Metell, 2015).

Very young children require multiple opportunities to practice new skills during the acquisition and fluency phases of learning. These opportunities may be even more important for infants and toddlers with visual impairments, since they have fewer opportunities to learn incidentally from visual information. For example, Smyth et al. (2014) noted the importance of extended periods to tactilely explore utensils during mealtime routines. Similarly, Dunnett (1999) surveyed parents and early intervention providers about their experiences in using "activity boxes" with children. Respondents found that the small space of activity boxes and the hanging objects that are typically found in them promoted active and voluntary exploration by children. Bradley-Johnson et al. (2004) studied the exploratory behaviors of 12 children ages 12 to 23 months compared to an age-matched group of sighted children. They found that the groups displayed similar behaviors, with significant differences only in the action of pushing. Although both groups were observed pushing a toy car, the sighted group pushed the car longer than did the group of infants and toddlers with visual impairments.

Several researchers have suggested that the possibility of mutual enjoyment by parent and child is important for sustaining the engagement of children and promoting learning (Chen et al., 2007;

Dale & Salt, 2007; Dolendo, 1997; Dunnett, 1999; Erickson et al., 2007; Herrera, 2015; Ihsen et al., 2010; Lappin & Kretschmer, 2005; Metell, 2015; Smyth et al., 2014). Activities that naturally engaged the senses beyond vision such as music (Metell, 2015), massage or touch (Lappin & Kretschmer, 2005; Rattray & Zeedyk, 2005), verbal play (Chen et al., 2007; Herrera, 2015; Rattray & Zeedyk, 2005), and sound-based interactions and movement (Ihsen et al., 2010) have resulted in positive outcomes for children with visual impairments. In addition, traditional visual activities have been supported with tactile or auditory adaptations (Dunnett, 1999; Erickson et al., 2007; Smyth et al., 2014), such as adding a bell inside a ball that is rolled between a caregiver and an infant. However engagement is promoted, the importance of child-led active exploration and exchange was a common theme across research studies.

Adult learning

Researchers have noted the benefits of adult learning theory when providing early intervention to families that include infants and toddlers with visual impairments (Chen et al., 2007). For example, Smyth et al. (2014) reported that parents implemented strategies that met their immediate needs, while they did not implement suggestions that did not meet their needs even if those strategies were effective. Follow-through is important, given the potential long-term benefits to child development that could result when parents integrate strategies into daily routines (Baird & Mayfield, 1997; Erickson et al., 2007; Ihsen et al., 2010; Sapp, 2001; Smyth et al., 2014). Biggs (2014) conducted a qualitative study focused on the involvement of seven mothers of infants and toddlers with visual impairments throughout the time period in which early intervention services were provided. The parents viewed their role in preparing their children to attend school as an important job that included a focus on literacy, math, and social skills (Biggs, 2014). Early interventionists could provide parents with resources including connections to other parents to help build parents' capacity and meet their needs. Although limited, researchers have suggested that respect is a valued component of partnerships between early intervention visual impairment professionals and parents (Chen et al., 2009; Dote-Kwan et al., 2001; Erickson et al., 2007; Murphy et al., 2008).

Quality team practices

Research within the field of visual impairment supports the idea of forming transdisciplinary teams as a means to provide early intervention. Ferrell et al. (1998) and Hatton et al. (1997) noted developmental delays in infants and toddlers with visual impairments in addition to a high prevalence of children with multiple impairments in the PRISM studies. These findings suggest a need for providers who have a variety of expertise, in order to address the myriad of needs presented by any individual family. Several researchers have discussed the benefits of vision personnel working in collaboration with specialists such as speech pathologists, occupational therapists, and physical therapists to best meet the needs of these children (Chen et al., 2007; Petersen & Nielsen, 2005). For example, Chen et al.

(2009) stressed the importance of professionals collaborating and having a working knowledge of all disciplines in order to address the needs of the whole child. Smyth et al. (2014) described a comprehensive model in which the speech-language pathologist, occupational therapist, and vision specialist worked together with the family to help develop successful mealtime routines and strengthen the confidence of family members in this activity. Additionally, Chen et al. (2009) described a successful preservice training model in which professionals from a variety of disciplines completed a university program to improve their knowledge and skills in teaming and working with infants and toddlers with multiple impairments including sensory impairments. Participants reported positive outcomes from the training, with strong applicability to their practice (Chen et al., 2009).

Discussion

Pletcher and Younggren's (2013) five foundational concepts of early intervention have considerable applicability to the work of early intervention visual impairment professionals. These concepts are supported by research and are known to benefit infants and toddlers and their families and help them achieve positive outcomes. In addition, at least four of the concepts appear to be strongly valued in the field of visual impairments, with the fifth concept (natural environments) appearing somewhat controversial. Although experts in visual impairment have debated a strict definition of "physical natural environment," support has been garnered for a broader definition that includes intervention within a natural state of living such as during daily routines.

Limitations

For this literature review, empirical studies were not evaluated for research quality, posing a limitation. In addition, most of the studies and commentaries were not written with the intent of applying the findings to early intervention foundational concepts. Therefore, the synthesis of the findings and the conclusions drawn in this study should be interpreted with caution.

Implications for workforce research and training

The application of Pletcher and Younggren's (2013) foundational concepts requires that early intervention visual impairment professionals are trained in a way that leads to competence and translates to quality practice. Based on the results from a survey of 121 of these providers, Dote-Kwan et al. (2001) concluded that visual impairment personnel-preparation programs should develop coursework that focuses on the unique developmental period that families must navigate when they have infants and toddlers with visual impairments. Dote-Kwan et al. also suggested that these programs require students to complete courses in early childhood special education, and they recommended that early intervention visual impairment providers participate in ongoing professional development that focuses on infants and toddlers with visual impairments. For as Anthony (2014) cautions, some of these professionals may not have the training necessary to effectively work with very young children with visual impairments and their families.

Conclusion

Foundational concepts that guide early intervention, including family-centered and relationship-based practices, natural environments, child learning, adult learning, and the formation of teams, are extremely applicable to early intervention visual impairment professionals. Although the field of visual impairment continues to protect the rights of families to have access to center-based programs even with the current trend emphasizing natural environments, a broader definition of this term that includes natural types of activities such as daily routines with parent-led interactions is still applicable.

In order to have a well-trained workforce to serve infants and toddlers with visual impairments and their families, university programs and professional development providers must provide quality preservice and in-service training that focuses on content specific to both early intervention and visual impairment. Research is needed to evaluate the extent to which this objective is being met. Research that focuses on workforce competencies as measured through self-efficacy scales and observational data will assist the field in better preparing early intervention visual impairment professionals by providing baseline data on current practices.

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