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Fine Motor, Perceptual Motor, and Handwriting Development in Young Children

Speech, Language, and Musical Development in Young Children

by

Kaia M. Swenson

Starred Papers

Submitted to the Graduate Faculty of

St. Cloud State University

in Partial Fulfillment of the Requirements

for the Degree of

Master of Science

in Child and Family Studies

December, 2019

Starred Paper Committee:
JoAnn Johnson, Chairperson
Ming Chi Own
Jerry Wellik

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Chapter 1: Introduction

Fine motor, perceptual motor, and handwriting abilities in early and middle childhood have been found to be related (Klein, Guiltner, Sollereeder, & Cui, 2011; Vinter & Chartrel, 2010). Handwriting is dependent on “motor, perceptual, cognitive, and linguistic abilities” (Maldarelli, Kahrs, Hunt, & Lockman, 2015). Fine motor control, along with the coordination of visual and manual movements, is necessary for children to be able to copy letters. Many professionals have examined the importance of fine motor, perceptual motor, and handwriting development and the connections between them. Attention and executive function, along with future academic success in reading and math, have been linked to fine motor and/or perceptual motor abilities in early childhood (Dinehart & Manfra, 2013; Grissmer et al., 2013; MacDonald et al., 2016; Son & Meisels, 2006; Stewart, Rule, & Giordano, 2007). More specifically, the ability to copy forms (including letters and shapes) had a significant positive effect on math scores for primary school students (Grissmer et al., 2013; Sparks, 2013). The practice of handwriting may facilitate reading acquisition and letter recognition in young children (James & Engelhardt, 2012; Longcamp, Zerbato-Poudou, & Velay, 2005).

The purpose of this paper was to review the results of current research on fine motor, perceptual motor, and handwriting development in young children. More specifically, the importance of effective interventions on the development of fine motor, perceptual motor and handwriting in young children is examined. Additionally, this paper looks at the developmental connections between fine motor, perceptual motor, and handwriting development in young children.

Background Information

The following provides an overview of fine motor, perceptual motor, and handwriting development in young children from birth through early childhood. Also examined is visual perceptual development, a more specific form of perceptual development related to visual processing of information. Included in the overview of handwriting development is a summary of the motor and perceptual skills necessary for handwriting to occur.

Fine motor development in early childhood. Fine motor development involves the manipulation and control of the smaller movements of the fingers, hands, wrists, feet, toes, mouth, and tongue. Developing fine motor skills is important for accomplishing activities of daily life, skills that include buttoning, zipping, grasping, pinching, squeezing, and tying. Early childhood programs frequently include activities that support development of fine motor skills including painting, drawing, coloring, writing, cutting, gluing, handling manipulatives, and self-care tasks such as dressing, undressing, zipping, fastening, tying, and feeding (Dinehart & Manfra, 2013; Huffman & Fortenberry, 2011; MacDonald et al., 2016; Rule & Stewart, 2002).

Fine motor development begins in early infancy and is typically concurrent with gross motor development, as most fine motor actions require gross motor ability (Marotz & Allen, 2016). By 8 weeks, most infants are discovering and playing with their hands by touch. They begin using hand-eye coordination to swipe at objects around two to four months. Infants typically begin grabbing objects using a palmer grasp, but gradually develop a more developed pincer grip around 8 to 10 months. At around 12 months, most infants are able to stack objects, nest items inside each other, use a deliberate pincer grip, poke with one finger, release objects, and transfer objects from one hand to the other (Marotz & Allen, 2016).

Toddlerhood (ages 12 months to 24 months) includes further advancement in fine motor skills including twisting, poking, pinching, zipping/unzipping, unbuttoning, grasping and turning knobs, pushing levers, and using writing and drawing tools to make scribbles. Hand dominance can begin to emerge at this time. Toddlers also continue to play with stackable objects but are more purposeful. Other fine motor play that toddlers often begin to engage in include pounding of pegs, engaging with snap toys, stringing large beads, and using play dough and clay (Marotz & Allen, 2016; Schwarz & Luckenbill, 2012).

When children reach preschool age (3 to 5 years), they continue to develop their fine motor skills that include squeezing, pinching, folding, ripping, cutting, gluing, writing, and drawing (le Roux, 2019). Once children reach kindergarten, they are typically able to draw a recognizable person, copy many shapes and letters, cut out basic shapes, build three-dimensional structures with small blocks copying a model, dress independently, and start tying their shoes independently. They have usually established a clear hand dominance at this point (Marotz & Allen, 2016).

Perceptual motor development in early childhood. Perceptual motor development (also referred to as sensory motor development) is closely linked to fine motor development. As in the definition of terms for this paper, perceptual motor development includes the sensory system (visual, auditory, tactile) working with the motor system to perform increasingly complex tasks and behaviors (Frost, Wortham, & Reifel, 2012). Perceptual motor development is tied to a child's mirror neurons, which allow a child to perform an action while seeing or hearing an individual doing a similar action (Del Giudice, Manera, & Keysers, 2009). This development primarily occurs in the parietal, temporal and frontal lobes of the brain, and the authors state that

“repeated observation of self-produced movements is necessary to link visual and sensory-motor representations of actions” (Del Giudice et al., 2009, p. 352). The grasping, pinching and several other fine motor skills that develop in infancy and toddlerhood rely on and are concurrent with perceptual motor development.

Perceptual motor development, like fine motor development, occurs during infancy. Although it is primarily linked to sight as visual perception, it can also be related to hearing and touch, or all three combined, and motor skills. In this paper, the primary focus of perceptual motor development is on visual perceptual development combined with fine motor development.

As children increase their perceptual-motor skills, their hand-eye coordination and body awareness improve. Perceptual motor and sensory motor development are related to sensory integration, which refers to a child’s ability to take in and process sensations in order to respond to his/her inner and outer environments (Ayers, 2005).

Visual perceptual development. Visual perceptual development occurs when infants and toddlers use their eyes to focus, track moving objects, and locate specific objects in their surroundings (le Roux, 2019). As children grow and develop their visual perceptual skills, they are able to visually discriminate and match forms/objects based on shape and detail. Depth perception and peripheral vision are also visual perceptual skills that are typically developed during early childhood (le Roux, 2019). Visual perceptual skills help a child make sense of and process the visual information that s/he receives (le Roux, 2019). For older children, visual perceptual skills include form consistency (understanding a form, such as a letter or shape, remains consistent no matter where it is seen), visual discrimination (matching and recognizing differences in forms), figure-ground perception (locating information among a busy

background), visual closure (identifying a whole object that is only partly visible), visual memory and visual sequential memory skills (le Roux, 2019). Both visual perceptual development and fine motor development contribute to visual motor integration, or the “effective (and) efficient communication between the visual systems and the motor systems” (le Roux, 2019).

Handwriting development in early childhood. Handwriting development is usually associated with early childhood and middle childhood academic learning. Children are often exposed to handwriting development activities in early childhood settings, kindergarten and beyond. Young children are learning letter awareness and early writing skills when practicing writing their name and other letters, numbers, lines and shapes. The ability to write incorporates a combination of cognitive, motor and neuromotor processing skills (Dinehart, 2015).

Unlike fine motor and perceptual motor development, handwriting development does not begin in infancy, but builds on earlier fine motor and perceptual motor skills. From a motor standpoint, children need to be able to develop and master whole arm and whole hand movements before moving to the more intricate finger grasping and control required for writing (Huffman & Fortenberry, 2011). Additional prerequisites for handwriting include perceptual motor, neuromotor, cognitive, and linguistic skills (Bara & Gentaz, 2011; Dinehart, 2015). Visual-spatial processing, which aids in copying random patterns, and orthographic processing (being able to code visual symbols as letters, letter clusters, and words) are also linked to more advanced handwriting development (Dinehart, 2015).

Early writing. Typically, children begin to draw and scribble by age 2. These initial attempts at drawing and writing advance through stages as children learn to draw with

directionality and begin forming geometric shapes including vertical and horizontal lines, circles, and intersecting lines (Dinehart, 2015). As children progress in their handwriting abilities, they start accurately producing letters and numbers as early as 3 to 4 years of age. Usually, children first learn and practice writing the letters of their name, followed by additional letters, numbers and symbols (Dinehart, 2015). It should be noted that “handwriting acquisition is generally slow and difficult” and, depending on the child’s ability and development, it may take years for a child to become proficient at handwriting (Bara & Gentaz, 2011, p. 746).

Motor skills needed for handwriting. Fine and gross motor skills are foundational for handwriting development. These skills depend on muscular control, patience, judgment and coordination (Huffman & Fortenberry, 2011). According to le Roux (2019) there are four essential bases for fine motor development in relation to writing: posture stability, tactile perception, hand function, and bilateral coordination. Fine motor skills are needed for the development of a functional pencil grip and grasp, and according to le Roux, these four bases are essential for proficient handwriting to occur.

Perceptual motor skills, which include visual perceptual skills and tactile perceptual skills, are another requirement for handwriting development. It was found that visual perceptual and motor skills are needed in reproducing shapes and visuo-motor ability was linked to performance in handwriting (Bara & Gentaz, 2011). Tactile perceptual skills are also an integral part of perceptual motor skills in regard to handwriting. Tactile perception, also known as touch perception, is the ability of an individual to make sense of what s/he can feel with his/her hands (le Roux, 2019).

Importance and Purpose of Study

Early handwriting development provides the foundation for future writing well into elementary school and beyond. Handwriting practice in early childhood may enhance letter recognition and processing, which are foundational steps for reading acquisition (James & Engelhardt, 2012; Longcamp et al., 2005). Researchers have linked fine motor, perceptual motor, and writing ability in early childhood to later academic achievement (e.g., reading and math skills) in elementary school (Dinehart, 2015; Dinehart & Manfra, 2013; Gerde, Bingham & Wasik, 2012; Grissmer, Aiyer, Murrah, & Steele, 2010; Son & Meisels, 2006). Researchers also suggest relationships exist between fine motor and perceptual motor abilities and executive function and attending (Grissmer et al., 2013; MacDonald et al., 2016; Sparks, 2013; Stewart et al., 2007).

The purpose of this research project was to investigate the current literature on fine motor, perceptual motor, and handwriting development to answer the following research questions.

Research Questions

- 1) What is the impact of early intervention on fine motor, perceptual motor, and handwriting development in young children?
- 2) What developmental connections exist between fine motor, perceptual motor, and handwriting development?

Research Review Procedures

To answer these research questions, I limited my search to research studies and informational sources of children from birth through middle childhood (11 years, 11 months of

age). The focus of this paper was meant to be primarily early childhood (3 years through 8 years, 11 months of age), although one study of upper elementary students was found to be applicable to this paper. I also used studies from the past 10 years, except for key research studies conducted in 2002, 2003, 2005, 2006, and 2007.

I conducted my search through the St. Cloud State University electronic library system. A variety of search engines were used to find literature on this topic including ERIC, PsychINFO, and Academic Search Premier. For each search engine, I completed an advanced search using either two or three search terms. All searches included a term to narrow down a targeted age group. Additional search terms were used for specific skill identification and handwriting development. Using Academic Search Premier, I used the following combination of search terms: (a) *early childhood education* for a target age group; (b) *fine motor ability* or *perceptual motor learning* for specific skill identification; and (c) *writing* for handwriting development. For ERIC, I used the following combination of search terms: (a) *early childhood education* for a target age group; (b) *psychomotor skills* for specific skill identification; and (c) *beginning writing* for handwriting development. For PsychINFO, I used the following combination of search terms: (a) *early childhood development* for a target age group; (b) *fine motor skills learning* or *perceptual motor learning* for specific skill identification; and (c) *writing skills* for handwriting development. Search terms were selected by using the “subject terms” or “thesaurus” option for each search engine. All searches were refined to include only peer-reviewed sources.

I also searched for book titles through the library electronic search and discovered two additional sources. A relevant and credible Internet search was done for online sources to

contribute additional information and sources for the topic. Internet sources needed to include the author's name, date of publication or copyright, and a list of references for further review.

Four studies were selected in the area of fine motor development, three studies in the area of perceptual-motor development, and six studies in handwriting development. There were three studies selected that linked two or three areas. Selection of research studies and other information sources involved determining whether the information included the target age group of early childhood; included recent and/or relevant information about fine motor, perceptual motor and/or handwriting development; and primarily focused on typically developing children. One study focused on upper-elementary aged students and was included because it addressed the relationship between handwriting development, perceptual motor development and fine motor development. There were two studies that examined children with disabilities included for review. There were also three studies that were included from the early to mid-2000s that included the effects of fine motor intervention on young children. These additional studies were included because they reported on experimental research that has not been replicated in other more recent studies.

Table 1 includes the results from this search when using a combination of the search terms across all three search engines. Additional articles were discovered through the APA reference lists from selected articles from my initial search.

Table 1

Search Results

Search Terms Used:	Target age group <i>and</i> specific skill identification search.	Target age group <i>and</i> handwriting development search.	Target age group <i>and</i> specific skill identification <i>and</i> handwriting development search.
Total Number of Search Results:	196	358	4

Definitions

Bilateral coordination: The ability to use both hands to work together in a coordinated effort (le Roux, 2019).

BOLD imaging: Blood oxygen level dependent imaging. A form of magnetic resonance imaging (MRI) that detects brain activity through changes in blood oxygenation levels (Devlin, 2008).

fMRI: Functional magnetic resonance imaging. A technique for measuring brain activity (Devlin, 2008).

Fine motor skills: Fine motor skills include the ability to control smaller movements of the fingers, hands, wrists, feet, toes, mouth, and tongue. These small muscle movements include holding, grasping, poking, pinching, sucking, tasting, and chewing (Marotz & Allen, 2016).

Fisted grasp: The ability of a child to grasp an object by wrapping the thumb and fingers around it in the shape of a fist in order to grasp. This is usually demonstrated before the palmer grasp in infancy and toddlerhood (le Roux, 2019).

Fusiform gyrus: A neural region of the brain that is used in letter processing in literate individuals (James & Engelhardt, 2012).

Graphomotor skills: Handwriting skills (le Roux, 2019).

Gross motor skills: Gross motor skills include the ability to control the body in order to perform larger movements of the hands, arms, feet, legs, abdomen, torso, and whole body. These large muscle movements include sitting, crawling, standing, walking, running, and other activities (Marotz & Allen, 2016).

Hand function: The ability of the hand, finger, wrist and forearm muscles to work together in order to control small objects and tools (le Roux, 2019).

Handwriting: The formation of letters, numbers and symbols in print (Gerde et al., 2012).

Orthographic processing: The coding of visual symbols including letters, clusters of letters and words (Dinehart, 2015b).

Palmer grasp: The ability of a child to grasp an object by wrapping the thumb and fingers around it from one side in order to grasp. This is usually demonstrated in infancy and/or toddlerhood in typically developing children (Marotz & Allen, 2016).

Perceptual motor development: Perceptual motor development is how children interact with their surrounding environment using their senses (visual, auditory, and tactile) and motor skills (Frost et al., 2008).

Pincer grasp: The ability of a child to grasp an object with the thumb and index finger with a pinching motion. This is usually demonstrated between 12 and 15 months in typically developing children (Marotz & Allen, 2016).

Reading circuit: The left-lateralized neural system of the brain that is activated when reading (James & Engelhardt, 2012)

ROI: Regions-of-interest. Analysis that looks at functional magnetic resonance imaging (fMRI) data from a defined region of the brain (Poldrack, 2007).

Posture stability: The stability and strength of muscles in the shoulder girdle and trunk (le Roux, 2019).

Sensorimotor skills: The combination of fine-motor coordination, visual-motor integration, visual perception, and visual skills (Klein et al., 2011).

Tactile perception: Also known as touch perception, tactile perception is the ability of an individual to make sense of what s/he can feel with his/her hands (le Roux, 2019).

Visual perception: The ability of an individual to make sense of the information the eyes are sending to the brain (le Roux, 2019).

Visual-motor integration: The “effective (and) efficient communication between the visual systems and the motor systems” (le Roux, 2019).

Visual-spatial processing: In regard to handwriting, visual-spatial (also known as visuospatial) processing aids the ability to lay work out accurately on the page, use appropriate spacing and sizing, and copy symbols, letters and numbers (Dinehart, 2015b; le Roux, 2019).

Writing: An activity that expresses ideas, views and opinions for communication or composing (Gerde et al., 2012).

Summary

The intention of the following literature review is to organize the information into four themes to address the research questions: 1) What is the importance of effective intervention for fine motor, perceptual motor and handwriting development in young children; and 2) what are the developmental connections among fine motor development, perceptual motor, and

handwriting development. Within each overview subheadings will be included to further organize the information into identified themes.

Chapter 2: Literature Review

This section includes an overview of current research regarding: 1) fine motor development in young children, 2) perceptual-motor development in young children, 3) handwriting development in young children, and 4) the connection between fine motor development, perceptual motor development and handwriting development in young children.

Fine Motor Development in Early Childhood

When conducting a search for research studies in the area of fine motor development in early childhood, four applicable studies were found in the following areas: effects of fine motor intervention and academic skills and fine motor development.

Effects of fine motor intervention. A study conducted by Stewart et al. (2007) found that fine motor activities increase female kindergartners' attention in school. This quasi-experimental study included 68 kindergarteners divided into experimental and control groups. The assignment to groups was not random or matched but based on voluntary teacher participation. The researchers assessed all participants with a pretest and posttest that scored expressive attention, visual selective attention and receptive attention. For 6 months, the experimental group received training in daily supplemental fine motor activities followed by 15 minutes to explore the activities. There was a medium effect size found among the girls in the experimental group when compared to the girls in the control group. Results show there was a gain of 4 points in the mean scores from the measures for attention of the experimental group and a loss of 6 points in the mean scores of the girls from the control group. The authors noted that the drop in the control group females' scores versus the gain in scores for the experimental group was a cause for concern, and if findings were replicated in future studies, a "strong

rationale would emerge for systematic fine motor skill activities for kindergarten females” (Stewart et al., 2007, p. 108). However, the boys in the experimental group did not show similar benefits.

In another study by Rule and Stewart (2002), researchers found that fine motor activities benefit all kindergartners’ fine motor skill development. In this quasi-experimental study, 186 kindergartners were divided into experimental and control groups. Again, the assignment was not random or matched, but based on voluntary teacher participation. The researchers used a pretest and posttest to assess participants’ fine motor skills through a penny posting test. The authors found that the experimental group significantly outperformed the control group with a medium effect size of .74 after receiving a treatment of 50 unique activities embedded into daily curriculum to promote fine motor development spread across a 6-month period of time. The fine motor activities were inspired by Montessori’s emphasis on “practical life” materials including tweezers, tongs, and spoons to handle objects (Rule & Stewart, 2002, p. 10). The authors also reported there was no significant difference in performance by gender.

Academic skills and fine motor development. In a correlational study that used secondary data analysis from the Miami-Dade School Readiness Project (M-DSRP) that included 3,903 participants, Dinehart and Manfra (2013) found that performance on fine motor writing and object manipulation tasks in preschool had small, unique effects on second grade reading and math achievement for students from low-income families. This effect was measured after completing four multi-level regressions for various academic achievement variables. Gender, race, free/reduced lunch status and number of absences from school were used as control factors. The unique effect of fine motor manipulation and writing skills were found above and beyond

the effects of control variables on achievement. Matching correlations were found between preschool fine motor writing scores and second grade math scores (.11 effect size) and preschool fine motor writing scores and second grade reading scores (.11 effect size), followed by preschool fine motor manipulation scores and second grade math scores (.09 effect size). There was no effect of preschool fine motor manipulation on second grade reading scores. The article also noted that girls performed significantly better than boys on both preschool fine motor writing and fine motor manipulation tasks. Based on this study, the authors suggested that fine motor skills, especially writing, be included in pre-kindergarten curriculums.

Another study by Grissmer et al. (2010) that examined at the impact of fine motor skills and later academic achievement indicated that early fine motor skills are a “strong and consistent predictor of later achievement” (p. 1013). In their analysis of three longitudinal data sets from a separate study that collected data on children from birth through at least third grade, the authors examined whether fine motor ability assessed in early childhood correlated with future math and reading achievement. They found a range of effect sizes for early fine motor ability and later reading achievement (.07 to .26) and early fine motor ability and later math achievement (.09 to .36). The early fine motor measure that had the highest correlation with both later math and reading success was the ability to copy eight basic designs.

Perceptual motor development in early childhood. When conducting a search for research studies in the area of perceptual motor development in early childhood, three applicable studies were found in the following areas: effects of perceptual motor intervention, executive function and visual motor integration, academic skills, and visual motor ability.

Effects of perceptual motor intervention. A study published by Grissmer et al. (2013) and reviewed by Sparks (2013) examined the results of an intervention called Minds in Motion (MIM) that used perceptual motor and fine motor activities and games (including drawing, copying, cutting, pasting, block building, and making models out of clay). This intervention was found to moderately increase visual attention (.71 effect size), auditory attention (.61 effect size), visuospatial ability (.56 effect size), and design copying skills (.54 effect size) in both kindergartners and first graders from low income families. Executive function skills (which aid in attending and self-regulation) significantly increased across both grade levels (.79 effect size). In this experimental study, 87 kindergartners and first-graders were randomly assigned to experimental and control groups and grade-matched. All participants were administered a pretest and posttest that assessed 12 abilities. The experimental group received daily 45-minute MIM trainings during an afterschool program for 7 months. There were also small to moderate effects on math scores for first graders after completing the intervention on three out of five measures. It should be noted that no math or numeracy skills were directly taught to children completing the intervention. The authors of this study noted that “certain kinds of structured games with children may be as important for building math skills as reading to children is for building literacy skills” (Grissmer et al., 2013, p. A-4).

Executive function and visual motor integration. In a correlational study by MacDonald et al. (2016), preschool children’s visual motor integration skills (tracing, copying, imitating a building with blocks, folding a paper with specific instructions, etc.) assessed in the fall were found to have a small correlation with executive function skills later in the school year. The study was conducted with 92 children ages 3 through 5. All participants were administered

a pretest and posttest that assessed visual-motor integration and executive function skills, once in the fall and again in the spring of their school year. A small correlation (.27 effect size) was found between fall time visual motor integration skills and spring time executive function skills, suggesting that visual motor integration skills provide “the foundation for the development of executive function skills” (MacDonald et al., 2016, p. 404). However, the authors noted that in this study, visual motor integration skills assessed in the fall of the school year did not have a statistically significant correlation with the change in executive function over the year (.10 effect size).

Academic skills and visual motor development. A correlational study by Son and Meisels (2006) found that higher scores on early fine motor, especially visual motor, assessments in Kindergarten correlated with higher math and reading scores at the end of first grade. By completing a hierarchical regression analysis of the Early Childhood Longitudinal Study- Kindergarten Class of 1998-99 (ECLS-K), which included 1,200 children, the authors discovered there was a statistically significant correlation between visual motor skills scores from the fall of kindergarten and achievement scores in reading and math in the spring of first grade. There was a greater effect on math scores ($r = .48$ correlation) than reading scores ($r = .40$ correlation). The authors noted that although there was a statistically significant correlation, the effect size was not considered large, and suggested that additional assessment be taken in to consideration when trying to predict future achievement from a kindergarten visual motor skills assessment.

Handwriting Development in Early Childhood

When conducting a search for research studies in the area of handwriting development in early childhood, six applicable studies were found in the following areas: effects of handwriting

intervention; motor skills and handwriting development; print related knowledge and handwriting development; and typing and handwriting, including their relationship with memory.

Effects of handwriting intervention. One study by Lifshitz and Har-Zvi (2015) examined the effectiveness of targeted writing interventions on Israeli kindergartners' handwriting quality, speed, and reactions to writing. In this quasi-experimental study, the authors assigned 101 kindergartners to two intervention groups, one group receiving a handwriting readiness program and the other group receiving a phonological awareness intervention. Both interventions were administered weekly over a period of 12 weeks. A pretest and posttest were administered to all participants to monitor handwriting readiness. Results indicated that the handwriting intervention group had significantly greater improvements in certain aspects of handwriting readiness including directionality of letter formation, quality and intensity of writing strokes, spatial positioning of letters, letter formation, and writing letters on a line. The handwriting intervention group also had increased positive reactions to handwriting vs. the phonological awareness intervention group, by receiving higher scores on the following observed behaviors: starting a writing task quickly, writing in a relaxed and determined manner, and showing pride in written work when completed. There was no significant difference in the improvement of handwriting speed between both groups. The authors concluded that the study further supports the inclusion of structured handwriting readiness instruction in an early childhood curriculum, that will "assist in children's readiness to transition to school" (Lifshitz & Har-Zvi, 2015, p. 54).

Motor skills and handwriting development. In an experimental study, Bara and Gentaz (2011) found a link between visuo-motor skills, perceptual skills, and handwriting. The

study included 38 typically developing native French-speaking kindergarteners who were divided in to two training groups. Groups were created by matching children on various measures including: 1) letter recognition, 2) phoneme identification, and 3) hand-eye coordination as determined by scores on screenings conducted by the researchers. One group received visual training for five letters and the other group received visual-haptic training. Training involving visual-haptic (visual perceptual and tactile perceptual) activities increased the letter recognition and global handwriting quality of the participants vs. those who only received visual training after five training sessions. It should be noted that both groups' scores on letter recognition, letter handwriting, letter copying, and global quality of handwriting increased significantly on assessments after training. The researchers indicated that utilizing visual-haptic exercises, including feeling physical letter shapes, increased the participants' abilities in letter recognition and global handwriting quality. The authors noted that "the representation of letters in the brain is not only visual but includes a motor component" (Bara & Gentaz, 2011, p. 756).

The development of handwriting skills for two children with perceptual motor delays (as well as developmental delays) was the focus of one research study conducted by Smith, McLaughlin, Neyman, and Rinaldi (2013). The researchers completed interventions that included use of lined paper, prompting, tracing and rewards to promote handwriting legibility with two preschool-aged children. After 10 weeks of intervention, taking place two times a week during the first 3 weeks and four times a week during the final 7 weeks, both children responded to various aspects of the intervention and showed improvement in writing the letters of their names. One child responded more to the rewards (hand-drawn stars for correct letter formation), while both responded to first tracing the letters of their names with gradual fading of

visual prompts. The authors concluded that “tracing letters and then fading prompts for those traceable letters was developmentally appropriate” in promoting handwriting development for the participants (Smith et al., 2013, p. 27).

Print related knowledge and handwriting development. The relationship between handwriting to literacy and print related knowledge has also been researched. Welsch, Sullivan, and Justice (2003) conducted group comparisons and regression analysis on results from a 2001 preschool literacy screening program of 3,546 4-year-old children from primarily low-income households. In their group comparison analysis, they found that name writing ability had moderate correlations with alphabet knowledge ($r = .51$); print knowledge, including being able to identify concepts of print as well as classify numbers, letters, words and pictures ($r = .42$); and concept of word knowledge, including pointing to each word while “reading” a simple book after being read the same book ($r = .35$). When conducting a regression analysis to determine the influence of age vs. other variables on results, they found that alphabet knowledge had the most significant influence on the variance in name writing, followed by print knowledge, and chronological age. These findings contribute to the base of research that suggests name writing appears to “predominantly reflect print-related knowledge” (Welsch et al., 2003, p. 757).

Typing and handwriting. The differences between typing and handwriting have been examined in order to determine the effect of both on young children and their learning. According to James and Engelhardt (2012), handwriting was found to promote reading acquisition in pre-literate children more than typing did. They used a repeated measures design with 15 typically developing pre-literate 4- and 5-year-old children who received different trainings that involved drawing, tracing and typing capital letters and shapes. Training was

followed by fMRI (functional magnetic resonance imaging) scans of brain activity while participants viewed images of letters and shapes from their trainings as well as control items that had not been included. After fMRI data was acquired, a Regions-of-interest (ROI) analysis was employed to determine the amount of processing of the participants' neural region called the fusiform gyrus: an area of the brain involved in letter-processing activity in literate individuals. They also examined whole brain function to determine how the different trainings affected various regions of the brain. The ROI analysis found that there was a greater level of blood oxygen level dependent (BOLD) activation in the fusiform gyrus area of participants when letters were presented than when presented with shapes. Also, there were significant differences between printed letters and typed or traced letters, with greater BOLD activation when participants were presented letters that had been printed rather than letters that had been typed or traced. The whole brain analysis showed that writing and printing letters caused increased activation in regions of the brain connected to the motor system, visual system, cognitive control and speech production when shown those letters after the trainings. The authors concluded that printing practice, especially self-generated handwriting, is important for letter-processing and "activates a network used for reading and writing," dubbed the "reading circuit," whereas typing letters did not "recruit any brain regions more than other sensori-motor conditions during letter perception" (James & Engelhardt, 2012, p. 39).

Typing and handwriting related to memory. Another study that examined handwriting and typing found that letter recognition increased when children were trained using handwriting (Longcamp et al., 2005). Included in the between-group experimental design study were 76 children from 3 to 5 years of age. Two groups were formed based on matching of age, sex,

handedness, manual dexterity, educational level and letter recognition level after all children received a set of pretests. One group received a typing training and the other a handwriting training that taught 12 uppercase letters over a period of 3 weeks. Results indicated that children who wrote letters increased their letter recognition with marginal gains than those who typed letters, but when age was factored in, a significant difference was noted among older children (older than 50 months). The authors concluded that “writing letters facilitates their memorization and their subsequent recognition” for older children (Longcamp et al., 2005, p. 75).

Conclusion

After reviewing handwriting development and the role of fine motor and perceptual motor skills along with the effects of handwriting training on young children, research suggests an inter-connectedness between handwriting, fine motor, and perceptual motor development. The next section reviews these connections.

Connections between Fine Motor Development, Perceptual Motor Development, and Handwriting Development in Early Childhood

According to Dinehart (2015b), several foundational skills are involved in handwriting development including graphomotor skills, visual-motor integration, fine motor writing skills, orthographic processing, and visual-spatial processing. Dinehart summarized these skills into cognitive, motoric, and neuromotor processes. This paper is specifically examining the relationship between fine motor and perceptual motor skills development and handwriting development. A handful of studies examine the relationship between these three areas, and how they affect each other.

When conducting a search for research studies in the area of fine motor development, perceptual motor development, and handwriting development in early childhood, three applicable studies were found in the following areas: visual motor integration and handwriting; and fine motor, visual motor, visual perception and handwriting.

Visual motor integration and handwriting. A study conducted by Vinter and Chartrell (2010) examined the effects of different types of training (visual, motor, or visual-motor) on 5-year-old children's handwriting. In this experimental study with 48 typically developing native French speaking children from middle class families, the authors randomly divided the children into four groups based on training (visual-motor, visual, motor, and control). Each group received four specialized training sessions, but the control group only participated in the first and last session, with a modified training similar to the motor group. For each training, children were expected to write letters presented visually using a tablet and stylus pen. Data were collected across all four session (two for the control group) on trajectory length, movement duration, velocity, fluency, and letter quality for each group. Results indicate that of the four groups, the control group showed little to no significant growth in any of the scored areas. The motor group (copying still letters) showed the least amount of development of the three trainings. Both the visual (observing letters as they are formed) and visual motor (observing and copying letters as they are formed) trainings produced significant improvements in handwriting scores, with the visual-motor group slightly outperforming the visual group. The authors concluded that "visual motor learning appears to be the most effective," with visual training proving to be almost as effective (Vinter & Chartrell, 2010, p. 484).

Another study also examined the relationship between visual motor integration and handwriting. According to Daly, Kelley, and Krauss (2003), visual motor integration skills are related to letter-writing proficiency among kindergarteners. As mentioned previously, visual motor integration (VMI) abilities are a requirement for children to be able to copy, write or draw what they observe (le Roux, 2019). VMI is related to perceptual motor development where visual perceptual skills coordinate with fine motor skills. The correlational study, which included 54 typically developing kindergarteners, compared results of a VMI assessment with a scored handwriting assessment to discover any relationships between the two areas. Results indicated there was a moderately positive relationship between the students' performance on the VMI and their ability to legibly copy letter forms (.64 correlation). The authors proposed that "visual motor integration is a requisite skill for handwriting legibility" (Daly et al., 2003, p. 461). It should be noted that this was a replication study that set out to support research by Weil and Cummingham-Amundson who found similar conclusions in a 1994 study.

Fine motor, visual motor, visual perception and handwriting. One final correlational study examined the relationship between fine motor, visual-motor and visual perception scores and handwriting legibility and speed (Klein et al., 2011). Visual motor ability, in this instance, refers to visual motor integration (VMI) abilities of the participants. Ninety-nine children in grades three through six with learning and/or behavior problems participated in the study where five different measures were used to assess speed and dexterity of fingers, hands, and arms (fine motor skills); visual-motor integration skills, visual perception skills, hand-eye coordination; and handwriting ability. The scores from these five assessments were collected and analyzed to reveal that there were small to medium sized correlations between the five areas when assessed

(correlation range of .04 to .42). However, certain assessments did have stronger correlations than others, including VMI and visual perception being strong predictors of the ability to copy forms and symbols. Fine motor and visual perception combined were strong predictors of handwriting speed when copying. One other interesting finding was that the handwriting speed did not differ between “skilled” and “unskilled” handwriters (Klein et al., 2011, p. 110). However, since there were no statistically significant correlations between the assessed areas, the authors stated professionals “should be cautious in making inferences about the relationship between scores on measures of sensorimotor performance and handwriting legibility and speed” (Klein et al., 2011, p. 112).

Conclusions

Although there are several informational sources that provide support for the relationship between fine motor, perceptual motor and handwriting development, few recent studies were discovered connecting all three of these areas. One reason for the small number of research studies could be that most research in early childhood is limited to the last 25 years, according to Dinehart (2015b). Another reason for the lack of research on handwriting development in early childhood is the more recent focus on emergent literacy, including emergent writing that focuses on technology use while diminishing the importance of explicitly taught handwriting skills across all age levels (Dinehart, 2015b). Results from more recent studies that seek to find a correlation between fine motor, perceptual motor, and/or handwriting are mixed. In the following chapter, a summary of the presented findings will be discussed.

Chapter 3: Summary

The discussed research studies indicate that fine motor, perceptual motor, and handwriting development are related and interdependent (Bara & Gentaz, 2011; Daly et al., 2003; Vinter & Chartrell, 2010). All three areas of development in early childhood have also been found to be related to executive function and/or academic readiness (Bara & Gentaz, 2011; Dinehart & Manfra, 2013; Grissmer et al., 2013; James & Engelhardt, 2012; Lifshitz & Har-Zvi, 2015; Longcamp et al., 2005; MacDonald et al., 2016; Son & Meisels, 2006; Stewart et al., 2007; Welsch et al., 2003). The following summarizes information from research on fine motor, perceptual motor, and handwriting development, along with the interconnectedness of these three areas.

Research findings indicate that fine motor development in early childhood is potentially linked to cognitive development. According to Dinehart and Manfra (2013), there is a small, unique correlation between early childhood writing performance and future academic performance on achievement tests in math and reading. Grissmer et al. (2010) also found a small correlation between early fine motor skills and later reading and math achievement. Dinehart and Manfra (2013) suggested that there is an association between self-regulation and fine motor skills, and cites several studies linking self-regulation to academic performance. The effect of fine motor intervention was the subject of two additional studies reviewed. It was found that girls benefited from an increase in attention and both boys and girls increased their fine motor skills with medium effect sizes from fine motor intervention (Rule et al., 2002; Stewart et al., 2007).

Perceptual motor development, which occurs with and is frequently reliant on fine motor development, has also been found to correlate with skills and behaviors related to academic achievement. Specifically, research studies indicate that perceptual motor abilities in early childhood are correlated to academic achievement, self-regulation, and executive function, with effect sizes varying from small to moderate (Grissmer et al., 2013; MacDonald et al., 2016; Son & Meisels, 2006; Sparks, 2013). Studies indicate there are several aspects of visual perceptual motor skills including spatial processing, visual-spatial working memory, and motor speed/automaticity that contribute to cognitive achievement (Son & Meisels, 2006). The development of visual perceptual motor skills has also led to better self-regulation and attending in young children, as well as a slight increase in math ability for first graders (Grissmer et al., 2013). Strong executive function skills (being able to attend and self-regulate) along with visual perceptual motor skills in young children predict higher reading and math scores in grade school (Sparks, 2013).

Research studies on the development of handwriting skills, along with interventions that impact that development, indicate that handwriting development is an important aspect of school readiness (Bara & Gentaz, 2011; Lifshitz & Har-Zvi, 2015; Welsch et al., 2003). Compared to typing, handwriting appears to increase a young child's ability to process, recognize and memorize printed letters (James & Engelhardt, 2012; Longcamp et al., 2005). Handwriting intervention in early childhood statistically increased the quality of handwriting in one study (Lifshitz & Har-Zvi, 2015), while in another study an intervention consisting of tracing along with fading of visual prompts was found to increase handwriting ability in the two participants (Smith et al., 2013).

When looking at research that connects fine motor, perceptual motor, and/or handwriting development, there is evidence that visual-motor training is an effective method for improving handwriting ability. In Vintner and Chartrell's (2010) study, visual-motor training, where children copy a letter after observing how it is formed, was more effective than other types of training. The next most effective training was visual training, where children observed how a letter is formed, but did not copy the letter after the demonstration. Motor training (copying still models) had little effect on the overall quality of handwriting. In a 2003 study by Daly et al., it was found that visual motor integration (VMI) skills in kindergarteners, including the ability to copy, write or draw what is observed, has a high correlation with handwriting legibility. Another study discusses the small to moderate correlations between visual motor and visual perceptual skills and handwriting ability, along with fine motor and visual perceptual skills and handwriting speed in children grades three through six (Klein et al., 2011).

Conclusions

In conclusion, the studies selected for use in this paper were a combination of experimental, quasi-experimental, longitudinal, and correlational studies to investigate fine motor, perceptual motor, and handwriting development in young children, along with the connections between these three areas. There were some limitations in the reviewed research. Although most studies focused on children in early childhood (3 through 8 years of age), one study included children from middle childhood (9 through 12 years of age). This study was the only one found that examined all three areas (fine motor, perceptual motor, and handwriting) and the connections between them, which is why it was included in this review. Also, two studies focused on children with disabilities, primarily due to no similar or replicated research with

typically developing children. As previously mentioned, most studies were chosen from the past 10 years, except for four studies chosen from the early- to mid-2000s that included un-replicated research. These limitations, along with the smaller sample sizes (15 to 186) in the quasi-experimental, experimental and correlational research from this age group, indicate that reported results and findings are somewhat limited. Most research articles reviewed discussed limitations that included no inclusion of the long-term follow-up or implications of their studies.

Another limitation is the lack of research studies found focusing on fine motor, perceptual motor, and handwriting development in young children. According to Dinehart (2015b), “little is known about the development of handwriting, the extent to which is of value in the early childhood classroom and the best means by which to teach handwriting, or at least handwriting readiness, to young children” (p. 97). She attributes this lack of research to two factors: limited focus and funding on school readiness in the United States prior to two key pieces of legislation in the 1990s and early 2000s, and the subsequent decline in handwriting’s importance in the early elementary grades’ (including school readiness) curriculums. This decline was due to an increased emphasis on “emergent literacy” that focused on content over form in early writing as well as an increase in use of technology (Dinehart, 2015b). This lack of research leads to inconclusive results for the best practices in teaching handwriting readiness, along with little evidence of the long-term effects of developing handwriting readiness skills in young children. No study included in this review went higher than third grade when examining the long-term effects or correlations with data from early childhood.

Chapter 4: Position Statement

Since I first learned about practices and interventions that can be done to improve fine motor and perceptual motor skills in children, I have been drawn to these specific areas of development. I seemed to intuitively know that instruction of these skills, along with handwriting readiness, is an important aspect of a high-quality early childhood education program. One of my first projects I completed for a special education course was monitoring the progress of a preschool child's name writing after receiving a series of researched and planned interventions. I did not realize at the time that not only was I assisting a child with letter formation and name writing, but also potentially increasing important school readiness skills.

After learning the Handwriting Without Tears curriculum during my first year as an early childhood special education teacher, I was even further drawn to the direct teaching of letter, number, and shape formation through both visual modeling, use of specific language, and guided practice. I now know that visual modeling, followed by immediate guided practice, appears to encourage children to develop increased handwriting legibility, speed and quality--more so than other methods of intervention, according to Vinter and Chartrell (2010). In addition, providing highlighted letters to trace, while gradually fading visual prompts (a technique I have frequently used in teaching young children to write letters, numbers and shapes), may also be an effective handwriting intervention (Smith et al., 2013). I have discovered that the correlation between perceptual motor skills (ability to copy forms) and handwriting is found to be significant enough over multiple studies, that interventions known to build perceptual motor skills at a young age should be included in an early childhood program as part of a handwriting readiness curriculum (Daly et al., 2003; Klein et al., 2011; Vinter & Chartrell, 2010).

I have also learned that teaching and promoting fine motor, perceptual motor, and handwriting skills at a young age have several immediate, short-term, and potentially long-term benefits for children. Perhaps one of the most important results of early intervention in all three areas is increased attending and/or executive function skills, which allow children to not only manage their own behavior and impulses, but also help them attend to and process presented information (Grissmer et al., 2013; MacDonald et al., 2016, Stewart et al., 2007). The ability to attend and focus is a significant life skill, a strong predictor of future academic success, and also a way to develop self-regulation, or the ability to calm and regulate cognition and emotion (MacDonald et al., 2016). Children demonstrating well-developed executive function skills in early childhood have a “49% greater odds of finishing college by age 25” (MacDonald et al., 2016, p. 397). The short- and long-term impact of developing and fostering executive function skills at a young age is worthy of further research and study, and a handful of the studies included in this paper point to small and medium correlations between executive function and perceptual motor ability in young children (Grissmer et al., 2013; MacDonald et al., 2016).

Finally, there are several studies that examined the immediate positive effects as well as short- and long-term correlations between fine motor, perceptual motor and handwriting skill development and academic ability in both reading and math (Dinehart & Manfra, 2013; Grissmer et al., 2010; James & Engelhardt, 2012; Longcamp et al., 2005; Son & Meisels, 2006; Welsch et al., 2003). These studies found a small to medium effect size between early childhood performance, especially with perceptual motor skills, and academic success in math and reading in first through third grade (Dinehart & Manfra, 2013; Grissmer et al., 2010; Son & Meisels, 2006). This is yet another reason to provide explicit and direct instruction, guided practice, and

independent practice of fine motor, perceptual motor, and handwriting skills in early childhood. With the increased focus on technology at younger and younger ages, I have found that I am making more deliberate decisions to minimize screen time exposure in the early childhood classrooms I work in. Although engaging and educational to a degree, technology use in early childhood settings has led to a decrease in the focus on handwriting readiness at a young age, which may have several adverse long-range effects (Dinehart, 2015a). Instead, I have strived to provide direct and guided practice of writing and drawing of various forms, shapes, letters, and numbers; facilitate engaging activities that promote fine motor dexterity and strength as well as hand-eye coordination (including fingerplays, tactile discrimination activities, and whole-body movement games); and teach foundational skills to promote perceptual motor development, including using the curriculums Ready Bodies, Learning Minds and Handwriting Without Tears. I have been fortunate to have several resources available in my classroom and district that have helped me provide thoughtful and meaningful instruction in fine motor, perceptual motor and handwriting development. The district's occupational therapists have also been valuable resources in providing materials, equipment, modifications, and ideas for promoting all three areas of development.

Throughout the process of gathering and examining research and information about the topic of this starred paper, I repeatedly came across multiple informational sources (both on line and in print), but I found a limited amount of current research studies that specifically focused on fine motor, perceptual motor, and/or handwriting development in young children. Although handwriting, fine motor, and perceptual motor skill instruction and practice are frequently included in the early childhood classrooms I have worked in, until I started reading through the

research regarding these areas of development, I was not always able to clearly articulate the importance of teaching these readiness skills in an early childhood program. The research indicates there are several reasons: increased executive function and attention skills, increased future academic success in both reading and math, and increased letter and form awareness. While these conclusions are promising, I believe more research in fine motor, perceptual motor, and handwriting development, specifically at this age level, is needed to assist and inform teachers and parents on what interventions to use, and why they are important. Also, among practicing early childhood professionals, there is a need for increased awareness and high-quality professional development in the areas of fine motor, perceptual motor, and handwriting development in young children. This not only educates and supports teachers' decisions concerning why and how to teach and foster fine motor, perceptual motor, and handwriting skills, but also informs administration, service providers and other key decision makers about the importance of doing so.

References

- Ayers, A. J. (2005). *Sensory integration and the child: 25th anniversary edition* (1st ed.). Los Angeles, CA: Western Psychological Services.
- Bara, F., & Gentaz, E. (2011). Haptics in teaching handwriting: The role of perceptual and visuo-motor skills. *Human Movement Science, 30*(4), 745-759.
- Daly, C. J., Kelley, G. T., & Krauss, A. (2003). Relationship between visual-motor integration and handwriting skills of children in kindergarten: A modified replication study. *American Journal of Occupational Therapy, 57*(4), 459-462.
- Del Giudice, M., Manera, V., & Keysers, C. (2009). Programmed to learn? The ontogeny of mirror neurons. *Developmental Science, 12*(2), 350-363.
- Devlin, H. (2008). *What is functional magnetic resonance imaging (fMRI)?* Retrieved September 9, 2018, from <http://psychcentral.com/lib/what-is-functional-magnetic-resonance-imaging-fmri/>.
- Dinehart, L. (2015a). Teaching handwriting in early childhood. *District Administration, 51*(6), 85-85.
- Dinehart, L. H. (2015b). Handwriting in early childhood education: Current research and future implications. *Journal of Early Childhood Literacy, 15*(1), 97-118.
- Dinehart, L., & Manfra, L. (2013). Associations between low-income children's fine motor skills in preschool and academic performance in second grade. *Early Education and Development, 24*(2), 138-161.
- Frost, J. L., Wortham, S., & Reifel, S. (2012). *Play and child development* (4th Ed.). New York, NY: Pearson Education Inc.

- Gerde, H. K., Bingham, G. E., & Wasik, B. A. (2012). Writing in early childhood classrooms: Guidance for best practices. *Early Childhood Education Journal, 40*(6), 351-359.
- Grissmer, D., Grimm, K. J., Aiyer, S. M., Murrah, W. M., & Steele, J. S. (2010). Fine motor skills and early comprehension of the world: Two new school readiness indicators. *Developmental Psychology, 46*(5), 1008-1017.
- Grissmer, D., Mashburn, A., Cottone, E., Brock, L., Murrah, W., Blodgett, J., & Cameron C. (2013), *The efficacy of minds in motion on children's development of executive function, visuo-spatial and math skills*. Paper presented at the Society for Research in Educational Effectiveness Conference, Washington, D.C.
- Huffman, M. J., & Fortenberry, C. (2011). Helping preschoolers prepare for writing: Developing fine motor skills. *Young Children, 66*(5), 100.
- James, K. H., & Engelhardt, L. (2012). The effects of handwriting experience on functional brain development in pre-literate children. *Trends in Neuroscience and Education, 1*, 32-42.
- Klein, S., Guiltner, V., Sollereeder, P., & Cui, Y. (2011). Relationships between fine-motor, visual-motor, and visual perception scores and handwriting legibility and speed. *Physical & Occupational Therapy in Pediatrics, 31*(1), 103-114.
- le Roux, T. (2019). *Pencil grasp development*. Retrieved August 1, 2019, from <http://www.ot-mom-learning-activities.com/pencil-grasp-development.html>.
- Lifshitz, N., & Har-Zvi, S. (2015). A comparison between students who receive and who do not receive a writing readiness intervention on handwriting quality, speed, and

- positive reactions. *Early Childhood Education Journal*, 43(1), 47-55.
- Longcamp, M., Zerbato-Poudou, M., & Velay, J. (2005). The influence of writing practice on letter recognition in preschool children: A comparison between handwriting and typing. *Acta Psychologica*, 119, 67-79.
- MacDonald, M., Lipscomb, S., McClelland, M. M., Duncan, R., Becker, D., Anderson, K., et al. (2016). Relations of preschoolers' visual-motor and object manipulation skills with executive function and social behavior. *Research Quarterly for Exercise and Sport*, 87(4), 396-407.
- Maldarelli, J. E., Kahrs, B. A., Hunt, S. C., & Lockman, J. J. (2015). Development of early handwriting: Visual-motor control during letter copying. *Developmental Psychology*, 51(7), 879-888.
- Marotz, L. R. & Allen, K. E. (2016). *Developmental profiles* (8th ed.). Boston, MA: Cengage Learning.
- Poldrack, R. A. (2007). Regions of interest analysis for fMRI. *Social Cognitive and Affective Neuroscience*, 2(1), 67-70.
- Rule, A. C., & Stewart, R. A. (2002). Effects of practical life materials on kindergartners' fine motor skills. *Early Childhood Education Journal*, 30(1), 9-13.
- Schwarz, T., & Luckenbill, J. (2012). Let's get messy! Exploring sensory and art activities with infants and toddlers. *Young Children*, 67(4), 26-30.
- Smith, E., McLaughlin, T. F., Neyman, J., & Rinaldi, L. (2013). The effects of lined paper, prompting, tracing, rewards, and fading to increase handwriting performance and

- legibility with two preschool special education students diagnosed with developmental delays, and fine motor deficits. *Journal on Educational Psychology*, 6(4), 23-29.
- Son, S., & Meisels, S. J. (2006). The relationship of young children's motor skills to later reading and math achievement. *Merrill-Palmer Quarterly*, 52(4), 755-778.
- Sparks, S. D. (2013). Studies link early spatial skills to math achievement. *Education Week*, 32(31), 8-8.
- Stewart, R., Rule, A., & Giordano, D. (2007). The effect of fine motor skill activities on kindergarten student attention. *Early Childhood Education Journal*, 35(2), 103-109.
- Vinter, A., & Chartrell, E. (2010). Effects of different types of learning on handwriting movements in young children. *Learning and Instruction*, 20, 476-486.
- Welsch, J. G., Sullivan, A., & Justice, L. M. (2003). That's my letter! What preschoolers' name writing representations tell us about emergent literacy knowledge. *Journal of Literacy Research*, 35(2), 757-776.

Speech, Language, and Musical Development in Young Children

by

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Chapter 1: Introduction

Speech and language development from infancy through early childhood is an important and multifaceted area of a child's overall development. According to Peterson, McIntyre and Forsyth (2016), "language is the foundation for learning to read and write and is the means through which children make sense of their world" (p. 12). Researchers have found that language development at a young age (12-36 months) is correlated with executive function, self-regulation, attention, and social skills among kindergarten-age children (Aro, Laakso, Maatta, Tolvanen, & Poikkeus, 2014). Several researchers suggest that speech, language, and musical development in young children are interconnected. Qualitative data including case studies, interviews with parents and practitioners, and observations of young children who are participating in music education programs indicate that music intervention improves young children's speaking, listening, vocabulary, and social communication skills (Harris, 2011; Pitts, 2016). Additional studies that utilized quantitative data also demonstrate a positive effect of music intervention and education in early childhood on development of vocabulary, grammatic understanding, phonological awareness, and executive function skills (Bugos & DeMarie, 2017; Moreno, Bialystok, Barac, Glenn Schellenberg, Cepeda, & Chau, 2011; Moritz, Yampolsky, Papadelis, Thomson, & Wolf, 2013; Runfola, Etopia, Hamlen, & Rozendal, 2012).

The purpose of this paper was to examine the results of current research on speech, language, and music development in young children, along with the connections between these areas. More specifically, effective practices for promoting speech, language and music development in young children are reviewed. Additionally, this paper examines the effects of music intervention on speech and language development in young children.

Background Information

The following is an overview of speech and language development and musical development in young children, from birth through early childhood. Included in the overview of musical development is a summary of early childhood music education standards and the parallels between language development and musical development.

Speech and language development in early childhood. According to Kuder (2012), speech is the neuromuscular act of producing sounds used in language, whereas language is a rule-governed symbol system for communicating meaning through a shared code of arbitrary symbols (i.e., words or signs). Kuder (2012) also noted that a true language communicates thoughts, ideas, and meaning, but does not require speech in order to do so. For example, American Sign Language (ASL) is a gestural language that is used to communicate by many people who are deaf. Language is also generative and creative, in that speakers can produce an infinite number of phrases and sentences, add new words to a shared vocabulary, and change the meaning of words.

Physiological and cognitive growth and development are necessary for speech and language development to occur in young children. Also, an environment that fosters social interaction is necessary for children to develop both skills. Speech and language, along with communication (the exchange of information, ideas, needs and desires), are all related, but also independent of each other. Language includes three major components: form (phonology, morphology, syntax), content (semantics) and use in context (pragmatics). Communication is the umbrella that may include both language and speech in order to exchange information between participants. All three abilities exist and continue to develop through a series of stages

from infancy throughout early childhood for a majority of children. Speech and language development occur in the home, community and school life of young children (Kuder, 2012).

Language development from birth through early childhood can be divided between prelinguistic language development (typically lasting up until 12-18 months of age) and linguistic language development (typically occurring from 12-18 months onward) (Kuder, 2012). A significant amount of a child's language learning occurs before the age of 5, making these early years crucial for promoting language development. By this age, children have typically mastered the sound system and grammar of their home language and have thousands of words in their vocabulary (Hoff, 2009; Peterson et al., 2016).

At birth, babies are able to communicate through a limited range of behaviors toward caregivers. As an infant grows and develops, communication gradually becomes more intentional and meaningful. At approximately 2 months of age, babies will often start to coo (vocalizing with only vowel sounds) which is followed by babbling (vocalizing with consonant and vowel sounds) and reduplicated babbling (repetition of consonant-vowel syllables) (Hoff, 2009; Kuder, 2012). From age 6 to 12 months, typically developing infants who have frequent opportunities to interact and engage with caregivers begin to develop intentional communication including gestures and joint attention. Vocalizations are combined with gestures to request, demand or comment (Kuder, 2012).

At about 12 months, babies are on the verge of saying their first meaningful words, although their understanding of words and language is far greater than what they can produce (Kuder, 2012). From 12-24 months, toddlers are rapidly developing speech and language that contribute to more complex thinking and learning (Marotz & Allen, 2016). By about 24 months,

toddlers have a spoken vocabulary from 50-300 words, with a significantly larger receptive vocabulary (Marotz & Allen, 2016). After the production of meaningful words begins, speech and language continue to develop throughout early childhood as a child's receptive and expressive language increase. From birth onward, parent involvement influences future language development. Maternal responsiveness (parenting that is "prompt, contingent, and appropriate") (Hudson, et al., p. 137) promotes parent-child reciprocal interactions that are the basis of communication development (Hudson, Levickis, Down, Nicholls, & Wake, 2015). Additionally, Hoff (2009) stated, "parents should be encouraged to treat their young children as conversational partners from infancy."

Musical development in early childhood. From birth, infants are attuned to music and respond to a caregivers' responsive singing and musical play (Malloch et al., 2012). In a study that examined the effects of music therapy with infants in a Neonatal Intensive Care Unit (NICU), three groups of infants were observed. Music therapy was provided by trained music therapists who interacted with infants "to provide attuned interaction which would bring the infant to a quiet alert state or a sleep state as needed" primarily through singing and vocalizations (Malloch et al., 2012, p. 390). Two groups included late pre-term and full-term infants in the NICU, where one group was given music therapy and one was not. Infants included in this study were in the NICU due to various medical conditions that required extended care of at least 4 weeks in a hospital setting. A healthy group of infants not given music therapy was also included as an additional control group. Results found that the music therapy intervention supported neurobehavioral development that included better self-regulation during social interactions, decreased irritability and crying, and more positive responses to being handled by

adults for the intervention group vs. the control groups. These infants were better “organized” and could expend more energy on healthy development (Malloch et al., 2012, p. 396). Malloch et al. (2012) also discussed the importance of “communicative musicality,” or shared sense of time between caregiver and infant through “mutually contingent gestures, (facial) expression(s), and timing (of shared movements),” which increases the infant’s ability to regulate and express a range of emotions (p. 387). Studies suggest that recorded soothing music (lullabies, classical music, and children’s music) in a NICU can encourage a “quiet alert” state in preterm infants while decreasing heart rate, reducing energy expenditure, decreasing stress responses, and increasing blood oxygen saturation (Malloch et al., 2012, p. 388). The study also noted that hospitalized infants prefer singing vs. spoken words, with singing producing lower heart rates, higher oxygen saturation, and reduced signs of distress. Singing was also found to hold infants’ attention and modulate their arousal levels better than talking (Malloch et al., 2012).

Music continues to provide therapeutic, as well as several other benefits throughout early childhood. According to LeFevre (2004), music enhances “communication, self-expression and personal growth” (p. 337). Focus group interviews of caregivers of young children, along with observational data, indicate that musical parenting, including the use of music through singing and movement in the home between child and caregiver, enhances social interaction, attention-getting, and storytelling in the home (Bond, 2012). When children listen to and practice making music, they are activating parts of the brain linked to motivation, reward, and pleasure (Bolduc & Edvard, 2017). One study by Harris (2011) examined the effects of music activities in a parent-child preschool setting, including adult-led instruction of nursery rhymes, actions songs, live and recorded music, and facilitated instrument exploration. It found that parents “were able to foster

a range of communication and language skills through musical activities” including speech production, vocabulary development, listening skills, ability to concentrate, and increase in rhythm through dance and movement (Harris, 2011, p. 144). Additional studies link music training and intervention with increased emergent literacy achievement in young children including phonological awareness, vocabulary, and grammatic understanding (Moritz, et al., 2013; Runfola et al., 2012). Although there appears to be a connection between musical development and several school readiness skills, the education of music for its own sake is promoted by Gordon (2013) and Bond (2012).

Musical development includes listening to, singing, audiating (hearing and comprehending music internally), performing, reading, writing, and improvising music (Gordon, 2013). Language and music development have a similar progression that includes “listening, speaking (performing), reading and writing” (Runfola et al., 2012, p. 9). Musical development also may begin at infancy and is primarily dependent on exposure to it in the home environment. Parents may expose their children to music, sing to and with their children, and/or play instruments. Inclusion of music education in early childhood settings is common, and songs and music are often built into various learning experiences (Gordon, 2013).

According to Gordon (2013), before young children can be formally trained in some type of music education program, they need to go through the three phases of preparatory audiation: acculturation, imitation, and assimilation. At the time children exit from the third phase (around 5 to 6 years of age), they are ready to enter more formal training. Preparatory audiation develops a young child’s ability to audiate (to hear and comprehend music internally) and is often promoted through an adult singing and chanting to and for them. Throughout this preparatory

phase that includes structured and unstructured informal guidance from parents and teachers, young children learn the tonal and rhythm patterns of music and the basis of audiation (Gordon, 2013).

Gordon (2013) proposed that musical babble (both tonal and rhythm babble) in response to a caregiver's singing/chanting, along with hearing music in infancy and toddlerhood, is necessary to further develop musical aptitude and achievement. Parents and caregivers are seen as playing a key role in a young child's musical development with home being the "most important school young children will ever know" (Gordon, 2013). Gordon stated that if the stages of preparatory audiation (ideally occurring in early childhood from infancy through age 5 or 6) are not experienced, children entering formal music education and training will not be able to learn the art of creating and improvising music. At best, they will only be able to learn instrumental technique and to decode musical notation. This lack of preparatory audiation hinders a child's ability to engage in their "imagination and unabashed creativity" through music (Gordon, 2013).

Early childhood music education. A variety of formal methods exist to teach music to children, with three of the most famous being the Kodaly, Orff, and Suzuki methods (Scott, 2004; Seeman, 2008; Szabo, 1999). There are also several curriculums available to music educators of children, including some that also address the early childhood years such as *Jump Right In: The Music Curriculum* (Gordon, 2013). Additionally, the National Association for Music Education (NAfME; 2018) has also developed music standards for preschool-aged children (NAfME, 2018).

The “Musical Play” program is an example of one preschool-age music program that was developed to promote both musical play and parent-child interaction in the home (Cooper & Cardany, 2008). The program includes developmentally appropriate songs, materials and activities that encourage parents and children to sing, move and play through finger plays, stories, lullabies, games, active listening, and exploring instruments. Standards addressed in this program are included in Figure 1. These standards were developed as a foundation for music literacy, which is the ability to read and write music (Scott, 2004). The standards also promote preparatory audiation. Samuelsson, Carlsson, Olsson, Pramling, and Wallerstedt (2009) proposed similar learning objectives for music in early childhood, including: discerning different aspects of music, developing different ways of representing music, and learning to listen in a musical way.

General Musical Characteristics of Children Ages 2 to 5
They demonstrate awareness of sounds: loud/soft, high/low, fast/slow, long/short They develop ability to distinguish between singing, speaking, whispering, and shouting They enjoy singing a wide variety of songs within their singing range They can follow a musical story sequence They can interact with simple, iconic pictures to tap the steady beat of a song They use movement and instruments to describe distinct musical ideas They enjoy participating in group activities They can perform simple actions songs and game songs

Figure 1. Music Standards for Children Aged 2 through 5

Parallels between Language and Musical Development

Runfola et al. (2012) summarized findings from various scholars stating the parallels between music and language development in Figure 2. Both rely on exposure through listening,

which eventually leads to production, reading and writing. Also, music and language are universal and can be found across all cultures, although the structure and formation of language and music is culture-specific.

Language	Music
<p>The notion of language is universal. Every culture uses language to communicate.</p> <p>Grammatical structure in language is not universal.</p> <p>Language development begins with an extensive listening period.</p> <p>Children begin with cooing and laughing. They engage in vocal play. Eventually, babies babble in context and attempt words.</p> <p>Children’s initial attempts at language are not always precise and accurate. However, they eventually “break the code.”</p> <p>After listening and speaking for approximately six years, children are asked to read and then write.</p>	<p>Singing is universal. Every culture has its own form of music.</p> <p>The way music is structured in various cultures is not universal.</p> <p>Music development should begin with an extensive listening period.</p> <p>Children also engage in music babble. Eventually they begin to respond purposefully to the music sounds that they hear.</p> <p>Children’s initial attempts at singing and chanting are not always accurate. They will break the code and imitate music patterns with accuracy.</p> <p>After listening and singing with accuracy, children then read and write what they can already perform.</p>

Figure 2. Parallels between Language Development and Music Development

Importance and Purpose of Study

The ability to effectively produce and understand language is critical for all young children and facilitates getting their immediate needs met, social interaction with others, problem-solving, and learning about and processing their environment. According to Vygotsky, there is a strong link between language and cognition, and the two eventually become interdependent (Kuder 2012). As children grow older, language is necessary for abstract thought and symbolic reasoning (Kuder, 2012). Additionally, language development in early childhood

has been tied to the development of several cognitive abilities including emergent literacy skills, increased vocabulary and phonological awareness, and many believe it may also impact executive function (Aro et al., 2014; Gooch, Thompson, Nash, Snowling, & Hulme, 2016; Kuder, 2012; Kuhn, Willoughby, Wilbourn, Vernon-Feagans, & Blair, 2014). Executive function is considered a critical aspect of school readiness and classroom learning in early childhood (Gooch et al., 2016).

The effect of music intervention on speech and language has been reviewed by many researchers. Not only does musical development parallel language development, it may also be related to speech and language development. Studies that used both quantitative and qualitative data indicate there may be a positive effect on speech and language development through exposure to music intervention and education in early childhood (Harris, 2011; Lorenzo, Herrera, Hernandez-Candelas, & Badea, 2014; Moreno et al., 2011; Moritz et al., 2013; Pitts, 2016; Runfola et al., 2012; Seeman, 2008; Yazejian & Peisner-Feinberg, 2009).

Given the importance of speech, language and musical development in early childhood, practices and approaches that promote their development should be considered. The purpose of this research project was to investigate the current research in speech, language and musical development in young children to answer the following research questions.

Research Questions

- 1) What is the current research on effective practices to promote speech, language and musical development in early childhood?
- 2) What are the effects of music intervention on speech and language development in young children?

Research Review Procedures

To answer these research questions, I conducted a library search. I limited my research to include studies of children from birth through middle childhood (11 years and 11 months of age). However, most of the literature I used for this paper was focused on early childhood (birth through 7 years 11 months of age). I also used studies from the past 10 years, except for some key informational sources and research studies in 1999 and 2004.

I conducted my search through the St. Cloud State University electronic library system. A variety of search engines were used to find literature on this topic including ERIC, PsychINFO, and Academic Search Premier. For each search engine, I completed an advanced search using either two or three search terms. All searches included a term to narrow down a target age group. Additional search terms were used for language development and music development. Using Academic Search Premier, I used the following combination of search terms: (a) *early childhood education* for a target age group; (b) *language acquisition* for language development; and (c) *music education* for musical development. For ERIC, I used the following combination of search terms: (a) *early childhood education* for a target age group; (b) *language acquisition* for language development; and (c) *music education* for musical development. For PsychINFO, I used the following combination of search terms: (a) *early childhood development* for a target age group; (b) *language development* for language development; and (c) *music education* for musical development. Search terms were selected by using the “subject terms” or “thesaurus” option for each search engine. All searches were refined to include only peer-reviewed sources. I also searched for book titles through the library electronic search along with the APA reference lists and discovered two additional sources. A

relevant and credible Internet search was done for online sources to contribute additional information and sources to the topic. Internet sources needed to include the author's name (if available), date of publication or copyright, and a list of references for further review.

Six studies were selected in the area of language development in early childhood and three studies in the area of musical development in early childhood. There were nine studies selected that examined the effects of music intervention on speech and language development in early childhood. Selection of research studies and other information sources involved determining whether the information included the target age group of early childhood; included recent and/or relevant information about speech, language and music development; and primarily focused on typically developing children. Studies were also selected based on whether they focused on language development within a child's home language, since the intention of this paper was not to investigate language acquisition beyond the child's home language.

Table 1 includes the results from this search when using a combination of the search terms across all three search engines. Additional articles were discovered through the APA reference lists from selected articles from my initial search.

Table 1

Search Results

Search Terms Used:	Target age group <i>and</i> language development search.	Target age group <i>and</i> music development search.	Target age group <i>and</i> language development <i>and</i> musical development search.
Total Number of Search Results:	1,538	352	14

Definitions

Acculturation: First type of preparatory audiation. It includes three stages. Typically, children are in the first stage from birth to 18 months, second stage 1 to 3 years, and third stage 18 months to 3 years of age (Gordon, 2013).

Assimilation: Third type of preparatory audiation. It includes two stages. Typically, children are engaged in the assimilation type of preparatory audiation from 4 to 5 years of age (Gordon, 2013).

Audiation: Hearing and comprehending in one's mind the sound of music that is no longer or may never have been physically present. It is different from discrimination, recognition, imitation, and memorization. Ideally, children begin to audiate when they are 5 years old after they have phased through preparatory audiation (Gordon, 2013).

Broca's Area: The area of the brain located near the middle of the left cerebral hemisphere where organization of the complex motor sequences necessary for speech production goes on (Kuder, 2012).

Communication: The process participants use to exchange information and ideas, needs and desires. Communication requires a sender and receiver of a message along with shared intent and means to communicate between the sender and receiver (Kuder, 2012).

Deictic Gestures: Gestures that are considered intentional communication and are most often used to direct and maintain caregivers' attention to a particular object or referent. Examples include giving, showing or pointing to objects (Kuhn et al., 2014).

Emergent Literacy: The theory of reading and writing development that claims that literacy develops continuously from early childhood experiences. Research shows that language and literacy develop concurrently and are interdependent from an early age (Kuder, 2012).

Executive Function: The cognitive abilities involved in the control and coordination of information in the services of goal-directed actions, including inhibitory control, working memory, and attention shifting (Kuhn et al., 2014).

Imitation: Second type of preparatory audiation. It includes two stages. Typically, children engage in the imitation type of preparatory audiation from 3 to 4 years of age (Gordon, 2013).

Language: A rule-governed symbol system for communicating meaning through a shared code of arbitrary symbols (Kuder, 2012).

Morphology: The study of words and how they are formed (Kuder, 2012).

Music Babble: Sounds a young child makes before developing objective tonality and meter. Music babble is to music what speech babble is to language (Gordon, 2013).

Music Intervention: An educational program that promotes musical awareness, understanding, and creation. Interventions typically include engaging and developmentally appropriate songs, activities and material (Bugos & DeMarie, 2017; Cooper & Cardany, 2008).

Phonemic Awareness: The ability to focus on and manipulate phonemes in spoken words (Kuder, 2012).

Phonological Awareness: The ability to understand, use and recall the phonological segment used in an alphabetic orthography (Kuder, 2012).

Phonology: The study of the sound system of language (Kuder, 2012).

Pitch: Part of a tonal pattern. A pitch is to a tonal pattern what a letter is to a word (Gordon, 2013).

Pragmatics: The use of language for communication in order to express one's intentions and to get things done (Kuder, 2012).

Rhythm: Consists of three fundamental parts: macrobeats, microbeats, and rhythm patterns. In audiation, microbeats are superimposed on macrobeats, and rhythm patterns are superimposed on microbeats and macrobeats (Gordon, 2013).

Semantics: The study of the meaning of words (Kuder, 2012).

Speech: The neuromuscular act of producing sounds that are used in language (Kuder, 2012).

Symbolic gestures: Gestures that are decontextualized from the referent and are used to represent an object that may or may not be present. An example would be flapping hands to represent "bird" (Kuhn et al., 2014).

Syntax: The study of rules that govern how words are put together to make phrases and sentences (Kuder, 2012).

Tempo: Speed at which rhythm patterns are performed and relative lengths of macrobeats within rhythm patterns (Gordon, 2013).

Timbre: The quality given to a sound by its overtones such as the resonance by which the ear recognizes and identifies a voiced speech sound or the quality of tone distinctive of a particular singing voice or musical instrument (Merriam-Webster, 2019).

Tonal Pattern: Two, three, four or five pitches in a tonality audiated sequentially forming a whole (Gordon, 2013).

Tonal Syllables: Names sung for different pitches in a tonal pattern. Tonal syllables used in learning sequence activities are based on movable *do* with a *la* based minor (Gordon, 2013).

Tone: The sound of a definite pitch or vibration (Merriam-Webster, 2019).

Wernick's Area: The area of the brain located to the rear of the left cerebral hemisphere in the temporal lobe that is involved with comprehension of language (Kuder, 2012).

Summary

The intention of the following literature review is to organize the information into themes that relate to the research questions: 1) effective practices to promote speech, language, and musical development in early childhood, and 2) the effect of music intervention on speech and language development in early childhood. Within each overview subheadings will be included to further organize the information into identified themes.

Chapter 2: Literature Review

This section includes an overview of current research regarding: 1) speech and language development in young children, 2) musical development in young children, and 3) the effects of music intervention on speech and language development in young children.

Speech and Language Development in Early Childhood

When conducting a search for research studies in the area of speech and language development in early childhood, six applicable studies were found in the following areas: early intervention for speech and language development, instructional strategies for speech and language development, and executive function and speech and language development.

Early intervention for speech and language development. A study by Marshall and Lewis (2014) examined qualitative data from a group of early childhood practitioners working with an ethnically, linguistically and socioeconomically diverse population in a city in England. The authors interviewed 12 specialists who work with children from birth through age 5 years, 11 months. They gathered qualitative information about environmental influences, assessment of communication development, and early intervention for children with speech and language delay. A summary of the responses indicated that all specialists agreed that “people were seen as integral to a child’s development of speech and language” and that quality interactions and attention paid to a child was “very important” for speech and language development (Marshall & Lewis, 2014, p. 342). Language rich environments that include intentional interactions with the child (gaining eye contact, turn-taking, sitting face-to-face), various types of play (physical, symbolic, role play), and a physical environment that promotes parent/child interaction were mentioned by several practitioners as ways to support speech and language development. These

findings correspond with research by Hudson et al. (2015) who found that toddlers with delayed expressive language whose mothers ranked higher in “maternal responsiveness” had higher language scores at three and four years of age than did similar toddlers/preschoolers whose mothers scored lower on a global rating scale (p. 136).

Instructional strategies for speech and language development. While a significant amount of speech and language development during early childhood happens within the home with the parents or caregivers being the primary communicative partners, there are studies discussing the importance of early childhood educators and their impact (Chiang et al., 2017; Hudson et al., 2015; Marshall & Lewis, 2014; Snow, Eadie, Connell, Dalheim, McCusker, & Munro, 2014). Storybook reading, guided play, and several other structured and unstructured times in a preschool setting provide opportunities for teachers and other adults to promote vocabulary, receptive language skills, and conceptual knowledge development (Massey, 2013). There has been a recent trend focusing on the teaching of phonemic awareness, phonics and decoding, vocabulary, fluency, and comprehension strategies to promote language and emergent literacy in young children. These instructional practices gained significant attention after a 2000 report was completed by the National Reading Panel commissioned by Congress (Chiang et al., 2017). The panel reviewed several small-scale studies and determined that explicit teaching of these strategies would lead to higher reading comprehension achievement in young children. However, studies following the implementation of these interventions indicate that although they sometimes positively impact a narrow range of skills, they do not impact language outcomes in preschool or reading comprehension outcomes in first through third grade (Chiang et al., 2017).

Chiang et al. (2017) completed a longitudinal study to further explore instructional practices that foster language development as well as comprehension to expand upon the previous research. The study was completed with 83 Title I schools across nine states with 4,969 students from prekindergarten through third grade. An observation tool was developed to measure various teaching strategies that, according to prior research, is related to students' language development. After completing classroom observations along with assessments of student growth in language, comprehension, and general knowledge skills from the fall to the spring, findings were compiled to show positive, neutral and negative relationships between instructional strategies and student growth. In the area of early childhood, five instructional practices had positive relationships to language growth: engaging students in defining new words during reading, focusing on the meaning of texts during pre-reading, helping students make connections between their prior knowledge and texts, focusing on world knowledge, and focusing on higher-order thinking. One instructional practice, focusing on the meaning of texts during pre-reading, was positively related to language growth for all subgroups in early childhood: 1) students with English as a home language, 2) students with Non-English as a home language, 3) high achievers, and 4) low achievers.

Another research study was found to support the findings from Chiang et al.'s 2017 study. An experimental study of 979 primary age students (grades kindergarten through second grade) in Australia compared children whose teachers received professional development in language and literacy to those in a control group where teachers followed accepted curriculum guidelines and did not receive any additional training (Snow et al., 2014). The intervention promoted instructional practices that increase students' oral language competency including a

range of “expressive and receptive language skills” (Snow et al., 2014, p. 499). Results indicated that children from the intervention group had increased oral language and reading growth with a medium effect size. Vocabulary, syntactic understanding, and some aspects of phonemic awareness showed more significant growth. Narrative ability was the one area that did not increase at a higher rate in the intervention group vs. the control group.

Executive function and speech and language development. In a longitudinal study completed by Aro et al. (2014), children with delayed language at a young age (6 to 24 months) were found to have less self-regulation and executive function/attention skills at ages 4 and 5 years than children with typical early language development. This study was completed in Finland with 185 children whose skills were measured through parent questionnaires. Based on the completed questionnaires of the children at 24 months, they were grouped in to three categories: children exhibiting typical overall development, children exhibiting delays in expressive language, and children exhibiting delays in social communication and receptive language. Results indicated that children exhibiting some type of language delay as toddlers “demonstrated poorer executive and regulative skills at kindergarten age” than typically developing toddlers with a correlation of .425 (Aro et al., 2014, p. 1413). Toddlers with language delays were also rated by parents as having lower social skills when they reached four and 5 years of age. The authors also found that the language ability of kindergarten age children was clearly associated with attention/executive function skills at that age (Aro et al., 2014).

Another longitudinal study by Kuhn et al. (2014) found that increased use of both gestures and language at a younger age (15 months to 3 years) correlated with more developed executive function at four years of age (correlation of .44), although the effect was mediated

through later language development (measured at both 2 and 3 years of age). The study found that earlier language development had significant direct and indirect positive effects on later development of executive function. The study was completed with 1,066 children from low-income families in the United States using data from interviews, observations, standardized measures, and specific tasks to assess executive function.

One additional study examined the relationship between executive function and language skills of children ages four through 7 years of age (Gooch et al., 2016). This study was completed with 243 children in England and used standardized measures, tasks to assess executive function, and rating scales completed by parents and teachers to measure attention and behavior. It found there was a concurrent association between language and executive function skills for children in all grade levels assessed (preschool through second grade). However, it was noted that there was limited reciprocal influences between the two, and executive function demonstrated at a younger age was predictive of later skills in attention and behavior, but not language. The authors concluded that, “although executive deficits are commonly seen in children with language impairment, each appears to have a distinct developmental course and deficits in each may require different interventions” (Gooch et al., 2016, p. 185).

Musical Development in Early Childhood

When conducting a search for research studies in the area of musical development in early childhood, three applicable studies were found.

Early childhood education and musical development. When looking at the early childhood educator’s role in music education and intervention, two studies discussed current practices and areas of potential need for professional development. One study administered

questionnaires about music education practices to 108 early childhood teachers in Canada, who were then divided into three groups based on their musical education, experience and background (Bolduc & Evrard, 2017). The study found that about half of the respondents had “good” or “in depth” musical knowledge, while the other half had “limited” musical knowledge (Bolduc & Evrard, 2017, p. 9). According to survey results, all teachers implemented music activities that promote awareness and knowledge of pitch; duration (i.e., quick vs. slow tempos); intensity (i.e., loud vs. soft sounds); timbre; songs, nursery rhymes, poems, and instrumental and vocal pieces; and creation and appreciation. However, teachers with more musical knowledge engaged in musical activities more frequently, used a greater variety of music education techniques, and further promoted music perception and production. Teachers with limited knowledge of music primarily focused on music activities related to perception.

In Rajan’s (2017) study, 178 preschool teachers from the midwestern United States responded to a questionnaire of use of music activities in the classroom. A majority of the teachers reported no background or training in music or music education. Results indicated that teachers primarily relied on “teacher-directed” activities such as singing at circle time and transitions, playing pre-recorded music, using music to build academic skills, and some instrumental and vocal play to engage in music activities within the classroom. Although teachers expressed the value of music being integrated into early childhood education, they reported “limited resources, lack of music ability, and an absence of knowledge of the standards for music education as inhibiting their use of child-centered music activities” (Rajan, 2017, p. 89).

Qualitative data were gathered from an action research project that involved preschool through second grade students to look at how teachers applied music to childrens' thinking, reading and creativity (Salmon, 2010). The author reviewed teachers' journals of classroom activities along with videotape, photographs, and student work from classrooms of teachers who attended a workshop connecting music and literacy. The author noted that listening to recorded music appeared to promote visualization and mental images in children, that they then verbally described and/or drew. The visualization activated when listening to music was similar to the visualization that helps children "access prior knowledge, predict, make connections, and question" when read stories (Salmon, 2010, p. 940). In addition, music that accompanied the telling of a story, when re-listened to, appeared to promote increased detail in retelling the story and in pictures children drew about the story. The author concluded that music has potential to add value to classroom learning through facilitating activation of prior knowledge, generating imagery, scaffolding of children's language and literacy development, connecting to a child's home culture, and nurturing imagination.

After reviewing the research and information sources on speech, language and music development in early childhood, literature was examined connecting these areas, along with the effects of music intervention on speech and language development. The next section reviews the connections between speech, language and music development and primarily focuses on the effect of music intervention on speech and language development.

Effects of Music Intervention on Speech and Language Development in Early Childhood

When conducting a search for research studies in the area of speech, language, and musical development in early childhood, nine applicable studies were found in the following areas: effects of music intervention on executive function and vocabulary development; effects of music intervention on language, literacy, and vocabulary development; and effects of music intervention on phonological awareness and emergent literacy.

Effects of music intervention: Executive function and vocabulary development. An experimental study completed by Bugos and DeMarie (2017) found that children who were exposed to short-term musical training increased some aspects of their executive function skills, including inhibition and visual discrimination. The study was conducted with 34 typically developing children from a diverse preschool in the United States. They were randomly assigned to a control group (where children received a Lego construction intervention) and a musical training intervention. The music intervention included activities that focused on playing various instruments, vocal exercises, and improvisational activities. The Lego intervention focused on problem-solving with spatial relationships. All children were administered pretests and posttests measuring their cognitive and executive function abilities. After completing 6 weeks of twice weekly intervention, the music group demonstrated fewer errors in a matching test than the Lego group with a significant group by time interaction (Cohen's effect size (d) of .987). This visually based assessment required children to point to matching pictures out of a set of images and measured both reflectivity and impulsivity in respondents. However, both groups improved at a similar rate in a verbally based test of inhibitory control, where children had to

adapt their verbal response to presented test items by saying the opposite of what the picture was showing. The authors concluded that “aspects of inhibition that were visually based and which involved motor control changed significantly for the music group but not for the Lego group” (Bugos & DeMarie, 2017, p. 864).

A study completed by Moreno et al. (2011) linked short-term music training to executive function and verbal intelligence in early childhood. In this experimental study, 48 children from 4 to 6 years of age were divided into two groups, each receiving a different computerized training program: one for music and one for visual art. The music training focused on listening activities that included motor, conceptual and cognitive tasks including rhythm, pitch, melody, voice and other musical concepts. The visual arts training emphasized visuospatial skills development including shape, color, line dimension and perspective. Both trainings were developed by Moreno. Children were also administered a standardized measure to assess their verbal and spatial ability as well as an executive function task through pretests and posttests. After completing 4 weeks of training (two 45-minute sessions per day, 5 days per week), children in the music training group significantly increased their verbal intelligences scores (vocabulary scores) vs. children in the visual art group. Results from the executive function task indicate the music group outperformed the visual art group on the posttest, showing a significant effect of session and significant interaction between group and session. The authors concluded that training in music-listening transfers to verbal ability and may be linked to executive function. They also suggested that “music and language are closely linked in cognition” (Moreno et al., 2011, p. 1429).

Effects of music intervention: Language, literacy and vocabulary development. In a study by Seeman (2008), the short-term effects of a music intervention on nine at-risk children in an early childhood program in a Chicago public school were examined. Over 10 weeks, the author taught music activities that focused on rhyme and rhythm twice a week. The students were assessed through the following: 1) a standardized measure for the pretest and posttest to determine receptive language ability, 2) rating scales completed by the classroom teacher to determine perceived growth in language and literacy, and 3) qualitative data including comments from teachers, parents, and participants. Results from both the standardized measure and rating scale indicated that students increased receptive vocabulary, communication skills, rhyme production, and vocabulary, with the greatest increase being communicating personal experiences (based on teacher report). There was a 21% increase in receptive language and a 34% increase in phonemic awareness skills after 10 weeks of intervention.

Lorenzo et al. (2014) found that young children who underwent 2 years of formal music training had increased language abilities when compared to a control group. In this quasi-experimental study, 213 children aged 3 to 4 years from a Head Start Program in Puerto Rico were assigned to an experimental group and control group. For the control group, teachers were trained and mentored by music specialists to teach music classes three times per week for 20 minutes. Teacher rating scales of developmental skills were used as both the pretest and posttest as well as intermittently throughout the intervention. Results showed there was a significant interaction between test time and group, with the intervention group scoring higher than the control group on the posttest after 2 years of music training. The authors concluded that

“continual formal music education can enhance early childhood language development”

(Lorenzo et al., 2014, p. 529).

In Harris’s (2011) study, young children (ages 9 months through 4 years of age) and their parents living in the United Kingdom received 20 weeks of weekly music classes with a music specialist. Seventeen parents were interviewed at both the start and end of the 20-week period, and both qualitative and quantitative data were gathered through the interviews. Several music and listening skills were facilitated through the weekly sessions including nursery rhymes, actions songs, instrument play, and recorded music. Exploratory play was also encouraged in the parent/child class using musical instruments. Parents reported perceived benefits of the music intervention at both Week 3 and Week 20. The benefits that increased the most, based on parent perception, included: aiding children’s enjoyment of singing, aiding in listening skills, aiding in vocabulary development, learning about the use of different instruments, improving rhythm skills, and increasing concentration. Observations of turn-taking, musical conversations, and imitation of musical patterns modeled by adults were also noted as being foundational skills for communication, language and literacy development. The author suggested that “language skills such as non-verbal communication, listening skills and vocabulary development were being fostered through music” (Harris, 2011, p. 149).

Pitts’s (2016) longitudinal study examined the impact of the United Kingdom’s “Soundplay Project,” which included biweekly 2-hour music classes (workshops) led by music specialists spread across 2 academic years. Along with the classes, were two concerts, an early childhood educator conference, in-service training for early childhood educators, and video and audio material for parents and teachers. Fifty-two children, aged 2 to 4 years, were included in

the study. Measures included criterion-referenced assessment in both music and language, observations, and questionnaires to parents and teachers. Results indicated an increase in overall language levels (listening, talking, and social communication), with improvement beyond expected growth found in all four centers. Representative case studies were also completed on children who made rapid growth in music and language skills as well as children who overcame language and communication challenges. Findings from these case studies suggested improved social communication, confidence, musical ability, and language ability in the three children examined. Early childhood teachers indicated that the conference and professional development gave them more confidence to teach music in their classroom. One teacher noted the children who attended the classes were noticeably better at “sitting still when asked, listening, waiting their turn, sharing, focusing on activities, (and) being creative” compared to other groups of children from past years (Pitt, 2016, p. 18). The author concluded that there was improvement in language and music skills of children across the study, “which could be attributed partly to their involvement in the workshops” (Pitts, 2016, p. 21).

Effect of music intervention: Phonological awareness and emergent literacy. Moritz et al. (2013) found that children who received more music education and training in kindergarten had increased phonological awareness skills at the end of the school year compared to children who received less training. In this quasi-experimental study conducted in the Boston area, 15 children attending a charter school who received daily 45-minute music lessons were compared to 15 children from a public school who did not receive additional music training. Measures included standardized cognitive and vocabulary tests as well as phonological awareness and music tests administered in the fall and spring of the participants’ kindergarten year.

Phonological awareness skills assessed included rhyming discrimination, rhyming production, segmentation of sentences, segmentation of syllables, isolation of initial phonemes, and deletion of compounds/syllables. Results indicated that children from the experimental group had better end-of-year phonological awareness skills than children in the control group. Children from the experimental group had highly significant differences between fall and spring scores measuring all aspects of phonological awareness with a large effect size, whereas children from the control group had significant improvement in four out of the six phonological awareness measures with a medium effect size.

A quasi-experimental study by Yazejian and Peisner-Feinberg (2009) found that children who received music intervention made greater gains on teacher-rated communication skills than the control group but found there was no significant difference on results from receptive language and phonological awareness measures. Two hundred seven children aged 4 and 5 years from Head Start classrooms in the United States were divided between an intervention and comparison group. Teachers who agreed to participate were randomly and non-randomly assigned to each. Three sites were included in the study. In one site, there was random assignment of classrooms to each group. In the other two sites, nonrandom assignments were used due to travel distance for the interventionist and other unrelated circumstances. The intervention group received 26 weeks of twice weekly 30-minute music lessons from a music teacher, and the comparison group did not. The music intervention consisted of music and movement activities developed to promote school readiness skills, including language development. Measures used for the pretest and posttest included a standardized assessment in receptive language, a teacher rating scale of communication skills, and a phonological awareness

test. Results indicate that children's receptive language and phonological awareness did not differ over time between the intervention and control group. However, children from the intervention group made greater gains on language development as measured by a teacher rating scale with an effect size of .37, which is considered small yet "typical of studies of psychological, educational, and behavioral treatments" (Yazejian & Peisner-Feinberg, 2009, p. 337). The authors concluded that the study provided "limited support for the hypothesis of a positive effect of the music intervention on children's language and literacy skills" (Yazejian & Peisner-Feinberg, 2009, p. 337).

One last experimental study examined the effect of music instruction on emerging literacy development in early childhood. Runfola et al. (2012) found that children from a music intervention group significantly increased their language skills compared to children from the control group. The participants for the study included 165 4-year-old children and their 11 teachers from multiple preschool settings within the United States. Once they were recruited and agreed to participate, preschool teachers were randomly assigned to experimental and control groups. The intervention included a music curriculum and two years of professional development. During the second year, teachers administered the intervention. Teachers in the intervention group provided daily musical activities during a 10-20-minute circle time promoting tonal and rhythm development, movement, singing, and exposure to various tonalities and meters. Teachers from the control group did not receive additional curriculum or professional development and were instructed to continue their usual musical activities already established in their classrooms. Measures included tests of music ability used during the posttest period and a standardized measurement of language for the pretest and posttest. Results indicated that

children in the experimental group had statistically significant increased oral vocabulary and grammatic understanding when compared to the control group. The authors also found that children with the lowest pretest scores in language tended to have the highest gains. The authors concluded that “preschool children who received this music intervention demonstrated better achievement in both music (early audiation of tonal elements) and aspects of emergent literacy (oral vocabulary and grammatic understanding)” (Runfola et al., 2012, p. 21).

Conclusions

This chapter reviewed several research studies in the areas of speech and language development, musical development, and the connection between these areas. The current research on the effects of music intervention on speech and language development was also reviewed. Two longitudinal studies using quantitative and qualitative data suggest music intervention in early childhood has a positive impact on several skills, including speech and language development (Harris, 2011; Pitts, 2016). Executive function has been linked to both language ability and music interventions (Aro et al., 2014; Bugos and deMarie, 2017; Gooch et al., 2016; Kuhn et al., 2014). However, results from various quasi-experimental and experimental studies examining the effect of music intervention on speech and language development have somewhat mixed results (Lorenzo et al., 2014; Moritz et al., 2013; Runfola et al., 2012; Yazejian & Peisner-Feinberg, 2009). In the following chapter, a summary of the presented findings will be discussed.

Chapter 3: Summary

Speech, language, and musical development in early childhood occurs from infancy onward through support and interaction with caregivers, and, as a child enters preschool age, early childhood professionals. Musical development parallels speech and language development, and children progress through various stages in both areas of development from listening and understanding to producing (Runfola et al., 2012). The importance of speech, language, and musical development along with the effects of music intervention on speech and language development has been the subject of several studies reviewed for this paper. The following summarizes information from research on speech, language and musical development, along with the effects of music intervention on speech and language development.

Research studies indicate that speech and language development during early childhood can be fostered both in the home and school setting. Specific interventions and instructional strategies that focus on oral language development may lead to increased language skills and growth at this age (Chiang et al., 2017; Marshall & Lewis, 2014; Snow et al., 2014). Chiang et al. found that teaching new vocabulary, focusing on text meaning during pre-reading and assisting children in making connections between prior knowledge and text during book read-alouds were all effective strategies in fostering language development in young children. Additional effective strategies include focusing on world knowledge and higher-order thinking when engaging with young children. These findings were supported by Snow et al.'s (2014) study that found promotion of instruction practices that increase children's oral language abilities increased their vocabulary, syntactic understanding and some phonemic awareness. There also appears to be a relationship between executive function and speech and language development

(Aro et al., 2014; Gooch et al., 2016; and Kuhn et al., 2014). According to Aro et al., the language ability of toddlers correlates with their executive function and attending ability when they reach kindergarten age with a moderate effect size. Kuhn discovered similar findings that correlated toddlers' language ability to their executive function skills at 4 years of age with a moderate effect size, although the effects were mediated by later language development. However, another longitudinal study conducted with children ages 4 through 7 years of age, found no correlation between early language skills and later executive function skills, although the authors note there is a "strong concurrent association" between language and executive function skills at each age assessed (Gooch et al., 2016, p. 180). Children demonstrating language impairment (expressive and/or receptive language delays) also showed delays in executive function across all age levels.

Additional research was found on music education in early childhood. In the three studies examined, a majority of early childhood professionals include some type of music education and/or activities in their classrooms (Bolduc & Evrard, 2017; Rajan, 2017; Salmon, 2010). However, in two studies that surveyed 286 early childhood professionals across Canada and the United States, a majority of the respondents from the United States reported little to no training in music education, whereas about half of the surveyed Canadian professionals had adequate training (Bolduc & Evrard, 2017; Rajan, 2017). Bolduc and Evrard found that all surveyed early childhood professionals included music education in their classroom, although teachers with more musical training included more frequent music activities and used a greater variety of music education techniques. Rajan found that most teachers primarily relied on "teacher-directed" musical activities. Another study by Salmon examined qualitative data to

determine music's impact on children's literacy skills. The author found that music potentially enhanced activation of prior knowledge, imagery generation, scaffolding of language and literacy development, relationships to the students' home culture, and imagination.

When looking at the effects of music intervention on young children, several studies found qualitative and quantitative data showing that some form of music intervention in early childhood had positive effects on the development of executive function, concentration, vocabulary, receptive and expressive language, social communication, phonological awareness, and grammatic understanding (Bugos & DeMarie, 2017; Harris, 2011; Lorenzo et al., 2014; Moreno et al., 2011; Moritz et al., 2013; Pitts, 2016; Runfola et al., 2012; Seeman, 2008; Yazejian & Peisner-Feinberg, 2009). The two studies that examined music's effect of executive function found that short-term musical training (vs. a separate skill training) increased certain aspects of executive function related to visual and/or motor-based inhibition with significant effect sizes in both studies (Bugos & DeMarie, 2017; Moreno et al., 2011). Qualitative and quantitative data from several studies noted specifically an increase in vocabulary in children after receiving some type of music intervention (Harris, 2011; Moreno et al., 2011; Runfola et al., 2012; Seeman, 2008). Additionally, music intervention was shown to increase phonological awareness, considered an "essential oral language skill" for learning to read, in kindergarten children with a larger effect size than a control group (Moritz et al., 2013, p. 741). However, a different study that examined the effect of music intervention with 4- and 5-year-olds did not find an increase in phonological awareness skills in the intervention group vs. the control group (Yazejian & Peisner-Feinberg, 2009). Yazejian and Peisner-Feinberg reported that children from the intervention group made greater gains in language development based on teacher rating scales

with a small effect size. Additionally, several studies noted perceived increase of childrens' overall communication and language abilities, turn-taking, non-verbal communication, listening skills, vocabulary, social communication, confidence, focus, and creativity (Harris, 2011; Lorenzo et al., 2014; Pitts, 2016; Seeman, 2008).

Conclusions

In conclusion, the studies selected for use in this paper were a combination of experimental research, quasi-experimental research, longitudinal studies, correlational studies, cross-sectional surveys, one-group studies, an action research study, and case studies to investigate speech, language and musical development in young children, along with the effect of music intervention on the speech and language development of young children.

There were some limitations in the reviewed research. As previously mentioned, most studies were chosen from the past 10 years, except for two studies chosen from the late 2000s that included un-replicated research. There were also studies with the smaller sample sizes (nine to 165) in the quasi-experimental, experimental, one-group, action research, and correlational studies from this age group, making reported results and findings somewhat limited. Several research articles reviewed discussed limitations that included no inclusion of the long-term follow-up or implications of their studies.

Another limitation is the lack of existing research on music education with young children. The research available primarily focused on qualitative data gathered from cross-sectional surveys of early childhood professionals, case studies, and action research. Although several articles were found that researched the effects of music intervention on young children, there were few articles found that examined best practices or methods of musical education for

young children, and no experimental research was found. The lack of information leads to inconclusive results for the best practices in teaching music to young children. There is also limited information on the long-term effects of music intervention at a young age. No study included in this review went past 20 months of tracking when examining the long-term effects of music interventions implemented in early childhood.

Chapter 4: Position Statement

I grew up in a musical family. Both of my parents were talented musicians, and their love of singing and playing instruments left me with lasting memories. Along with enjoying regular impromptu performances by both of my parents, I gained a great appreciation for recorded music. Indelible in my early memories are the hours of listening to various vinyl records that my father frequently played. From Motown to Bernstein, to Bizet, I listened to a range of recorded music that I still seek out to this day. From a young age, I intuitively understood the positive effects of music, one of the most important being the emotional connection I had with the songs and melodies that were a part of my childhood.

I was encouraged at a young age to learn how to play an instrument, and I chose to study the violin. I later utilized my skill in playing the violin to teach lessons to children and adults when I was in high school. Although I appreciated the opportunity to teach, especially in an area of high interest for me, I knew even at a young age that giving music lessons was not going to be my eventual career. However, my appreciation and enjoyment of music soon came bubbling to the surface later in life once I began teaching young children. In my first teaching position as a kindergarten teacher, I was happily surprised by all the music available for teaching children standards in math and literacy. Along with using music to teach these skills, I also played recorded music in my room throughout various parts of the day, had a music time in the day where we primarily focused on learning and singing new songs, and I used music for greetings, transitions, and games. I now realize that my intrinsic motivation to include music as much as possible in learning not only made the classroom more enjoyable for me and my students, but also most likely fostered language, pre-literacy skills, social skills, executive function, and

musical ability in the children I taught (Bugos & DeMarie, 2017; Harris, 2011; Lorenzo et al., 2014; Moreno et al., 2011; Moritz et al., 2013; Runfola et al., 2012).

After I became an early childhood special education teacher 4 years ago, I rediscovered my passion for music education and began to frequently use music in the classrooms I worked in. I soon discovered the power of music to assist a child or group of children in giving attention and focus to the teacher, to teach concepts, to embed pre-literacy skills (rhythm, alliteration, rhyming, segmentation, etc.), to encourage play and creativity, to encourage language and social skills, to regulate emotions, and to foster a love for learning and education. Music and movement have been consistently engrained in my approach toward education of young children. However, although I've had lessons and training in music since childhood, I was unsure as to how and what to teach to young children in regard to music. I had minimal required coursework that discussed methods and practices for teaching music to young children. After reviewing articles for this paper, my situation is not uncommon. Most early childhood learning professionals in the United States report little to no training in music education in their coursework (Rajan, 2017).

Although I have always integrated music in the classrooms I have worked in, it was not until I began working with young learners that I fully realized the importance of speech and language development in early childhood. I started out working in elementary and middle school settings for the first 7 years of my teaching career. Beyond teaching literacy concepts and skills (including vocabulary) and encouraging class discussion and 1:1 conversation between myself and students, I did not give much thought to oral language development in children. Once I began working and taking coursework in early childhood, I soon began to realize the significance

of speech and language development at a young age. After reviewing research for this paper, I have discovered even more important aspects of language development in early childhood, including its potential link to executive function and early literacy skills (Aro et al., 2014; Gooch et al., 2016; Kuhn et al., 2014; Snow et al., 2014). I also found it interesting that the emphasis on phonemic awareness when teaching emergent literacy skills, which was a big push when I was going through my teacher preparation courses, was found to be not as important in promoting language ability and comprehension as questioning and discussion with young children before and during oral readings of text (Chiang et al., 2017).

When examining the importance of speech and language development, it is worthwhile to thoroughly investigate proven interventions and strategies that promote its development.

Although a significant amount of qualitative data was discovered that indicated music intervention increased language abilities in young children, there were a handful of studies included in this paper that used quantitative data to support this finding as well (Lorenzo et al., 2014; Runfola et al., 2012; Seeman, 2008; Yazejian & Peisner-Feinberg, 2009). While intuitively, it makes sense to me that music education and intervention would inevitably foster speech and language development in young children, actually finding research that supports this belief was reassuring. However, the limited number of recent articles I found with quantitative data was somewhat surprising, and I feel that further research studies that investigate music's direct and long-lasting impact on speech and language development with young learners is an important area for further investigation.

In conclusion, I was able to find a range of articles that provide support for utilizing music instruction in early childhood to promote speech and language development through

research using both qualitative and quantitative data. I did not discover any research on effective music education strategies and practices for young children, although I did find several informational articles and texts discussing standards, methods, and approaches to teaching young children music (Bolduc & Edvrard, 2017; Cooper & Cardany, 2008; Gordon, 2013; Samuelsson et al., 2009; Szabo, 1999). Investigating effective strategies and interventions for teaching music to young children appears to be another area in need of further research. Also, the lack of professional development and training in music education for early childhood professionals was not only evident in the research I reviewed, but also in my own educational and professional experience as well. I have yet to go through school- or district-sponsored professional development that focuses on effective practices for music education with young children. This may be partly due to the fact that, starting in kindergarten, most children go to a specialist for their music education, and therefore specialized training in music education for general educators is deemed unnecessary by staff and administration. However, according to Gordon (2013), musical training, including preparatory audiation, needs to be completed by age 5 or 6, or the child is unable to move past learning instrumental techniques and decoding musical notation. This lack of education and exposure also inhibits a child's ability to engage in music improvisation and creation. Although some parents and teachers may argue that creating and improvising music is not an important life skill for children to develop, according to Gordon, limiting early exposure and education permanently impacts a young child's future musical abilities and potential. Whether promoting musical development in early childhood is deemed valuable enough for its own sake by administrators, professionals, and parents that work with young children, there is evidence that supports the positive effects of music intervention on

speech and language development (along with several other benefits). Therefore, an increase in professional development and teacher training in music education for young children is definitely warranted.

References

- Aro, T., Laakso, M., Määttä, S., Tolvanen, A., & Poikkeus, A. (2014). Associations between toddler-age communication and kindergarten-age self-regulatory skills. *Journal of Speech, Language, and Hearing Research, 57*(4), 1405-1417.
- Bolduc, J., & Evrard, M. (2017). Music education from birth to five: An examination of early childhood educators' music teaching practices. *Research and Issues in Music Education, 13*(1).
- Bond, V. L. (2012). Music's representation in early childhood education journals: A literature review. *Update: Applications of Research in Music Education, 31*(1), 34-43.
- Bugos, J. A., & DeMarie, D. (2017). The effects of a short-term music program on preschool children's executive functions. *Psychology of Music, 45*(6), 855-867.
- Chiang, H., Walsh, E., Shanahan, T., Gentile, C., Maccarone, A., ... & Waits, T. (2017). *An exploration of instructional practices that foster language development and comprehension: Evidence from prekindergarten through grade 3 in title I schools. NCEE 2017-4024*. National Center for Education Evaluation and Regional Assistance.
- Cooper, S., & Cardany, A. B. (2008). Making connections: Promoting music making in the home through a preschool music program. *General Music Today, 22*(1), 4-12.
- Gooch, D., Thompson, P., Nash, H. M., Snowling, M. J., & Hulme, C. (2016). The development of executive function and language skills in the early school years. *Journal of Child Psychology & Psychiatry, 57*(2), 180-187.
- Gordon, E. E. (2013). *Music learning theory for newborn and young children*. Chicago, IL: GIA Publications, Inc.

- Harris, D. J. (2011). Shake, rattle and roll--can music be used by parents and practitioners to support communication, language and literacy within a pre-school setting? *Education 3-13*, 39(2), 139-151.
- Hoff, E. (2009). *Language development at an early age: Learning mechanisms and outcomes from birth to five years*. Retrieved August 23, 2016, from <http://www.child-encyclopedia.com/language-development-and-literacy/according-experts/language-development-early-age-learning>.
- Hudson, S., Levicks, P., Down, K., Nicholls, R., & Wake, M. (2015). Maternal responsiveness predicts child language at ages 3 and 4 in a community-based sample of slow-to-talk toddlers. *International Journal of Language & Communication Disorders*, 50(1), 136-142.
- Kuder, S. J. (2012). *Teaching students with language and communication disabilities*. (4th ed.) New York: Pearson.
- Kuhn, L. J., Willoughby, M. T., Wilbourn, M. P., Vernon-Feagans, L., & Blair, C. B. (2014). Early communicative gestures prospectively predict language development and executive function in early childhood. *Child Development*, 85(5), 1898-1914.
- Lefevre, M. (2004). Playing with sound: The therapeutic use of music in direct work with children. *Child and Family Social Work*, 9(4), 333-345.
- Lorenzo, O., Herrera, L., Hernández-Candelas, M., & Badea, M. (2014). *Influence of music training on language development. A longitudinal study*. Doi: <https://doi.org/10.1016/j.sbspro.2014.03.200>.

- Malloch, S., Shoemark, H., Crncec, R., Newnham, C., Paul, C., Prior, M., ... & Burnham, D. (2012). Music therapy with hospitalized infants: The art and science of communicative musicality. *Infant Mental Health Journal, 33*(4), 386-399.
- Marotz, L. R., & Allen, K. E. (2016). *Developmental profiles* (8th ed.). Boston, MA: Cengage Learning.
- Marshall, J., & Lewis, E. (2014). 'It's the way you talk to them.' The child's environment: Early years practitioners' perceptions of its influence on speech and language development, its assessment and environment targeted interventions. *Child Language Teaching & Therapy, 30*(3), 337-352.
- Massey, S. L. (2013). From the reading rug to the play center: Enhancing vocabulary and comprehensive language skills by connecting storybook reading and guided play. *Early Childhood Education Journal, 41*(2), 125-131.
- Merriam-Webster Inc. (2019). Retrieved September 29, 2019, from <https://www.merriam-webster.com/>.
- Moreno, S., Bialystok, E., Barac, R., Glenn Schellenberg, E., Cepeda, N. J., & Chau, T. (2011). Short-term music training enhances verbal intelligence and executive function. *Psychological Science (11)*, 1425.
- Moritz, C., Yampolsky, S., Papadelis, G., Thomson, J., & Wolf, M. (2013). Links between early rhythm skills, musical training, and phonological awareness. *Reading and Writing: An Interdisciplinary Journal, 26*(5), 739-769.

National Association for Music Education. (2018). *2014 music standards (PK-8 general music)*.

Retrieved August 22, 2018, from <https://nafme.org/my-classroom/standards/core-music-standards/>.

Peterson, S. S., McIntyre, L. J., & Forsyth, D. (2016). Supporting young children's oral language and writing development: Teachers' and early childhood educators' goals and practices.

Australasian Journal of Early Childhood, *41*(3), 11-19.

Pitts, S. E. (2016). Music, language and learning: Investigating the impact of a music workshop project in four English early years settings. *International Journal of Education & the Arts*, *17*(19-20), 1-25.

Rajan, R. S. (2017). Preschool teachers' use of music in the classroom: A survey of park district preschool programs. *Journal of Music Teacher Education*, *27*(1), 89.

Runfola, M., Etopio, E., Hamlen, K., & Rozendal, M. (2012). Effect of music instruction on preschoolers' music achievement and emergent literacy achievement. *Bulletin of the Council for Research in Music Education*, *192*, 7-27.

Salmon, A. (2010). Using music to promote children's thinking and enhance their literacy development. *Early Child Development and Care*, *180*(7), 937-945.

Samuelsson, I. P., Carlsson, M. A., Olsson, B., Pramling, N., & Wallerstedt, C. (2009). The art of teaching children the arts: Music, dance and poetry with children aged 2–8 years old.

International Journal of Early Years Education, *17*(2), 119-135.

Scott, L. K. (2004). Early childhood brain development and elementary music curricula: Are they in tune? *General Music Today*, *18*(1), 20-27.

- Seeman, E. (2008). *Implementation of music activities to increase language skills in the at-risk early childhood population*. (Master of Arts).
- Snow, P. C., Eadie, P. A., Connell, J., Dalheim, B., McCusker, H. J., & Munro, J. K. (2014). Oral language supports early literacy: A pilot cluster randomized trial in disadvantaged schools. *International Journal of Speech-Language Pathology*, *16*(5), 495-506.
- Szabo, M. (1999). Early music experience and musical development. *General Music Today*, *12*(3), 17-19.
- Yazejian, N., & Peisner-Feinberg, E. S. (2009). Effects of a preschool music and movement curriculum on children's language skills. *NHSA Dialog*, *12*(4), 327-341.