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The Effect of the Missouri Preschool Program
on School Readiness

by

Madeline June Allin

August 5, 2020

A Dissertation submitted to the Education Faculty of Lindenwood University in

partial fulfillment of the requirements for the degree of

Doctor of Education

School of Education

The Effect of the Missouri Preschool Program
on School Readiness


by

Madeline June Allin

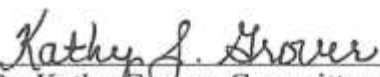
This Dissertation has been approved as partial fulfillment
of the requirements for the degree of
Doctor of Education
Lindenwood University, School of Education



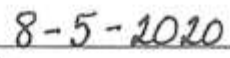
Dr. Shelly Fransen, Dissertation Chair



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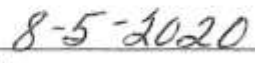
Dr. Kathy Grover, Committee Member



Date



Dr. Sherry DeVore, Committee Member



Date

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work at Lindenwood University and that I have not submitted it for any other college or university course or degree.

Full Legal Name: Madeline June Allin

Signature: Madeline June Allin Date: August 5, 2020

Acknowledgements

I would like to extend my sincere and heartfelt thanks to all the persons on my committee who guided me through this doctoral journey. To the head of my committee, Dr. Shelly Fransen, I express my gratitude and appreciation for always being willing and enthusiastic to assist me on this journey. Dr. Fransen provided me with consistent encouragement, guidance, and support and was unmatched in her positivity; she was my cheerleader. I am also indebted to Dr. Kathy Grover for her constant availability and eagerness to share her broad knowledge of statistics with me as I traversed my research design. Dr. Grover's kind and encouraging words were greatly valued. I also extend my gratitude to Dr. DeVore, whose exacting standards pushed me to reach new personal heights of scholarship. The completion of my doctoral journey would not have been possible without these dedicated professors.

To my caring, loving, and supportive family go my deepest reverence and gratitude. Your encouraging words through difficult and exhausting times will always be remembered and appreciated. Heartfelt gratitude goes out to my dear friend, Mary Jo Green, whose inspiring words of encouragement instilled confidence in me throughout this entire doctoral journey. I am eternally grateful to her for the gentle invitations extended to me to grow and dream big.

And last but not least, I give thanks to my Lord and Savior whose grace and blessings have embraced and sustained me on this doctoral journey. "I can do all things through Christ who strengthens me" – Philippians 4:13.

Abstract

National policymakers, practitioners, and researchers have consistently questioned how to develop the necessary skills for the nation's youth to meet the challenges of the 21st century. The answer points directly to the provision of high-quality early childhood programs to prepare children for entrance to kindergarten and put them on a trajectory toward lifelong positive outcomes (Ferrarello, 2017; Phillips et al., 2017). The Missouri Preschool Program is a high-quality, state grant-funded program, with grant priority given to schools serving a large number of disadvantaged children (MODESE, 2018a). The purpose of this quantitative causal-comparative study was to compare the school readiness skills of four-year-old children who participated in a Missouri Preschool Program to the school readiness skills of their peers who did not participate in a Missouri Preschool Program as measured by the Developmental Indicators for the Assessment of Learning Fourth Edition (DIAL-4) instrument in the five domains of school readiness. A two-tailed *t*-test was performed on de-identified secondary data sets collected from two school districts in southwest Missouri. With the level of significance set at $\alpha = .05$, the results indicated the mean scores of the Missouri Preschool Program participants were significantly higher than the non-Missouri Preschool Program participants in each of the skill domains of motor, concepts, language, self-help, and social-emotional. These findings are consistent with the mounting evidence of researchers who have documented the value of quality early childhood programs not only for promoting school readiness but for providing long-lasting positive effects, especially for economically disadvantaged children (Bakken, Brown, & Dowling, 2017; Ferguson, 2018).

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Chapter One: Introduction

Early childhood education has been developing and evolving for centuries with contributions from countless expert scientists, philosophers, and theorists (Follari, 2019; Morrison, 2017). Persuasive scientific evidence has led nations worldwide to invest in early childhood education and has guided the establishment of policy and programs (Stansbery, 2018). Because of global competition, an increased focus on early childhood education has developed worldwide in the 21st century (Garvis, Phillipson, & Harju-Luukkainen, 2018). Nations have come to accept the premise that the greater the investment in early childhood education, the stronger and healthier a nation becomes (Powers & Devercelli, 2016). The vital contribution of high-quality early childhood education to brain development, school readiness, later academic success, positive health results, and comprehensive national economic growth has been established (Black et al., 2017; Devercelli, 2017).

Early childhood education has become nationally recognized as the foundation for academic success in school and has been linked to short- and long-term social and economic outcomes (Elango, Hojman, García, & Heckman, 2017; Morrison, 2017; Workman & Troe, 2017). The United States Department of Education (USDOE) (2015) confirmed that for every dollar spent on early childhood education, society saves \$7 due to a reduction in spending on public programs (para. 4). Heckman (2017) found high-quality early childhood programs can provide a 13% annual return on investment, much higher than the previously established return of 7% to 10% (para. 1). Lifetime benefits of participation in high-quality early childhood programs include better health, enhanced

employment opportunities, higher earnings, lower crime rates, and reduced dependency on welfare programs (Devercelli, 2017; Grossberg, 2018).

Currently, four-year-old students are served in state-funded preschool programs in 44 states and the District of Columbia (Friedman-Krauss et al., 2019, p. 7). The Missouri Preschool Program is a state-funded grant program intended to give school districts the opportunity to develop quality early childhood programs (Missouri Department of Elementary and Secondary Education [MODESE], 2018a). The state-funded Missouri Preschool Program grant gives funding priority to districts whose programs serve disadvantaged children (MODESE, 2018a). The Missouri Preschool Program was implemented in 1998, and the most recent evaluation of the program occurred in 2003 (Barnett, Carolan, Fitzgerald, & Squires, 2016; Thornburg, Mayfield, Watson, Matthews, & Fuger, 2003). Following the 2003 evaluation, Thornburg et al. (2003) determined the Missouri Preschool Program's quality was high with a significant positive effect on school readiness. Thornburg et al. (2003) concluded monies were not required to make the program more effective, but the overriding need was to increase the funding investment in the Missouri Preschool Program so that more significant numbers of children could attend and subsequently enter kindergarten with the skills needed to learn.

Presented in this chapter is the background of the study. In this section, a brief discussion of the Missouri Preschool Program is offered. Next, the theoretical framework selected to underpin the study, constructivism, is provided. The problem and the purpose of the study are described, and the research questions and hypotheses, which were designed to guide the study, are stated. The significance of the study is then explained.

In addition, the key terms relevant to the study are defined, followed by identification of the delimitations, limitations, and assumptions.

Background of the Study

The fundamental concept of early childhood education came to the United States from Europe within the first part of the 20th century during the Industrial Revolution (Lipoff, 2011). Termed infancy schools, early childhood centers were created in churches and private homes to provide care for young children while parents worked in factories (Lipoff, 2011). For the United States, early childhood education did not become a paramount movement until the latter part of the 20th century (Morrison, 2017). Since then, the United States government has made a determined effort to promote high-quality early childhood programs to ensure all children enter school ready to learn (Bivens, Garcia, Gould, Weiss, & Wilson, 2016). Researchers have presented compelling evidence that quality early intervention has a positive impact on school readiness and development in the areas of cognitive ability and social-emotional skills (Barnett et al., 2018).

President Lyndon Baines Johnson, in his first State of the Union Address in January 1964, proclaimed a war on poverty (United States Department of Health and Human Services [USDHHS], 2019a). Soon after, a panel of child development experts was assembled by Sargent Shriver to create an early childhood development program for disadvantaged preschool children (USDHHS, 2019b). These experts designed the Head Start program “to help break the cycle of poverty, [by] providing preschool children of low-income families with a comprehensive program to meet their emotional, social, health, and psychological needs” (USDHHS, 2019b, para. 2). The first Elementary and

Secondary Education Act was signed in 1965 by President Johnson, who believed a primary national priority should be a commitment to provide all students with an equal educational opportunity (USDOE, 2016).

From the Elementary and Secondary Education Act came the implementation of Head Start in the summer of 1965 to provide disadvantaged children a literal head start in school (Morrison, 2017). At the program's launching, President Johnson stated, "We have taken up the age-old challenge of poverty, and we don't intend to lose generations of our children to this enemy of the human race" (as cited in Mead, 2017, para. 1). In 2007, the Head Start program was reauthorized with passage of the Improving Head Start for School Readiness Act, which included many new policies to heighten the quality of the program (Morrison, 2017; USDHHS, 2019b). The Head Start program has served over 36 million preschool children since its inception in 1965 and today serves annually more than one million children in all 50 states, including the District of Columbia and U.S. territories (USDHHS, 2019b, para. 6).

President George W. Bush reauthorized the Elementary and Secondary Education Act in 2002 and enacted the No Child Left Behind (NCLB) Act, which advanced the strongly held belief that every child should enter school ready to learn (USDOE, 2016). The aims of the NCLB Act were to elevate the quality of education, especially for disadvantaged children, and to advance the accountability of schools for student achievement (Follari, 2019). It was a significant step forward for children, as the NCLB act generated assistance regardless of "race, income, zip code, disability, home language, or background" (USDOE, 2016, para. 4). One of the main pillars of the NCLB Act was support for early childhood learning to ensure all children acquired the readiness skills to

enter school and experience success (USDOE, 2003). Researchers established that if children are provided with instruction in reading skills in the early years, they will be more successful in school in later years (USDOE, 2003).

The NCLB Act sanctioned the Early Reading First program to assist preschools with funding, especially those serving children from low-income homes (National Conference of State Legislators [NCSL], 2019b; USDOE, 2003). The Early Reading First program was designed to specifically support the direct instruction of cognitive, language, and early reading skills to ensure young children began school with the skills necessary for academic success (NCSL, 2019b; USDOE, 2003). The Early Reading First program included early childhood programs with scientifically-based professional development, instructional materials, and activities to help young children obtain the necessary skills to attain maximum reading development in kindergarten and beyond (NCSL, 2019b; USDOE, 2003). The NCLB Act also authorized an independent assessment of the Early Reading First program (USDOE, 2003). The 2007 Reading First Impact Study Final Report indicated the Reading First program had significant positive impacts on teacher professional development, which in turn affected language and reading instructional practices; however, data revealed identification of letters and words were improved, but phonological skills and reading comprehension were not (Morrison, 2017).

The NCLB Act was scheduled for revision in 2007 but was not considered for reauthorization until President Obama recognized in 2010 the need to create a new law to adequately prepare students to succeed (USDOE, 2016). President Obama signed the Every Student Succeeds Act (ESSA) on December 10, 2015, which reauthorized the 50-

year-old Elementary and Secondary Education Act and recommitted the USDOE to equal opportunity for all students (USDOE, 2016). The ESSA incorporated a pivotal provision to sustain and expand the government's historic investments in increasing access to high-quality preschool (Morrison, 2017; Sharp, 2016). Although more federal dollars are allocated for early childhood programs than ever before, many are unsure about the future funding of early childhood education (Grossberg, 2018). A large portion of educational authority was repositioned back to governing state offices and local school agencies when the ESSA was passed in 2015 (Sharp, 2016). President Obama left a long-lasting contribution to the augmentation of the governance of education to the states (McGuinn, 2016). This recent change in federal policy indicates the future of early education depends on the future funding investment of state governments (Friedman-Krauss et al., 2018).

The Missouri Preschool Program is one of 44 state-funded early childhood programs (Friedman-Krauss et al., 2019, p. 7). The Missouri Preschool Program began serving three- and four-year-old children in 1998 by providing funding to 54 school districts with the passage of House Bill 1519 (Barnett et al., 2016). Funding for the Early Childhood Development Education and Care Act is generated from the tobacco settlement fund and general state revenue (Barnett et al., 2016). Originally a three-year grant, the Missouri Preschool Program is now a five-year renewable grant to establish or expand early childhood programs for children who are one or two years from being eligible to attend kindergarten (MODESE, 2018a).

Programs serving large numbers of children from low-income families and children with special needs receive priority for grant funding (Friedman-Krauss et al.,

2018). Payment from parents is required on a sliding scale based on criteria, including eligibility for free or reduced-price meals (Friedman-Krauss et al., 2019). The Missouri Preschool Program must be in session 6.5 hours per day, five days per week, 12 months a year, and limit class sizes to 20 children with a teacher certified in early childhood education (MODESE, 2019b, p. 2). Regular site visits are scheduled, and classroom assessments are tracked using the Early Childhood Environment Rating Scale-3 (ECERS-3), which assesses the environmental areas of cognitive, social-emotional, motor, and health (Friedman-Krauss et al., 2019).

State policymakers cut funding for the Missouri Preschool Program in 2012 to transfer additional funding to the Parents as Teachers program (Barnett et al., 2016). In 2014-2015, Missouri legislators improved the Missouri ranking in early childhood funding to 31st out of 43 states with a 73% increase of \$5.7 million (Barnett et al., 2017, p. 108). Now despite the need for increased funding, a decrease of almost \$4 million over the past few years has Missouri ranked 38th out of 44 state-funded programs in early childhood spending (Barnett et al., 2017, p. 108; Friedman-Krauss et al., 2018, p. 111).

Theoretical Framework

The theory of constructivism was selected to frame this study on school readiness. Project Construct was developed by the MODESE in 1986 to provide a child-centered early childhood education model (Project Construct National Center, 2014b). Project Construct is a MODESE-approved early childhood curriculum for the Missouri Preschool Program, and its curriculum standards coincide with the Missouri Learning Standards (MODESE, 2018b; Kirksville R-III Schools, 2018). Three other approved curriculums are child-centered and based on constructivist learning in state-funded Missouri

Preschool Programs: Creative Curriculum, Emerging Literacy and Language, and High/Scope (MODESE, 2018b).

The Project Construct framework, which is drawn from the constructivist theory of learning and development, is organized into four domains: sociomoral, cognitive, representational, and physical (Project Construct National Center, 2014a). Project Construct is rooted in the theory of constructivism, which assumes children are active participants in constructing their learning within their physical and social environments (Dalcour, 2019; Project Construct National Center, 2014b). Constructivism is a cognitive process of making meaning through interaction with the world and is a social activity that involves interaction and collaboration within the community environment (Alanazi, 2016).

Children are central in the learning process and actively construct their knowledge through observation and discovery learning (Aljohani, 2017; Dalcour, 2019). The theory of constructivism contends children are active learners and not passive recipients of knowledge (Alanazi, 2016). In that sense, children are responsible for their learning, and the teacher acts only as a facilitator and provider of guidance (Alanazi, 2016; Dalcour, 2019). The theory of constructivism is heavily embedded in the Missouri Preschool Program standards for high-quality preschool programs. Therefore, the theoretical framework of constructivism was selected to guide this study on school readiness.

Constructivism is grounded in the research of the two most-recognized developmental theorists of the 20th century, Jean Piaget and Lev Vygotsky (Dalcour, 2019; Ekpenyong & Edokpolor, 2016; Ozturk, 2016; Thompson, 2018). There are two education approaches to constructivism: Piaget's theory of cognitive constructivism and

Vygotsky's theory of social constructivism (Ekpenyong & Edokpolor, 2016; Ozturk, 2016; Scholnik, Kol, & Abarbanel, 2016). These two approaches are not independent of each other as both theorists asserted belief in the basic concept that children learn by actively participating in constructing their knowledge (Ekpenyong & Edokpolor, 2016; Scholnik et al., 2016).

Piaget, a Swiss psychologist, spent his life examining the cognitive development of children through observational and experimental studies (Follari, 2019; Morrison, 2017; Thompson, 2018). Piaget's (1936) major theoretical principle was that children are consistently seeking knowledge and are the active creators of knowledge through direct interaction with the physical environment (Morrison, 2017). Through his observations, Piaget (1936) developed a four-stage theory of cognitive or intelligence development.

Piaget's (1936) four stages of development include sensorimotor (birth to 2 years), preoperational (2 to 7 years), concrete operations (7 to 11 years), and formal operations (11 and up) (Anastasia, 2018; Cherry, 2018a; Lindsay, 2018). Piaget (1936) believed all children move through the stages of development in the same order, but the age of the children progressing through the stages might vary (Anastasia, 2018; Carpendale & Lewis, 2018; Morrison, 2017; Shroff, 2017). Piaget (1936) explained that as children move through the cognitive stages, knowledge is developed through the interaction of the mental constructs of existing schemas, assimilation, accommodation, and equilibrium (Carpendale & Lewis, 2018; Cherry, 2018a; Follari, 2019).

Vygotsky (1978), a Russian psychologist, placed greater emphasis on social development than his contemporary theorist Piaget (Thompson, 2018). Vygotsky (1978) characterized learning as preceding development and occurring through social interaction

and language in an environmental and cultural context (Ekpenyong & Edokpolor, 2016; Thompson, 2018). Vygotsky (1978) asserted, “Learning awakens a variety of developmental processes that are able to operate only when the child is interacting with people in his environment and in collaboration with his peers” (p. 244). Vygotsky (1978) suggested social interchange guides a child’s learning processes and formation of knowledge with language playing a critical role in cognition.

Vygotsky (1978) developed two key social constructivist concepts: zone of proximal development and scaffolding (McLeod, 2018b; Morrison, 2017). The zone of proximal development constitutes the space between what a learner cannot do alone and what he or she can accomplish with guidance and help from a more-skilled peer or adult (Cherry, 2019d; McLeod, 2018b; UK Essays, 2016; Vygotsky, 1978). The concept of scaffolding is defined as the assistance of the teacher or another more-knowledgeable adult or peer to help a child complete a task or acquire knowledge he or she cannot perform or understand independently (McLeod, 2018b; Vygotsky, 1978). Although underlying differences are evident between Piaget’s (1936) belief that active learning and self-discovery are crucial with the teacher serving only as a facilitator and Vygotsky’s (1978) belief that social development is essential and the teacher is necessary to guide learning, both provided the foundation for the theory of constructivism (Ekpenyong & Edokpolor, 2016; Thompson, 2018).

Statement of the Problem

Recognizing the benefits of early education, state policymakers are taking notice and realizing financial support of early childhood programs is a cost-effective foundation for school success (Morrison, 2017). The Missouri Preschool Program is a high-quality,

grant-funded program through House Bill 1519 (MODESE, 2018a). Unfortunately, Missouri has significantly reduced funding compared nationally and to neighboring states (Curtis, 2016).

Senator Nasheed characterized the need for more to be done with the following statement, “I can truly say that the state of Missouri is not doing nearly enough when it comes to early childhood education. Right now, we spend approximately \$37 million on early childhood education, and that is appalling” (as cited in Curtis, 2016, para. 9). According to a 2017 National Institute for Early Education Research report, Missouri served only 2.5% of its four-year-old children in public preschools compared to neighboring states serving between 31% and 73% (Friedman-Krauss et al., 2018, p. 24).

Friedman-Krauss et al. (2018) tracked state-funded preschool programs in *The State of Preschool 2017 National Institute for Early Education Research Annual Report* and found most states do not adequately fund preschool programs and invest too little too late to prepare children for entrance to kindergarten. The ESSA makes it clear early education is dependent on the states (Friedman-Krauss et al., 2018; USDOE, 2018b). Missouri’s legislators have decreased state funding for preschool, and enrollment is very low (Delaney, 2018; Friedman-Krauss et al., 2018; Nelson, 2018). Friedman-Krauss et al. (2018) reported Missouri policymakers cut preschool funding by \$4 million (18%) and state spending per child by \$1,000 to \$3,667, well below the national average, which ranked the Missouri Preschool Program nationally at 42nd out of 44 states in access to four-year-old children and 38th out of 44 in allocated spending (pp. 111-112).

Senior Co-Director Barnett stated:

Our report highlights which states invest best in their young children and which leave too many children behind. Missouri is at serious risk of leaving children behind. The state needs to increase its pre-K investments so more children can benefit from high-quality early learning opportunities. (as cited in the National Institute for Early Education Research [NIEER], 2018, para. 4)

Missouri does have Parents as Teachers, the Missouri Preschool Project, and quality early education programs across the state, but many programs are struggling to survive, and investments in early learning are less than adequate (Curtis, 2016).

In addition, even though Missouri policymakers, educators, parents, and community leaders continue to emphasize the importance of early childhood education, Missouri has not conducted a comprehensive evaluation of the Missouri Preschool Program in over 17 years (Thornburg et al., 2003). In this Missouri-based study, Thornburg et al. (2003) determined the quality of the Missouri Preschool Program to be high and asserted monies were not needed to make the program's quality better. The need was to increase investment in the Missouri Preschool Program so more children could be served to ensure school readiness for all (Thornburg et al., 2003).

Purpose of the Study

The attention of policymakers, educators, and researchers has been on how to develop necessary skills in the nations' youth to meet the challenges of the 21st century with the answer pointing directly to how well early childhood programs prepare young children to enter kindergarten (Ferrarello, 2017; Phillips et al., 2017). Therefore, the purpose of this quantitative causal-comparative study was to examine the school readiness skills of four-year-old children who participated in a Missouri Preschool

Program as compared to the school readiness skills of their peers who did not participate in a Missouri Preschool Program. The readiness skills assessed included the domains of motor, concepts, language, self-help, and social-emotional as measured by the Developmental Indicators for Assessment of Learning-Fourth Edition (DIAL-4) (Pearson Education, Incorporated, 2018). Nationally the focus of current research is on preschool education's effect on school readiness for kindergarten, particularly for disadvantaged children (Attanasio, Cattan, & Krutikova, 2016; Joughin, 2018; Ma, Nelson, Shen, & Krenn, 2015).

Research questions and hypotheses. The following research questions guided the study:

1. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of motor for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

H_{1o}: There is no statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of motor for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

H_{1a}: There is a statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of motor for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

2. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of concepts for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

H2₀: There is no statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of concepts for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

H2_a: There is a statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of concepts for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

3. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of language for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

H3₀: There is no statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of language for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

H3_a: There is a statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of language for children who participated in a

Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

4. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness domain of self-help provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program?

H4₀: There is no statistical difference between the DIAL-4 scores for the kindergarten readiness domain of self-help provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program.

H4_a: There is a statistical difference between the DIAL-4 scores for the kindergarten readiness domain of self-help provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program.

5. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness domain of social-emotional provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program?

H5₀: There is no statistical difference between the DIAL-4 scores for the kindergarten readiness domain of social-emotional provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program.

H5_a: There is a statistical difference between the DIAL-4 scores for the kindergarten readiness domain of social-emotional provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program.

Significance of the Study

Funding for state early childhood programs is a tangled network which comprises various levels of government, funding sources, and competing priorities (Parker, Diffey, & Atchison, 2018). Therefore, the results of this study will assist Missouri educators, community leaders, and government policymakers in making informed decisions about the Missouri Preschool Program. Facing tight budgets, state and community practitioners and policymakers have a critical role in providing funding for supporting the school readiness of children through quality early childhood programs (McCormick, Hsuch, Weiland, & Banger, 2017; National School Readiness Indicators Initiative, 2006).

Practitioners and policymakers acknowledge the significance of the sensitive early years and the need for quality early childhood programs, but these stakeholders require measurable data-driven evidence to base their decisions for the funding allocations and design of programs (NCSL, 2019a). The research is significant because educators will be provided current evidence-based data on the impact of a high-quality early childhood program, the Missouri Preschool Program, on the students' readiness to enter kindergarten. The research results of this study will add new empirical statistics to a 2003 Missouri state mandated study of the Missouri Preschool Program effect on school readiness skills, which included the measures of cognitive and social-emotional

skills between Missouri Preschool participants and their non-participant peers (Thornburg, 2003).

The National School Readiness Indicators Initiative (2006) stated the concept of school readiness is important because a child's early experiences influence the future development of school success and set the stage for future positive life outcomes. Early childhood experiences are crucial to brain development and establishing the neural connections for the foundation of the multiple facets of school readiness—motor, language, concepts, and social skills (AAP Council on Early Childhood and AAP Council on School Health, 2016; National School Readiness Indicators Initiative, 2006; Riley & Terada, 2019). High-quality early childhood education is increasingly recognized as crucial to advancing child development and ensuring children enter school ready to learn (Elango et al., 2017; Morrison, 2017; Pianta, Downer, & Hamre, 2016; Workman & Troe, 2017). By providing children a high-quality early childhood education, there is the potential to generate economic returns, which not only benefit children but society at large (Heckman, 2017).

Additionally, the findings from this study address a gap in the research by comparing preschool participants and non-participants in the domains of social-emotional and self-help functions. There is a large body of research that indicates early childhood education affects school readiness academically, especially in the academic areas of cognition and language (Barnett et al., 2018; Brotto, 2018; Phillips et al., 2017). Although, readiness is more complex than children knowing their ABC's, numbers, letters, colors, and being able to write their names (Sahin, Sak, & Tuncer, 2013).

Dr Jessica Alvarado stated that early childhood is more than a time to learn basic academic skills but is also a time when children learn those essential social-emotional skills (as cited in National University, 2020). Brotto (2018) argued, “Although the vast majority of education stakeholders agree social-emotional learning is important, it has remained on the sidelines while education leaders have instead focused on academics alone—as opposed to the development of the whole child” (para. 11). According to brain research, the development of the young child’s social-emotional learning is crucial to a healthy state of mind (AAP Council on Early Childhood and AAP Council on School Health, 2016; Riley & Terada, 2019). Research indicates young children who are healthy mentally demonstrate more happiness, have more motivation to learn, are more apt to engage with others, have a more positive attitude to school, and ultimately perform better academically (Kostelnik, Soderman, Whiren, Rupiper, Gregory, 2015; Rosin, Corcoran, Cheung, & ChenXie, 2018). A sizable amount of research measures self-regulatory skills and attentiveness, but few studies examine the school readiness domains of social-emotional and self-help skills (Meloy, Gardner, & Darling-Hammond, 2019).

Definition of Key Terms

The following terms are defined:

Developmental Indicators for the Assessment of Learning-Fourth Edition.

The Developmental Indicators for the Assessment of Learning-Fourth Edition (DIAL-4) is a developmental screening instrument used to identify the strengths and needs of young children and to help predict a child’s success in the classroom (Mardell & Goldenberg, 2016a). The DIAL-4 is used to test a child’s skills in the domains of motor, concepts, and language as well as the skill domains of self-help and social-emotional as measured

by a parent questionnaire (Mardell & Goldenberg, 2016a). The five domains of the DIAL-4 align with the early childhood development standards and domains of the National Educational Goals Panel and the National Association for the Education of Young Children (Mardell & Goldenberg, 2019). The DIAL-4 has been normed on a national representative sample and provides standard scores and percentile ranks by age (Pearson Education, Incorporated, 2018).

Early childhood education. Early childhood education programs prepare young children, ages 3 to 5, for the transition to kindergarten (Sutton, 2019). The term early childhood education is also commonly used to refer to preschool or pre-kindergarten programs (Morrison, 2017).

Missouri Preschool Program. The Missouri Preschool Program is a grant-funded program to provide school districts the “opportunity to create or expand high-quality early care and education programs for children who are one or two years from kindergarten eligibility” (MODESE, 2018a, para. 1).

School readiness. School readiness for children is defined as being prepared for school in key developmental domains, including language, cognitive, motor, social-emotional, and physical well-being (MODESE, 2019c).

Delimitations, Limitations, and Assumptions

The scope of the study was bounded by the following delimitations:

Time frame. The secondary data in this quantitative study included DIAL-4 scores from two participating Missouri Preschool Program school districts that administered the DIAL-4 in the spring of 2018 and 2019. These secondary data were

collected from elementary school principals or early childhood administrators in the fall of 2019.

Location of the study. The location for this quantitative study was the southwest Missouri geographic area, which included school districts that participated in the Missouri Preschool Program for four-year-old students.

Sample. The sample population included children who had participated in a Missouri Preschool Program and their peers who had not participated in a Missouri Preschool Program. The sample children were of kindergarten-eligible age.

Criteria. The criteria essential for this study was participation in a Missouri Preschool Program for two years, 2017-2018 and 2018-2019, and the use of the DIAL-4 instrument as a screening device to measure readiness for kindergarten.

The following limitations were identified in this study:

Sample demographics. The two schools from which the sample was taken are predominately rural with moderate to high free/reduced-price meal rates, which may limit the applicability of the results of this study to other regions of Missouri comprised of urban or suburban areas with higher socioeconomic standards.

Information on non-Missouri Preschool Program peers. An additional limitation was the information available regarding students in the peer group who had not participated in a Missouri Preschool Program. Little or no record-keeping of their education prior to kindergarten existed; therefore, information on attendance at a public Head Start program, a private early childhood program, or no program prior to kindergarten entrance was virtually unattainable.

The following assumptions were identified in this study:

Secondary de-identified data. In this study, it was assumed the secondary de-identified DIAL-4 data from the motor, language, concepts, self-help, and social-emotional domains were collected by certified school district designees and reflected the actual authentic scores of Missouri Preschool Program participants and non-Missouri Preschool Program participants. In addition, it was assumed confidentiality was maintained in the collection and reporting of data.

Self-reported data. In this study, it was assumed the parents of participants responded honestly and truthfully when sharing their perceptions for the DIAL-4 questionnaire domains of self-help and social-emotional.

Summary

Provided in Chapter One were descriptions of the background of the study, the theoretical framework, and the statement of the problem. The purpose of the study and the research questions were introduced. Next, the significance of the study and the key definitions were included. Finally, the delimitations, limitations, and assumptions were detailed.

The next chapter includes an in depth review of the theoretical framework. A review of current literature on the topic of the effect of early childhood education on school readiness is presented. The literature review consists of an examination of the biographical history of early childhood pedagogy; school readiness; neuroscience of early childhood development; and early childhood longitudinal, meta-analytic, and state-funded studies.

Chapter Two: Review of Literature

Early childhood education has been identified by the federal government and Missouri policymakers as an area of focus to ensure all young children enter school ready to learn (MODESE, 2018a; USDOE, 2018a). Early childhood programs are publicly funded in 44 states and the District of Columbia and serve 1.5 million children (Friedman-Krauss et al., 2019, p. 14). The Missouri Preschool Program is one of the state-funded programs serving three- and four-year-old students (MODESE, 2018a). The Missouri Preschool Program is of high quality, but the primary need is to expand funding to ensure school readiness for all Missouri children (Friedman-Krauss et al, 2018). Despite the need for increased funding, Missouri legislators have actually decreased funding (Barnett, Friedman-Krauss, et al., 2017; Friedman-Krauss et al., 2018). There is a need to evaluate the impact of the preschool experience so policymakers can better determine how to distribute financial resources, especially to those populations in greatest need (Attanasio et al., 2016; Ma et al., 2015).

Within this chapter, the theoretical framework of constructivism is presented. The biographical history of early childhood education is chronicled in the review of literature. School readiness is examined, which includes defining its scope and summarizing the four conceptualized school readiness interpretations. A review of the neuroscience of early childhood development, birth through age five, is presented. Included in the review is an examination of three areas of previous early childhood research: longitudinal studies, meta-analytic studies, and state-funded studies.

Theoretical Framework

Developed by the MODESE in 1986, Project Construct is an early childhood child-centered curriculum model (Project Construct National Center, 2014b). The Project Construct National Center (2014b) specified:

Project Construct is derived from constructivism—the theoretical view that learners construct knowledge through interactions with the physical and social environments. The constructivist theory assumes that learning is due more to the reorganization of ways of thinking, of building upon the “known,” than to development alone or the accumulation of facts alone. (para. 2)

Constructivism is based on the premise that children construct knowledge by building upon past knowledge through active participation in observation and discovery learning (Alanazi, 2016). The child is central to constructivism as he or she constructs cognitive and social development (Dalcour, 2019; Suhendi & Purwano, 2018). Teachers are but facilitators and assume the role of guidance in the child-centered constructivist learning process, a theory of the procurement of knowledge by discovery (Alanazi, 2016; Dalcour, 2019). Children are not passive learners but are guided by their curiosity rather than direct instruction (Dalcour, 2019).

The guiding principles of Project Construct are founded in the constructivist theory and are formulated into four specific descriptions of child development (Project Construct National Center, 2014a). The guiding principles are described as follows:

Principle 1. Children have an intrinsic desire to make sense of their world.

Principle 2. Children actively construct knowledge and values by interacting with the physical and social worlds.

Principle 3. In their universal effort to understand the world, children's thinking will contain predictable errors.

Principle 4. Children's development is an interactive and interrelated process and spans the Sociomoral, Cognitive, Representational, and Physical Development domains. (Project Construct National Center, 2014a, p. 1)

The Project Construct method is congruous with early childhood developmentally appropriate practice, and its learning and curriculum standards are consistent with the Missouri Early Learning Standards (Kirksville R-III Schools, 2018). Project Construct is an approved curriculum of the Missouri Early Learning Department to be used at any state-funded Missouri Preschool Program site (MODESE, 2018a). Since Project Construct is deeply embedded in the Missouri Preschool Program, constructivism was selected as the theory with which to frame this study of the effects of participation in the Missouri Preschool Program on school readiness.

Piaget and Vygotsky are the most-recognized psychology theorists of the 20th century (Aljohani, 2017; Ekpenyong & Edokpolor, 2016; Ozturk, 2016; Thompson, 2018). The constructivist approach to early learning is deeply rooted in the research studies of Piaget and Vygotsky (Dalcour, 2019; Suhendi & Purwano, 2018; UK Essays, 2016). Basically, constructivist approaches to education are categorized into two groups: Piaget's theory of cognitive constructivism and Vygotsky's theory of social constructivism (Ekpenyong & Edokpolor, 2016; Ozturk, 2016). The two constructivism

approaches are not mutually independent, as both adhere to the belief children actively construct their knowledge (Ekpenyong & Edokpolor, 2016).

Piaget's (1936) theory of cognitive constructivism was based on the mind developing through observation and physical experiences (Thompson, 2018; UK Essays, 2016). His work was founded on insightful observations and experimentation with children, especially his children, which led Piaget to author three books (Carpendale & Lewis, 2018). Although not opposed to social interaction, Piaget (1936) firmly believed intelligence develops through self-discovery experiences with the physical environments (Morrison, 2017). Piaget also proclaimed cognitive development consists of four stages, and all children go through the stages in the same sequence (Anastasia, 2018; Carpendale & Lewis, 2018). Piaget advocated an early childhood classroom based on the four stages with differentiated self-discovery activities for exploration focused on each child's development level (Follari, 2019). Today an early childhood classroom influenced by Piaget's theory would be interactive and replete with manipulatives and imaginative play and devoted to self-discovery (Follari, 2019; Morrison, 2017).

The four stages of Piaget's (1936) cognitive development include sensorimotor, preoperational, concrete operational, and formal operational (Anastasia, 2018; Cherry, 2018a; Lindsay, 2018). These stages are a template of intellectual growth from infancy through adulthood (Shroff, 2017). Piaget (1936) acknowledged children might not move through the stages at the same time, but he insisted the sequence would always follow the same pattern (Anastasia, 2018; Carpendale & Lewis, 2018; Morrison, 2017; Shroff, 2017). According to Morrison (2017):

The process of development from one (Piaget) cognitive stage to another is gradual and continual and occurs over a period of time as a result of maturation and experiences. No simple set of exercises will cause children to move up the developmental ladder. Rather ongoing developmentally appropriate activities lead to conceptual understanding. (p. 73)

The four stages of cognitive development are a distinct blueprint of intellectual development and are age-specific from infancy to adulthood with thought processes and specific goals (Cherry, 2018a; Marcin, 2018; Morrison, 2017; Shroff, 2017).

During the sensorimotor stage, birth to age 18 to 24 months, children gain knowledge through the manipulation of objects and basic sensory experiences of movement such as grasping, crawling, and listening (Cherry, 2018a; Marcin, 2018; Morrison, 2017). The main goal of the sensorimotor stage is object permanence, which is knowing that an object is still in existence when it cannot be seen (Marcin, 2018; Morrison, 2017). Language, memory, and imagination are developed in the preoperational second stage, ages two through seven years (Cherry, 2018a; Marcin, 2018; Morrison, 2017). Children at this age tend to be egocentric and develop symbolic thinking, which is the goal of the preoperational stage (Cherry, 2018a; Marcin, 2018; Morrison, 2017; Shroff, 2017). Concrete operations, ages seven to 11, is the third stage and is marked by logical, concrete reasoning and less egocentric thinking (Cherry, 2018a; Marcin, 2018; Morrison, 2017; Shroff, 2017). Operational thought is the goal of this stage, which is developing literal thinking and becoming accomplished at the utilization of logic (Cherry, 2018a; Marcin, 2018).

Piaget's fourth stage, the formal operational stage, covers the development of adolescence through adulthood (Cherry, 2018a; Marcin, 2018; Shroff, 2017). The adolescent or young adult begins to think abstractly and hypothetically and can use symbols to comprehend abstract concepts such as algebraic equations and scientific constructs (Cherry, 2018a; Marcin, 2018; Shroff, 2017). The main achievement of the formal operational stage is establishing an understanding of abstract concepts, including abstract moral, ethical, and social concepts such as justice (Cherry, 2018a; Marcin, 2018). Piaget (1936) held to the theory that when an individual reaches the operational stage, the emphasis is on knowledge being continuously built upon and not necessarily on changing how knowledge is attained or comprehended (Marcin, 2018).

Piaget (1936) asserted children move through the stages by using intelligence to adapt to their surroundings through the mental constructs of schemas, assimilation, and accommodation (Carpendale & Lewis, 2018; Follari, 2019). He characterized the term schema as the fundamental building block of intelligent development through adaptation (Cherry, 2018a; McLeod, 2019; Morrison, 2017). According to Piaget (1936), schemas can be defined as units of knowledge, or interconnected representations of the world, that become arranged in a hierarchical structure from general to specific (Anastasia, 2018; Marcin, 2018; McLeod, 2019). Piaget (1936) explained learning develops by the continual interrelationship among schemas (the existing organization of information), assimilation (the organization of new information into schemas), accommodation (adjusting schemas and creating new ones), and equilibrium (balance in the understanding of new information) (Carpendale & Lewis, 2018; Cherry, 2018a; Follari, 2019).

The processes that allow a child to move from one of Piaget's cognitive stages to another are the core concepts of assimilation, accommodation, and equilibrium (Anastasia, 2018; Marcin, 2018; McLeod, 2019; Morrison, 2017). Assimilation is the process of absorbing sensory information into a pre-existing schema (Anastasia, 2018; Cherry, 2018a; Marcin, 2018). Basically, a child is taking a new experience, idea, or object and assimilating it into an already existing schema (Anastasia, 2018; Cherry, 2018a; Marcin, 2018).

In the process of accommodation, a child may try to change or transform an existing schema, which often results in new experiences and information that results in the creation of a new schema (Anastasia, 2018; Cherry, 2018a; Morrison, 2017). According to Morrison (2017), "The processes of assimilation and accommodation, functioning together, constitute adaptation" (p. 68). Piaget believed if assimilation and accommodation perform their functions jointly, equilibrium must establish a balance between them for children to understand new experiences and move through the cognitive stages of development (Anastasia, 2018; Cherry, 2018a; McLeod, 2019; Morrison, 2017). Piaget's theory of cognitive constructivism, characterized by discovery learning and movement of a child through the stages of development by adapting to experiences through mental constructs of schemas, assimilation, and accommodation, is universally applied in schools today when designing curriculum for young children (Marcin, 2018).

Unlike his contemporary theorist Piaget, Vygotsky's (1978) theory of social constructivism was founded on his belief cognitive development is driven by social interactions (Lindsay, 2018; Morrison, 2017). He emphasized there are no set stages of

development, and a child's cognitive, language, and social development come through interacting with people in the child's environment (Ekpenyong & Edokpolor, 2016; Thompson, 2018). Vygotsky (1978) asserted learning and development are blended, and learning begins at birth. Vygotsky (1978) discovered children have two developmental levels, the actual developmental level, which is what can be accomplished on their own, and the proximal level, which is what can be done with assistance.

Vygotsky (1978) is recognized for two of the most important concepts in early childhood development—the zone of proximal development and the idea of scaffolding (Lindsay, 2018; UK Essays, 2016). Vygotsky (1978) specified:

[The zone of proximal development is] the area of development into which a child can be led in the course of interaction with a more competent partner, either adult or peer. It is not some clear-cut space that exists independently of joint activity itself. Rather, it is the difference between what the child can accomplish independently and what he or she can achieve in conjunction with another more competent person. (p. 244)

Vygotsky (1978) believed instruction should be oriented toward the zone of proximal (see Figure 1) development so maturation can occur, and the child can then operate at a higher level than when alone. Scaffolding is the concept of assisting in the zone of proximal development by a more-skilled adult or peer to aid children to complete a learning task independently (McLeod, 2018c; Vygotsky, 1978). Scaffolding comprises a teaching method that employs verbal cues, adapting material, and providing challenging learning exercises to lead the child through the zone of proximal development (Follari, 2019).

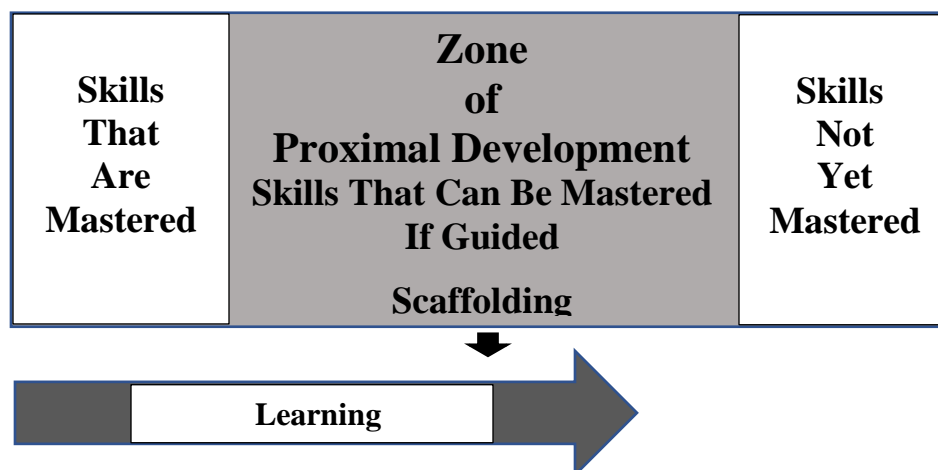


Figure 1. Vygotsky's zone of proximal development. The model figure of Vygotsky's Zone of Proximal Development describes the skills a child can do and those skills too difficult to master on his or her own, but the child can master with assistance and guidance from a skilled adult or peer, which is termed scaffolding in the zone of proximal development. Adapted with permission from "The Zone of Proximal Development and Scaffolding" by S. McLeod, 2018c, *Simply Psychology*. Retrieved from <https://www.simplypsychology.org/Zone-of-Proximal-Development.html>

The zone of proximal development is divided into four stages: assisted performance, unassisted performance, full internalization, and de-automization (Quain, 2020; Rajeev, 2018; Vygotsky, 1978). The assisted performance stage is described as the stage where capacity begins, and assistance is provided to a child by someone who has knowledge of the skill being mastered (Quain, 2020; Vygotsky, 1978). When the child begins to comprehend a piece of new information or a skill, the child is advancing into the unassisted performance stage and can now perform a learning task without the help of another person (Quain, 2020; Rajeev, 2018).

The second stage, unassisted performance, is when capacity is beginning to develop (Quain, 2020; Rajeev, 2018). The third stage, full internalization, is the stage when a child can perform a task automatically through internalization and fossilization (Quain, 2020; Rajeev, 2018; Vygotsky, 1978). At the time when a learner has achieved a sense of mastery of a subject or skill, the fourth stage, de-automization, may occur (Quain, 2020; Rajeev, 2018; Vygotsky, 1978). The learner will regress to the former stages and thus will have to progress through the stages again to regain mastery and solidify the cognitive learning (Quain, 2020; Rajeev, 2018; Vygotsky, 1978). The theories of Vygotsky's zone of proximal development can have a contemporary application today in helping teachers identify those areas in which students need educational guidance (Quain, 2020).

Both Piaget and Vygotsky provided educators with influential views of cognitive development (Thompson, 2018). Piaget (1936) subscribed to the view that a child moves through cognitive development in four stages of maturation with an emphasis on discovery learning through the constructs of assimilation, accommodation, and equilibrium (Cherry, 2018a; Follari, 2019). In contrast, Vygotsky (1978) stressed the importance of learning through social interactions and developed the concept of the zone of proximal development divided into four stages (Morrison, 2017; Quain, 2020).

Piaget implied teachers give minimal support as facilitators to children in their exploration and active self-discovery, which differs from Vygotsky's view that teachers are present to provide guided instruction (Thompson, 2018). Although Piaget (1936) placed emphasis on cognitive development as a product of interaction with one's material surroundings and Vygotsky (1978) placed emphasis on cognitive development as a

product of interaction with one's social surroundings, they are both considered constructivists and have had a profound effect on the development of early childhood learning and educational practices (Cherry, 2019d; Thompson, 2018).

Biographical History of Early Childhood Education

Throughout history, many prominent researchers, philosophers, and theorists have contributed to the development of early childhood education (Elkind, 2015; Follari, 2019; Morrison, 2017). The philosophical roots of early childhood education can be found in the writings of 16th- and 17th-century philosophers such as Martin Luther, John Amos Comenius, John Locke, and Jacques Rousseau (Bonnay, 2017; Follari, 2019). Johann Pestalozzi, Fredrick Froebel, and Maria Montessori are credited with formulating the beginnings of early childhood methodology and curriculum (Bonnay, 2017). In addition to the well-known theorists Jean Piaget and Lev Vygotsky, John Dewey, Rudolf Steiner, Erik Erikson, Urie Bronfenbrenner, and Howard Gardner are renowned for their early childhood research and theories (Bonnay, 2017; Elkind, 2015). According to Elkind (2015), these influential individuals are considered "the giants" in the development of early childhood education discipline (p. 3).

The origins of early childhood education can be traced back to the beginnings of the 16th century and the father of the Reformation, Martin Luther (1483-1546) (Bonnay, 2017). He believed the primary role of education was to teach children to read so they could have access to the knowledge in the scriptures of the Bible (Bonnay, 2017; Garris, 2017). Luther's perspective that all children, boys and girls, should be educated and should learn to read contributed to the idea today of universal education and the critical nature of literacy (Bonnay, 2017; Harwood, 2017; Morrison, 2017). Luther adhered to

the tenets that the most important first teachers of children are their parents and that education strengthens the family, and in turn, the community and society (Gnan, 2017). Today the core standards of the National Association for the Education of Young Children (NAEYC) (2018) adhere to the premise that a high-quality early childhood program ensures strong connections to the family and community (Gnan, 2017). Luther was the first to advocate for family and community as an essential element in the education of young children (Gnan, 2017).

Building on the ideas of Luther, John Amos Comenius (1598-1670) is credited with being the first to promote the concept of educating very young children (Bonney, 2017). He is known today as the father of modern education and wrote a series of over 200 textbooks on educational pedagogy and curriculum (Binibini, 2017; Hilmar-Jesek, 2016). Comenius asserted all children should be afforded the opportunity to learn, rich and poor, boys and girls, and that children learn through active sensory exploration (Binibini, 2017; Elkind, 2015; McNamara, 2016; Morrison, 2017). Comenius infused his teaching with the use of drama and visual aids, including paintings, charts, and maps (Binibini, 2017; Hilmar-Jesek, 2016). Comenius also promoted the idea of four school levels still currently used universally: nursery school up to age six, primary school from ages to six to 12, secondary school for ages 12 to 18, and higher education (Binibini, 2017; Hilmar-Jesek, 2016).

Comenius is recognized for authoring the first picture book, *Orbis Sensualium Pictus* (*The Visible World in Pictures*), which was published in 1658 (Binibini, 2017; Bonney, 2017; Elkind, 2015; Hilmar-Jesek, 2016; McNamara, 2016). One hundred fifty pictures and illustrated daily activities such as gardening, brewing beer, and preparing

bread were included in this picture book (McNamara, 2016). The book also contained animal pictures with their corresponding sounds, which was a forerunner of the current phonetic reading system and provided a complement to the development of literacy (McNamara, 2016). The text portions incorporated Bible stories and included units on science, music, plants, and birds (McNamara, 2016). This book by Comenius was translated into many languages and was, for over 200 years, the commonly accepted textbook in Europe (Hilmar-Jesek, 2016; McNamara, 2016).

John Locke (1632-1704) was an English philosopher and is considered the founding father of empiricism, which is based on the principle that at birth, the human mind is a blank slate, and education is gained through sensory exposure (Anirudh, 2018; Bonnay, 2017). According to Locke, parents and caregivers are instrumental in providing development through exposure to experiences in the environment (Morrison, 2017). He promoted the belief that children should begin to learn at an early age, which impacted today's educational practice to promote early childhood education as a foundation for learning in a child's early years (Morrison, 2017). Translated into many European languages, Locke's most important educational treatise, *Thoughts Concerning Education* (1693), remained an influential educational philosophical piece for over a century and had a profound influence on Jean-Jacques Rousseau's educational philosophy (Anirudh, 2018).

Like Comenius and Locke, Jean-Jacques Rousseau (1712-1778) believed in early learning rich in sensory experiences (Morrison, 2017). He contributed to the concept of readiness and that the development of children occurs according to their natural timeline (Elkind, 2015; Follari, 2019; Maheshwari, 2016). Rousseau suggested children's nature

“unfolds” as a result of the progression of development (Morrison, 2017). This approach is at the center of early childhood practices today, as teachers correlate their teaching methodology to a child’s level of development and skill level (Morrison, 2017).

Rousseau’s views on early childhood education developed into a child-centered approach rich with a wealth of sensory experiences, and he became known as the father of early childhood education (Bertram, 2017; Maheshwari, 2016).

Influenced by Comenius’ and Rousseau’s philosophies, Johann Pestalozzi (1746-1827) advanced the idea education is a natural process based on sensory impressions in the early years (Elkind, 2015; Morrison, 2017). Pestalozzi adhered to the belief all children can learn beginning at birth, and mothers are the first teachers (Follari, 2019). He authored several books to provide teaching guidance to mothers of young children (Morrison, 2017). Pestalozzi emphasized children learn through the senses and activities, not due to verbal instruction (Elkind, 2015; Silber, 2019).

To promote learning, Pestalozzi developed what he called object lessons in which manipulatives such as wooden block letters were used to teach spelling and reading, and dried beans or small stones were used to teach counting (Elkind, 2015). Manipulatives are, to this day, an important tool in early childhood education (Follari, 2019). He developed several teaching methods still used currently, such as ability grouping, where he grouped children according to their mental capabilities and not by their chronological age (Elkind, 2015; Silber, 2019). He also practiced whole group instruction where children answered in unison rather than individually and employed active participation in activities such as art, penmanship, music, and physical activities (Silber, 2019).

Pestalozzi believed all children, even the impoverished and both boys and girls, should be

afforded the opportunity to be educated (Elkind, 2015; Follari, 2019). Pestalozzi's educational methods and fundamental beliefs have been assimilated into what is called elementary education today (Silber, 2019).

Frederick Froebel (1782-1852) is renowned as the father of kindergarten and the principal promoter of learning through play (Bonney, 2017; Johnston, Nahmed-William, Oates, & Wood, 2018; Morrison, 2017). In 1837, he founded the first kindergarten, which in German translates "garden of children," a place where Froebel believed children unfolded like flowers (Eschner, 2016; Follari, 2019; Morrison, 2017). Froebel believed in play as an indispensable element to learning and created many objects and toys, which he termed gifts, to vitalize learning through play activities (Elkind, 2015; Elsworth, 2017; Morrison, 2017). The classroom activities were accompanied by songs, fingerplays, and movement (Elsworth, 2017). The concept of learning through play is Froebel's most important contribution to early childhood education and continues to be a fundamental early childhood precept today (Eschner, 2016; Morrison, 2017). Because Froebel knew that education begins in infancy and a child's brain develops dramatically between birth and three years old, he recognized mothers are the first teachers and were well-suited to be nurturing teachers in his schools (Elsworth, 2017; Eschner, 2016). Froebel championed women, and because of his work, many women entered the workplace and began teaching careers with several of his protégés by starting their kindergartens and spreading the kindergarten system around the globe (Elsworth, 2017).

All of the giants in early childhood education advocated the practices of instruction should reflect the needs and abilities of the young child; however, Marie Montessori (1870-1952), an Italian physician, first began the scientific research approach

to early childhood education with an emphasis on observation and experimentation (Elkind, 2015; Jacobs, 2016; Starling, 2018). Inspired by the work of Froebel, she began developing unique diagnostic and teaching methods when working in a psychiatric hospital for special needs children (Elkind, 2015; Jacobs, 2016; Kraus-Boelte, 2018; Starling, 2018). Creating innovative equipment and instructional approaches to teach these impaired children, Dr. Montessori's results were remarkable, and thus began the development of the Montessori Method (Elkind, 2015; Starling, 2018). Her scientific studies with disabled children led her to believe, like many before her, that development is a product of nature and nurture, and thus all children are born with innate abilities and can learn provided the proper nurturing environment (Elkind, 2015; Follari, 2019; Rankin, 2018).

Dr. Montessori strongly believed the classroom environment should be arranged so children can freely interact with their surroundings (Bonnay, 2017; Elkind, 2015; Starling, 2018). She developed a child-sized environment which included child-sized chairs and tables, utensils and dishware, and even had the doorknobs lowered in the classroom so children could do for themselves (Elkind, 2015; Starling, 2018). To support cognitive learning, Dr. Montessori developed an array of didactic sensory materials such as colored rods, blocks, and sandpaper letters, which are still used around the world today (Follari, 2019; Morrison, 2017).

In addition, an essential part of her curriculum was teaching the practical life skill of dressing (Follari, 2019; Starling, 2018). In the Montessori classroom, children were given total autonomy to learn independently and to use self-correcting materials (Bonnay, 2017; Morrison, 2017). Children worked at their own pace with teachers acting only as

facilitators and skilled observers to guide and channel the children's learning (Morrison, 2017). An essential part of her curriculum was teaching practical life skills through four types of exercises: care of the person, care of the environment, social relationships, and motor control (Follari, 2019; Starling, 2018).

Dr. Montessori believed children move through sensitive periods when the brain is developing between the ages of 0 and six (Seldin, 2017; Starling, 2018). Supported today by neuroscience research, she theorized young children pass through critical periods of development when the brain is particularly receptive to learn specific skills (Epstein, 2016; Follari, 2019; Seldin, 2017; Starling, 2018). Dr. Montessori concluded these are transient periods, and if a child is not exposed at specific times to these sensitive stages, the opportunity to learn will pass (Maghifiroh, 2017; Seldin, 2017). The 11 main sensitive periods she identified included:

- Movement (birth to 1 year): a child learns to touch, grasp, crawl, and walk,
- Language (birth to 6 years): a child listens to sounds and progresses from coos and babbles to words to phrases to sentences,
- Order (6 months to 4 years): a child has a desire for routines and consistency and likes repetitious activities,
- Objects (1 to 4 years): a child's eye-hand coordination becomes developed as handling small projects is refined,
- Senses (2 to 6 years): a child is involved with sensory experiences like smell, sound, and touch,

- Social Awareness (2 to 6 years): a child interacts with others and learns to imitate considerate and amiable behaviors which are internalized,
- Music (2-6 years): a child becomes interested in the sounds of pitch, cadence, and song resonance,
- Writing (3 to 4 years): a child begins to use pencil and paper to produce letters and numbers,
- Reading (3 to 5 years): a child begins to see a relationship between letters and the sounds he/she makes which will lead to sounding out words,
- Spatial Relationships (4 to 6 years): a child begins to understand spatial relationships which lead to activities like completing puzzles, and
- Mathematics (4 to 6 years): a child will start to concretely understand numbers and quantities as he/she begins to play with manipulatives. (Epstein, 2016; Maghifiroh, 2017; Seldin, 2017; Starling, 2018)

Dr. Montessori was one of the most distinguished 20th-century early childhood educational philosophers and theorists (Maghifiroh, 2017). Over a half-century after her death, the Montessori Method is internationally recognized and thriving with countless Montessori schools in the United States and worldwide (Bonney, 2017; Starling, 2018).

Of the numerous theories of child development, Piaget, Vygotsky, Dewey, Steiner, Erikson, Bronfenbrenner, and Gardner provided some of the most valuable insights into cognitive development. Before the theories of constructivism by Piaget and Vygotsky were generally acknowledged, John Dewey (1859-1952) was promoting the belief that young children learn best when interacting with the environment (Dewey,

1938; Williams, 2017). Dewey is considered the father of progressive education and advocated learning is child-centered and education is a social interactive process with the school primarily a social institution (Dewey, 1897; Morrison, 2017; Williams, 2017). Dewey (1897) stated, “Education being a social process, the school is simply that form of community life in which all those agencies are concentrated that will be most effective in bringing the child to share in the inherited resources of the race” (p. 77). He held learning should be stimulated through the life of the community, and student interests should prompt instruction (Dewey, 1897; Williams, 2017).

Dewey (1938) asserted children are individually unique learners and not passive recipients of knowledge, but rather active participants in their learning in a classroom considered a social entity (Bonney, 2017; Williams, 2017). Dewey (1897) proclaimed from the very early years, “education... is a process of living and not a preparation for future living” (p. 77). Dewey’s progressive movement, based on a child’s learning by interacting with the environment and performing activities mirroring skills necessary for living, shaped constructivist education, which in turn provided the foundation for the principles of early childhood education (Morrison, 2017; Williams, 2017).

The Austrian philosopher Rudolf Steiner (1861-1925) developed a spiritual scientific theory called anthroposophy, which includes the belief in three main facets of the human being: body, mind, and spirit (Bamford & Utne, 2019; Follari, 2019). Based on this spiritual theory, Steiner emphasized the development of the whole child and “that a child’s moral, spiritual, and creative sides need as much attention as their intellect” (as cited in Newcomb, 2019, para. 2). Steiner believed the development of a child is epigenetic, defined as the process of cognitive, social, spiritual, and physical

development through three developmental stages: early childhood (will), middle childhood (feeling), and adolescence (thinking) (Bonnay, 2017; Follari, 2019).

According to Steiner, during the early childhood stage, infancy to seven years of age, children learn by imitation, not intellectualism, and a child's energy is focused on physical development and the will of doing (Elkind, 2015; Follari, 2019). The transition to middle childhood is characterized by learning through imagination; for example, through story, music, dance, and art with human feeling as the primary focus (Follari, 2019). The adolescence stage is transitioning from child to adult and is marked by the physical changes of puberty with intellectual cognition and feelings of social consciousness becoming prominent (Follari, 2019). Steiner's pedagogical theory of child development led to the creation of what is known as the Waldorf educational philosophy; schools with an emphasis on Waldorf early childhood programs highlight creative play and imagination (Bonnay, 2017; Follari, 2019). Steiner is known as the first educational theorist to give prominence to the holistic approach to learning (Elkind, 2015; Follari, 2019).

Erik Erikson (1902-1994), a German theorist, developed the psychosocial theory of development, which was founded on his belief that cognitive and social development are interdependent (Cherry, 2019a; Morrison, 2017). Erikson claimed a child's personality and social skills develop within the framework of society, and relationships, especially with parents and teachers, are key to the development of the child's personality and cognitive development (Cherry, 2019b, Morrison, 2017). Erikson classified his psychosocial theory into eight stages of development and growth from birth through adulthood (Cherry, 2019b).

Of the stages of Erikson's psychosocial theory of development, the first three, birth to six years of age, are relevant to early childhood education (Cherry, 2019b). In the first stage, Trust vs. Mistrust, children ages birth to 18 months learn to trust or mistrust the persons providing their basic needs (Cherry, 2018b; Morrison, 2017). When the child develops trust, he or she will feel safe and secure when the basic needs of nourishment, love, and nurturing physical contact are provided by the adult caregiver (Cherry 2018b, 2019b; Follari, 2019; Morrison, 2017). The second stage of the psychosocial theory of development, Autonomy vs. Shame and Doubt, occurs during early childhood, ages 18 months to three years (Morrison, 2017). At this stage of a child's development, the child is beginning to do things for self and is gaining a sense of independence and personal control, which helps to develop autonomy and confidence (Cherry, 2018b; Follari, 2019; Morrison, 2017). If overprotected and not given opportunities to act on their environment and choose their toys, food, and clothing, children will begin to doubt their abilities and experience low self-esteem, which may hamper achieving autonomy in adolescence and adulthood (Cherry, 2019b; Elkind, 2015; Morrison, 2017).

The third stage, Initiative vs. Guilt, happens in the preschool years, ages three to five years (Cherry, 2019b; Follari, 2019; Morrison, 2017). During this stage, children begin to initiatively direct their activities and social interactions and form a sense of purpose and achievement over physical skills (Cherry, 2019b; McLeod, 2018a; Morrison, 2017). If children are thwarted from initiating activities and prevented from doing things independently, they can develop a feeling of guilt and self-doubt (Cherry, 2019a, 2019b;

Morrison, 2017). Together, the three stages of Erikson's psychosocial development theory "give us a panoramic description of the young child" (Elkind, 2015, p. 178).

Urie Bronfenbrenner (1917-2005) was a Russian-born American psychologist renowned for the development of the ecological systems theory in 1979 (Ettekal & Mahoney, 2017; Follari, 2019; Zierten & Gilstrap, 2016). The ecological systems model illustrates how children's development is shaped by the relationships in their environmental systems or ecosystems (Ettekal & Mahoney, 2017; Follari, 2019; Zierten & Gilstrap, 2016). Bronfenbrenner separated the ecological system into four distinct subunits which nest within each other and interact: microsystem, mesosystem, exosystem, and macrosystem (Ettekal & Mahoney, 2017; Follari, 2019).

The microsystem is the first and most proximate layer of the nested system and includes those settings in which individual children directly interface with their immediate surroundings and interpersonal relationships (Ettekal & Mahoney, 2017; Follari, 2019). These interactions comprise the environments of a child's parents, siblings, extended family, peers, schools, teachers, religious groups, and neighborhoods (Follari, 2019). The second layer moving outward is the mesosystem, which involves the exchanges among all the entities in the microsystem in which individual children are imbedded (Ettekal & Mahoney, 2017; Follari, 2019). An example of the mesosystem might be the interrelationship between a child's parents and teachers (Follari, 2019).

The third outer layer is the exosystem, which encompasses incidents in which the child is not directly affected but can have an indirect influence (Ettekal & Mahoney, 2017; Follari, 2019). An exosystem example might be a parent having lost employment, which elicits not only family stress but reduces the family income, and most assuredly,

the child is influenced (Follari, 2019). The outermost layer is the macrosystem, “which is defined as the set of overreaching beliefs, values, and norms, as reflected in the cultural, religious, socioeconomic organization of society” (Ettekal & Mahoney, 2017, p. 241). This system is the largest with the greatest number of remote persons (Ettekal & Mahoney, 2017). The macrosystem encompasses an array of societal beliefs, which includes “such things as the relative freedoms permitted by the national government, cultural values, the economy, wars, etc.” (Oswalt, 2020, para. 4). The absence or presence of these societal beliefs can profoundly affect the development of a child (Follari, 2019; Oswalt, 2020). Bronfenbrenner clearly contributed to developmental psychology with his research and ecological systems model that brought attention to the many environmental and societal influences which impact early childhood development (Follari, 2019; Oswalt, 2020).

Howard Gardner (b. 1943), a psychologist and Harvard education professor, developed the groundbreaking theory of multiple intelligences in 1983 (Armstrong, 2019; Cherry, 2019c; Lynch, 2018). He challenged the traditional thought that intellect is based on the measurement of an intelligence quotient and believed it covers a broader range of modalities and a number of individual human intelligences (Armstrong, 2019; Gardner & Hatch, 1989; Lynch, 2018). Gardner “defined intelligence as the capacity to solve problems or to fashion products that are valued in one or more cultural settings and detailed a set of criteria for what counts as human intelligence” (Gardner & Hatch, 1989, p. 5). After establishing each set of criteria, Gardner identified eight intelligences: Spatial-Visual, Logical-Mathematical, Interpersonal, Musical-Rhythmic, Bodily-Kinesthetic, Linguistic-Verbal, Intrapersonal, and Naturalistic (Armstrong, 2019; Cherry,

2019c; Lynch, 2018). Gardner's theory of multiple intelligences provides early childhood educators with an understanding of the many facets of intelligence in young children (Siphai, Supandee, Raksapuk, Poopayang, & Kratoorek, 2017). Recognizing young children's dominant intelligence helps educators provide learning activities to encourage the use of children's diverse intelligences (Siphai et al., 2017).

Over the centuries, early childhood has become universally accepted as an influential period of learning and an investment for later in life (Attanasio et al., 2016). The individuals chronicled here are considered prominent figures in the development of early childhood education (Follari, 2019). Elkind (2015) aptly called them "giants in the nursery" (p. 1). Over the centuries, many expert scientists, theorists, psychologists, philosophers, and educators have sought to uncover the principles of child development (Aleksov, 2018). These individuals have contributed and influenced, each in his or her way, to the development of a child-centered view of early childhood education and the profound effect of early learning on childhood development (Elkind, 2015; Follari, 2019).

School Readiness

School readiness is a common hot topic discussed in the field of early childhood education with no clear definition or single predictor of readiness for the transition to kindergarten (Hadani, 2016). Hadani (2016) stated, "Research supports that school readiness is multifaceted and not limited to early reading and mathematics skills, but rather includes a wide range of components including executive function skills, curiosity, language, socioemotional well-being, motor skills, and health" (p. 3). School readiness is an area of concern for both parents and educators as it is a multidimensional function that

involves a multitude of developmental areas and skills other than a focus just on cognition and language (Sahin et al., 2013).

In response to the 1983 *A Nation at Risk* report, President Bush and 50 state governors met in 1989 in Charlotte, North Carolina, to reform American schools (Vinovskis, 1999). From this meeting, six national goals were created, and the National Education Goals Panel was established (Vinovskis, 1999). The National Education Goals Panel (1997) adopted goal one in 1990, often called the readiness goal, which stated all children in America would start school ready to learn by the year 2000.

The National Education Goals Panel (1997) described school readiness in goal one as language and literacy skills, general knowledge and cognition, physical well-being and motor development, and social and emotional development. The National Education Goals Panel (1997) also considered high-quality instruction and family and community support systems as necessary components of school readiness. Echoing the goals set by the National Education Goals Panel, the USDOE (2019a) created five essential domains of school readiness, including “the domains of language and literacy development, cognition and general knowledge, approaches toward learning, physical well-being and motor development, and social and emotional development” to guide and help parents and educators (para. 9). The five domains are interconnected indicators of a child’s ability to be successful in school and are not sequential stages, but are child development abilities that can be achieved concurrently (Mead, 2016).

Many state funded early childhood program standards mirror the National Education Goals Panel (1997) and the USDOE (2019a) domains of school readiness. The

Missouri Early Learning Department of the MODESE (2013) established a comprehensive list of school readiness standards which provides a conceptual framework for the Missouri Preschool Program and applies to all children birth to kindergarten:

- I. Approaches to learning
- II. Social-emotional development
- III. Physical development
- IV. Language and literacy
- V. Mathematics
- VI. Science
- VII. Understanding the world
- VIII. Expressive arts. (pp. 1-13)

The guiding principle of the standards is for the children of Missouri to be provided with a variety of high-quality learning experiences to prepare them for success in school and for their entire lives (MODESE, 2013).

Four conceptualized interpretations of the term “school readiness” are evident in early childhood literature (Hadani, 2016; Meisels, 1998). The idealist/nativist concept, or maturational view of school readiness, is that a child is ready for school when he or she reaches a level of maturation, including the self-control to follow directions and interact appropriately with peers and teachers (Hadani, 2016; Meisels, 1998). Essentially, the maturational concept claims proficiency in school is a function of a child’s maturation (Hadani, 2016; Meisels, 1998).

The empiricist or environmental constructivist, in contrast, views readiness as the knowledge and concrete skills, such as naming colors and shapes, a child possesses to

provide a foundation for success in school (Meisels, 1998; Miller, Cameron, Dalli, & Barbour, 2018). Readiness is simply viewed by the empiricist in terms of proficiency with a specific set of skills (Meisels, 1998; Wickett, 2019). The empiricist identifies the child's environment and all persons encompassing that environment as responsible for developing skillsets as a prerequisite for school learning (Meisels, 1998; Wickett, 2019).

According to Meisels (1998), a child is in a perpetual state of readiness to learn within the constructive process of readiness with the teacher. The social constructivist views readiness as a function of community and its cultural values (Hadani, 2016; Meisels, 1998). This view is described as a lack of focus on the child; it is the beliefs and experiences of those who participate in school and community that define school readiness (Hadani, 2016; Meisels, 1998).

Meisels (1998) identified a fourth view called the interactionist model, with a bi-directional concept of school readiness focused on the current skill level and knowledge of the child in conjunction with maturational level and environmental and cultural experiences. Specifically, Meisels (1996) stated:

Readiness and early school achievement are bi-directional concepts that focus both on children's current skills, knowledge, and abilities and on the conditions of the environment in which children are reared and taught... Although it [readiness] can be applied to individual children, it is not something in the child, and it is not something in the curriculum. It is a product of the interaction between children's prior experiences, their genetic endowment, their maturational status, and the whole range of environmental and cultural experiences that they encounter. (p. 409)

The interactionist concept of school readiness is a multidimensional construct combining what children know and the capacity of schools to provide experiences to children who demonstrate individual strengths and weaknesses as they reach school age (Hadani, 2016).

Neuroscience of Early Childhood Development

Among the United States and nations worldwide exists a growing concern that young children do not arrive at kindergarten ready to learn (Garvis et al., 2018). According to the AAP Council on Early Childhood and the AAP Council on School Health (2016), “The importance of school readiness has become increasingly apparent with recent research on early brain development, which emphasizes the effects that early experiences and relationships have on the brain’s foundational architecture and subsequent function” (p. 2). The interplay between early environmental experiences and biology influences the effects of either stress or support on brain development and young children’s learning (Thompson, 2016). The cumulative experiences of early childhood, positive and negative, can profoundly affect brain development, which makes early life a time of opportunity and great vulnerability (Arizona State University, 2017; Hawley, 2017; Riley & Terada, 2019; Robinson et al., 2017).

A growing body of neuroscience research indicates the brain of a child from the womb to age five undergoes extremely rapid growth (Bales, 2019; Lynch, 2019; Robinson et al., 2017). At the age of five, a child’s brain is 90% developed, which signifies that the period from birth to entering school is a crucial time of development when a child’s brain has great plasticity (Hunter, 2017; Silva, 2018). Nevertheless, at a critical window of timing from birth to three when a child is extremely responsive to

learning, public spending allocation for early childhood education is lower than 4% of the national education expenditure (George Kaiser Foundation, 2019, para. 3).

In the womb, an infant's brain creates a neural tube that closes after three weeks and proceeds to form into the brain structure and the spinal cord (Weaver & Hillary, 2019). Neurons, or brain cells, the building blocks of the brain, are formed in the womb, and an infant is born with 100 billion neurons, essentially all the brain cells for life (Bales, 2019; Hunter, 2017). These neurons are not connected at birth and embark on a rapid journey of connecting in the first two years of life, forming over one million separate connections every second called synapses (Arizona State University, 2017; Center on the Developing Child, Harvard University, 2007; Eagleman, 2015).

A child has over 100 million synapses formed by the age of two years—more than the child will ever use (Bales, 2019; Eagleman, 2015). This is the reason young children learn at a faster rate than adults; their brains are far more active, characterized by more curiosity and eagerness to explore (Lynch, 2019). Initially, the sensory synapses of vision and hearing are formed, succeeded by language (see Figure 2) (Center on the Developing Child, Harvard University, 2007).

The foundation for increasingly complex cognitive connections is provided by these early connections (Weaver & Hillary, 2019). Repetition strengthens neuron connections and is a significant way parents and caregivers can foster a child's early brain development (Bales et al., 2018). Exposure to new experiences and continuous repetitions of those experiences make the neuron connections stronger (Bales et al., 2018). The repetitive interaction between a child and a parent or caregiver is called

“serve and return” and is essential to reinforcing neuron connections (Bales et al., 2018; Center on the Developing Child, Harvard University, 2007).

The excessive production of the neural connections is termed synaptic overproduction, and the process of pruning develops (Bales et al., 2018). According to Bales (2019):

The developing brain is a little like a fertile garden. When we plant a garden, we plant more seeds than needed to ensure that some of them grow and thrive. When too many seeds sprout, there is not enough room for the healthiest plants to thrive. By weeding out some plants, we allow more room for the crops to grow. The brain has a similar ‘weeding’ process called pruning. (para. 4)

Pruning establishes enough space in the brain for new connections to develop and allows the brain to operate more efficiently (Bales et al., 2018). The brain will be pruned back to 50% of the connections as the child ages (Eagleman, 2015). Pruning synapses based on experiences allows stronger and more sophisticated connections to form (Bales, 2019; Eagleman, 2015).

Human Brain Development

Neural Connections for Different Functions Develop Sequentially

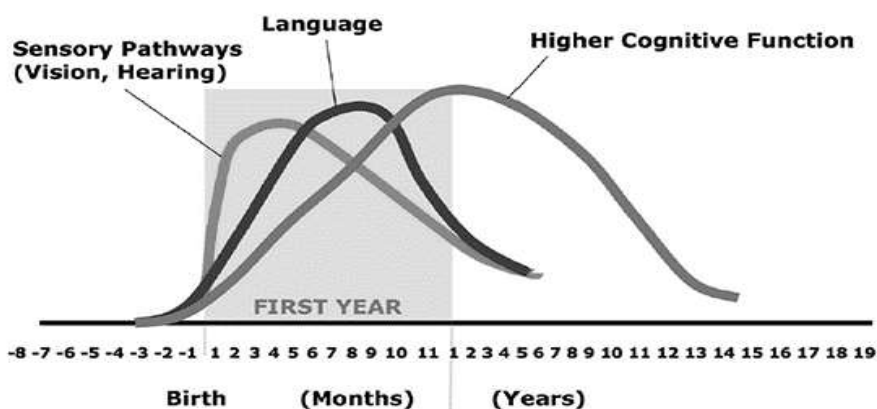


Figure 2. Human brain development. The figure of human brain development describes the neural connections developing sequentially from birth through the first year for vision, hearing, and language and then the following years for complex cognitive functions. From “In Brief, The Science of Early Childhood Development” by Center on the Developing Child, Harvard University, 2007. Retrieved from <https://developingchild.harvard.edu/resources/inbrief-the-science-of-early-childhood-development>. Reprinted with permission.

Even though the brain has the potential and capacity to develop biologically, the brain is clearly dependent on exposure to environmental experiences to continue to develop and grow (Hunter, 2017). From birth, the experiences captured by the five senses are essential to strengthening connections and directing early development (Bales, 2019). Experiences of nurturing care, stimulating interaction with parents and adult caregivers, and access to quality early education ensure a child’s positive brain

development lasts a lifetime (Arizona State University, 2017; Hawley, 2017; Hunter, 2017). The opposite is true as well; collectively, negative experiences, the absence of caring interactions, an unstable home environment, poverty, and scarcity of access to quality early education can negatively impact a child's brain connections and impair the architecture which is the foundation for all subsequent learning, health, and behaviors (Center on the Developing Child, Harvard University, 2007; Hunter, 2017; Robinson et al., 2017). A child exposed to toxic stress or trauma can experience decreased connections and brain size as well as negative changes to emotional and behavioral brain functions (USDHHS, 2016).

Three aspects of negative experiences influence their outcomes: the amount of exposure, the duration of the exposure, and the timing of the exposure (Bales et al., 2018). A young child exposed to a great number of negative experiences is at risk for damage to the brain (Bales et al., 2018). Similarly, a child exposed to protracted periods of negative occurrences will experience negative brain effects (Bales et al., 2018). Sensitive time frames in brain development are when specific parts of the brain are more receptive to information than at other times (Bales et al., 2018; Nelson, Zeanah, & Fox, 2019). The brain at these times is prone to harm in those particular sections of the brain when exposed to negative experiences; however, in contrast, the brain is highly plastic and can readily adapt to positive sensory intake, especially during the sensitive periods of infancy and early childhood (Bales et al., 2018; Hawley, 2017; Morrison, 2017).

Early childhood neuroscience indicates it is important to provide a positive, nurturing, stable, and safe environment in infancy and early childhood to guarantee the brain will develop normally and secure a child's healthy, successful life (Eagleman,

2015). The neuroscience of early childhood development has shown that the early years from infancy to age five are a time of enormous opportunity and vulnerability (Arizona State University, 2017; Hawley, 2017; Riley & Terada, 2019; Robinson et al., 2017).

The fact children learn and thrive in a positive environment rather than a negative state of emotion has great significance for early childhood education and development of the school readiness domains of motor, language, cognitive, and social-emotional skills (AAP Council on Early Childhood and AAP Council on School Health, 2016; Riley & Terada, 2019).

Longitudinal Studies of the Effects of Early Childhood Programs

The HighScope Perry Preschool Project, the Abecedarian Project, and the Chicago Child-Parent Center Project are the oldest and most-renowned early childhood intervention longitudinal studies of high-quality programs, all of which proved to be cost-effective with impacts lasting well into adulthood for participants (McCormick et al., 2017). The HighScope Perry School Project was launched by David P. Weikart in the district of the Perry Elementary School in Ypsilanti, Michigan, in 1962 (Heckman & Karapakula, 2019b; HighScope Research Education Foundation, 2017; Wiltshire, 2019). The original 1962-1967 HighScope Perry Preschool Project study sample was a group of 123 three- and four-year-old disadvantaged African Americans who were randomly assigned; 53 participated in the preschool program, and 65 received no preschool education (Heckman & Karapakula, 2019b, p. 5; Schweinhart et al., 2014, p. 1).

The 65 preschool members participated in a high-quality intervention program, founded on the HighScope curriculum, for 2.5 hours five days per week during the academic calendar year with certified teachers, class sizes of eight or fewer students, and

weekly home visits (Heckman & Karapakula, 2019b, p. 5; Follari, 2019, p. 164). Data were collected each year, ages three through 15, and after that, at ages 19, 27, 40, and 55 (Heckman & Karapakula, 2019b; Schweinhart et al., 2014). In this longitudinal study, at the age of 40, the participants who attended the Perry Preschool were found to have experienced “fewer teenage pregnancies, were more likely to have graduated from high school, were more likely to hold a job and have higher earnings, committed fewer crimes, and owned their own home” (HighScope Research Education Foundation, 2019, p. 1). Schweinhart et al. (2014) noted the results of the study through age 40 extended across the domains of education performance, economic achievement, crime prevention, and cost benefits.

The participants in the Perry Preschool exceeded the control group in achieving 12th-grade education or higher, 77% opposed to 60% (HighScope Research Education Foundation, 2019, p. 1; Schweinhart et al., 2014, p. 2; Wiltshire, 2019, p. 13). In addition, the Perry Preschool participants performed better than non-program participants “on various intellectual and language tests from their preschool years up to age 7; on school achievement tests at ages 9, 10, and 14; and on literacy tests at ages 19 and 27” (Schweinhart et al. 2014, p. 2). It is important to note that up to seven years old, the participants gained an average of 15 IQ points, but experienced diminished IQ gains or fade-out after that (Hanford, 2009, p. 13; Mongeau, 2019, para. 2; Schweinhart, 2016, p. 3). Even though the Perry Preschool participants’ IQs were on average no higher than their peers during their school years, they were unlikely to be placed in special education classes specifically for mental deficiency (Hanford, 2009). At ages 15 and 19, the program participants exhibited a considerably better attitude toward school and spent a

greater amount of time doing homework than the non-program participants (Follari, 2019; HighScope Research Education Foundation, 2019; Schweinhart et al., 2014).

The collected data indicate program participants significantly outperformed non-program participants in the area of socioeconomics (Follari, 2019; HighScope Research Education Foundation, 2019; Schweinhart et al., 2014). A significantly greater number of program participants than non-program participants (69% versus 56%) were employed at age 27, which was a trend that continued to age 40 (76% versus 56%) (Schweinhart et al., 2014, p. 2). The average median annual salary was higher for program participants than non-program participants at age 27 and age 40 (Follari, 2019, p. 165; Schweinhart et al., 2014, p. 3). At age 27, the participants' salary was \$12,000 versus the non-participants' salary at \$10,000; at age 40, it was \$20,800 versus \$15,300 (Follari, 2019, p. 165; Schweinhart et al., 2014, p. 3). In addition, more program participants owned their own homes at ages 27 (27% versus 5%) and at age 40 (37% versus 28%) (Follari, 2019, p. 165; Schweinhart et al., 2014, p. 3). Significantly, at age 40, 76% of program participants had savings accounts compared to 36% of non-program participants, a clear sign of economic stability (Schweinhart et al., 2014, p. 3). Additionally, Schweinhart et al. (2014) noted that by age 40, program participants had accessed social services far less than non-program participants during any time in their lives, 71% versus 86% (p. 3).

The greatest difference between Perry Preschool participants and non-participants was in the area of crime, which included overall arrests and subsequent prison incarceration over the lifetime of the participants, a compelling indication of social responsibility as a study outcome (Schweinhart et al., 2014; Wiltshire, 2019). By age 40, program participants received fewer arrests than non-participants, 36% versus 55%,

which included fewer arrests for violent drug crimes, property crimes, and violent crimes combined (Follari, 2019; Schweinhart et al., 2014, p. 3; Wiltshire, 2019, p. 13). In addition, program participants were sentenced to fewer months in prison by age 40 than non-program participants, 28% versus 52%, and actually served in prison fewer months, 9% versus 21% (Hanford, 2009, p. 23; Schweinhart et al., 2014, p. 4). Wiltshire (2019) argued the reduction in criminal behavior emphasizes “the importance of social and emotional development in early years; this is a non-cognitive effect but related to impulse control, a need for attention and emotional intelligence in general” (p. 13).

The Perry Preschool Project’s economic benefit analysis was a new dimension to the field of longitudinal studies and proved to have strong implications for a national investment in high-quality early childhood programs (Wiltshire, 2019). An economic benefit was indicated at the age of 27 of \$7.16 and at the age of 40 of \$12.90 for every dollar spent on the high-quality preschool program in this longitudinal study (Follari, 2019, p. 165; Schweinhart et al., 2014, p. 4; Wiltshire, 2019, p. 18). Schweinhart et al. (2014) confirmed the return to society on an individual investment per program participant of \$15,166 was \$244,812 (p. 4). Of the dollars returned to society, 88% were from the cost savings of crime reduction, 4% from increased education attainment, 1% from increased taxes due to elevated earnings, and 1% from cost savings of limited dependence on welfare services (Schweinhart et al., 2014, p. 4). Interestingly, 93% of the calculated dollars returned to society were from the performance of male program participants (Schweinhart et al., 2014, p. 4).

Of the 123 original participants, attrition was low, with 83% available to be surveyed in their mid-50s (Heckman & Karapakula, 2019b, p. 5). The survey was

conducted during the years 2014-2016; questions were asked of Perry Preschool Project participants regarding their children (Heckman & Karapakula, 2019a). Heckman and Karapakula (2019a) found positive intergenerational effects 50 years later for program participants as compared to non-program participants (Heckman & Karapakula, 2019a; Jacobson, 2019; Mongeau, 2019).

The mid-life report, released in May 2019, indicated the offspring of the 55-year-old Perry Preschool Program participants acquired similar benefits (Heckman & Karapakula, 2019a; Jacobson, 2019; Mongeau, 2019). Compared to 40% of the children of non-program participants, 67% of the program participants' children graduated high school with no suspensions, and 60% were never arrested (Heckman & Karapakula, 2019a, p. 15; Mongeau, 2019, para. 5). In addition, 59% of the program participants' children were employed full-time compared to 42% of non-program participants' children (Heckman & Karapakula, 2019a, p. 15; Mongeau, 2019, para. 5). Heckman and Karapakula (2019a) noted the original participants in the Perry Preschool Project, when compared to non-participants, provided for their children a more stable home life with financial security. High-quality early childhood programs “can contribute to lifting multiple generations out of poverty” (Heckman & Karapakula, 2019a, p. 25).

Like the Perry Preschool Project, the 111 disadvantaged mainly African-American participants of the longitudinal Carolina Abecedarian Project launched in 1972 were randomly assigned—57 to the treatment group and 54 to the control group (Conti, Heckman, & Pinto, 2016; Morgan, 2019; Schweinhart, 2016). The participants were engaged at infancy and assessed at ages 5, 8, 12, 15, 21, 30, 35, and 40 (Conti et al., 2016; Garcia, Heckman, Leaf, & Prados, 2019; Morgan, 2019; Shaw, 2016). The

experimental group participated in a full-day, year-round, quality center-based program from infancy until the age of five with home visits (Garcia et al., 2019; Shaw, 2016). The learning experiences focused on four core components: “language priority, conversational reading, enriched caregiving, and game-based curriculum” (Sparling & Meunier, 2019, p. 1).

According to Campbell, Pan, and Burchinal (2019), the Abecedarian participants saw lasting positive effects on academic achievement and behavior. The Abecedarian participants recorded higher IQ scores through age 15 than non-participants (Shaw, 2016, p. 8). During the elementary and secondary years, Abecedarian children additionally scored higher in the areas of math and reading on achievement tests and had low retention rates and special education placements (Campbell et al., 2019). Significantly, at 21 years of age, the Abecedarian group maintained their intellectual and academic efficacy, and in fact, 35% of the recipients of the Abecedarian curriculum attended college as compared to 13% of the control group participants (Morrison, 2017, p. 206). At 21, 47% of the Abecedarian group held skilled labor jobs as compared to 27% of the control group; more importantly, reduced crime rates, drug use, and depression were evident (Meloy et al., 2019, p. 2; Morrison, 2017, p. 206).

When assessed at age 30, the Abecedarian group, when compared to the control group, were more likely to hold a bachelor’s degree, have consistent employment, and have delayed becoming a parent (Shaw, 2016). At 35, the Abecedarian group experienced an unexpected outcome; they outperformed the control group with better health and wellness (Shaw, 2016). The economic results of the program were 13.7% per annum rate of return and a 7.3% benefit/cost ratio (Garcia et al., 2019, p. 1). Similar to

the Perry Preschool Project, the Carolina Abecedarian Project, a high-quality early childhood program, resulted in longitudinal data indicating a clear economic and overall wellbeing benefit to the lives of at-risk children 40 years later (Shaw, 2016).

In contrast to the Perry Preschool Project and Carolina Abecedarian Project characterized by small random samples, the Chicago Child-Parent Center Project began in 1986 with a large-scale sample of 1,539 children across low-income districts in Chicago (Schweinhart, 2016). Of the 1,539 participants, 92% were black, and 7.1% were Hispanic (Reynolds, Ou, & Temple, 2018, p. 249). The Chicago Child-Parent Center Project was a 30-year longitudinal study of the effects of a Title I government-funded preschool center-based intervention program for disadvantaged children from ages three to eight years old (Ou et al., 2020). The Chicago Child-Parent Center Program's goal was to facilitate a foundation for school success by emphasizing "early intervention, parent involvement, a structured language-based instructional model, and program continuity between the preschool and early school-age years" (Center for Educational Innovation, University of Minnesota, 2020, para. 4).

The short-term effects from ages five to 13 of the Chicago Child-Parent Center Program resulted in the center participants significantly outperforming the comparison group who did not participate in the center program (Center for Educational Innovation, University of Minnesota, 2018a). The center participants met national norms in school readiness at rates 12% to 18% greater than their comparison peers with significantly superior performance in the domains of language, math, and socio-emotional development (Richardson, Reynolds, Temple, & Smerillo, 2017, p. 620). In addition, the children receiving preschool intervention experienced fewer retentions and placements in

special education through age 13 as compared to children not receiving the intervention (Center for Educational Innovation, University of Minnesota, 2018a, p. 5). The findings of the early years, five to 13, continued to influence the educational achievement and development of the participants (Center for Educational Innovation, University of Minnesota, 2018a).

At 15, the center participants had greater achievement scores in math and reading than non-center participants equating to a four-month gain in performance (Center for Educational Innovation, University of Minnesota, 2018a, p. 5). At the age of 18, center participants had a 29% higher graduation rate and spent less time in special education (up to one year less at a 41% reduction in placement) (Center for Educational Innovation, University of Minnesota, 2018a, p. 6; Morrison, 2017, p. 206). The Chicago Child-Parent Center Project indicated children who received special education placement tended to have lower graduation rates and higher rates of imprisonment, drug use, and depression (Chesmore, Ou, & Reynolds, 2016). By the age of 18, the center group arrests were at a much lower rate than the non-center group, 16.4% versus 25.9%; a pattern of diminished delinquency continued throughout the study to favor the center participants (Center for Educational Innovation, University of Minnesota, 2018a, p. 7).

For 30 years after the end of the initial multilevel Chicago Child-Parent Center intervention, the original 1,539 sample participants, 989 who attended the center and 550 who did not attend, were tracked and assessed (Reynolds et al., 2018). There was a correlation between the center participants and their midlife postsecondary education completion (Reynolds et al., 2018). The participants who had received the Chicago Child-Parent Center intervention program as compared to their peers who did not “were

more likely to have achieved an associate's degree or higher (15.7% vs. 10.7%), bachelor's degree or higher (11% vs. 7.8%), and master's degree or higher (4.2% vs. 1.5%)” (National Institutes of Health, 2018, para. 6). The differences resulted in a 47% increase in achieving an associate's degree and a 41% increase in receiving a bachelor's degree (Center for Educational Innovation, University of Minnesota, 2018b, para. 8). In addition, the annual earnings of the center participants were 25% higher, and they possessed more potential to make a larger income and fall less into poverty than their peers who did not receive the center intervention (Arends, 2019, para. 3). The Chicago Child-Parent Center Project resulted in a cost-benefit analysis that for every dollar invested in the program, \$7.10 was returned to society (Reynolds, Temple, Robertson, & Mann, 2001, para. 6).

The growing evidence that high-quality early childhood programs make a significant difference in preparing children for school, especially children growing up in low-income family units, is supported by the research outcomes of the HighScope Perry Preschool Project, the North Carolina Abecedarian Project, and the Chicago Child-Parent Center Project (Meloy et al., 2019). According to Schweinhart (2016), “These three studies have emerged as the standard bearers for the finding that high-quality early childhood programs for children living in poverty have long-term effects and strong returns on investments” (p. 3). The programs were diverse but produced very compelling similar positive short- and long-term results on participants' lives that led to health and well-being later in life (National Institutes of Health, 2018).

Meta-Analytic Studies of the Effects of Early Childhood Programs

Meta-analysis is a methodology that has gained interest in many branches of study

(Fraenkel, Wallen, & Hyun, 2019). In simple terms, “meta-analysis is an attempt to reduce the limitations of individual studies by trying to locate all of the studies on a particular topic and then using a statistical means to synthesize the results of these studies” (Fraenkel et al., 2019, p. 16). The Harvard School of Education conducted a quasi-experimental meta-analytic study on 22 high-quality early childhood programs from 1960 to 2016 (Feldman, 2018; McCoy, Yoshikawa, & Ziol-Guest, 2017). Walsh (2017) stated the Harvard study covering 46 years of research indicated “the benefits of early childhood can persist for years—bolstering the case for expanding early education programming in the United States” (para. 4). The Harvard study revealed participating in early childhood programs leads to reductions in special education placements, fewer grade retentions, and increased high school graduation rates (Feldman, 2018; McCoy et al., 2017). The researchers concluded quality early childhood education strengthens cognitive and social-emotional skills to ensure school readiness, promotes well-being, and prevents the achievement gap (Feldman, 2018; McCoy et al., 2017).

Karoly, Kilburn, and Cannon (2005b) conducted a meta-analytic literature review of 20 early childhood programs focused on development from pre-birth to kindergarten entrance. The three notable longitudinal studies, the Perry Preschool Project, the North Carolina Abecedarian Project, and the Chicago Child-Parent Center Project, all of which are founded on strong scientifically based research, were included in this study (Karoly, Kilburn, & Cannon, 2005a, 2005b). The early childhood programs were divided into three intervention approaches:

- programs providing home visits to educate parents and support families;

- programs providing center-based early childhood education; and
- programs that combine the two approaches, center-based with supportive parent education. (Karoly et al., 2005b, p. 2)

Significant benefits were demonstrated in two-thirds of the programs in the measured domains of “cognition and academic achievement, behavioral and emotional competencies, educational progression and attainment, child maltreatment, health, delinquency and crime, social welfare program use, and labor market success” (Karoly et al., 2005a). Researchers estimated the cost-benefit to society ranged from \$1.80 to \$17.07 for every dollar spent on program costs (Karoly et al., 2005b, p. 3). Even though some of the programs’ early achievement and cognitive gains faded out, this meta-analytic study indicated consistent long-term gains in graduation rates, decreased numbers of special education placements and grade retentions, and reduced crime and use of social programs (Karoly et al., 2005b).

There is much criticism that government-funded early childhood programs reflect a phenomenon known as fadeout (Rand Corporation, 2018). Some researchers have found scores of children in preschool programs are high, but those advantageous school readiness scores fade out after moving past third grade (Baumfalk, 2018). Mounting solid and conclusive evidence indicates early quality experiences for young children produce positive outcomes for school readiness, and that these positive gains persist throughout future schooling and into adulthood (McCoy et al., 2017). It seems high-quality is the common denominator and key for early childhood programs to develop

gains in school readiness skills that persist and ensure success in school and life (Baumfalk, 2018; Nadworny, 2016).

In 2017, the Rand Corporation sponsored a research study, an update to an earlier 2005 meta-analysis of the effectiveness of early childhood programs (Cannon et al., 2018). The researchers focused the current study on children from infancy to the age of five within 115 programs that met a criterion of rigorous scientific assessment (Cannon et al., 2018; Rand Corporation, 2018). Out of the 115 programs, 102 (89%) resulted in an improvement in at least one or more positive outcomes in the domain areas of social-emotional, cognitive, child health, crime, education attainment, income, family relations, and use of adult social services (Cannon et al., 2018, p. 5; Rand Corporation, 2018, p. 3). The domain of cognitive achievement showed greater positive gains than the other domains (Cannon et al., 2018). The Rand researchers reported a cost-benefit analysis that for every dollar invested in early childhood education, two to four dollars were returned (Cannon et al., 2018, p. 10; Rand Corporation, 2018, p. 3).

In contrast with the meta-analytic study by Karoly, Kilburn, and Cannon, the Rand study's cognitive, social, and economic benefits continued to show significant gains into kindergarten and primary school and often into adulthood (Cannon et al., 2018; Rand Corporation, 2018). The researchers did caution unless the foundations of early childhood interventions are followed with continuous support of developmental experiences and quality services in the middle and high school years, the positive benefits of early childhood education cannot be fully realized (Cannon et al., 2018). Rebecca Kilburn, a coauthor of the study, stated the issues examined in the Rand study point to the same mounting body of evidence that high-quality, well-implemented early childhood

programs can impact the trajectory of children's lives into middle and high school years and adulthood (Rand Corporation, 2018).

In the United States, more than 1.5 million four-year-old children are served in 44 state-funded early childhood programs (Friedman-Krauss et al., 2019, p. 14). A current meta-analysis of eight state-funded preschool programs presented consistent significant gains in children's readiness skills for kindergarten in the areas of literacy, language, and math using a regression discontinuity research design (Barnett et al., 2018). The positive effects on emergent literacy were largest, math were moderate, and language were the smallest (Barnett et al., 2018). The study resulted in undeniable evidence that state-funded early childhood programs can provide short-term improvement in readiness skills and child development (Barnett et al., 2018). Although this meta-analytic study only measured effects at the entrance to kindergarten, many researchers have consistently indicated that initial skill gains are linked to a trajectory that leads to positive impacts in adulthood (Bailey, Duncan, Odgers, & Yu, 2017; Barnett & Frede, 2017; Barnett et al., 2018). To heighten benefits, the researchers recommended more rigorous and consistent evaluations should be conducted of the state-funded programs (Barnett et al., 2018).

Meloy, Gardner, and Darling-Hammond (2019) reviewed 21 public-funded early childhood programs with strong research designs and studied their impact on school readiness. The researchers found distinct benefits for participants in 17 out of 18 programs in which early literacy skills were assessed and for 14 out of 15 programs in which math skills were assessed (Meloy et al., 2019, p. 3). Only six programs measured socioemotional skills, and four out of those six showed benefits in the areas of student behavior and engagement (Meloy et al., 2019, p. 3). Half of the programs that measured

literacy beyond kindergarten entrance were found to result in significant gains in children's reading performance enduring to grade five (Meloy et al., 2019, p. 4). In mathematics performance, Meloy et al. (2019) found that of 13 program studies that measured math skills, 10 resulted in significant benefits through middle school (p. 4).

Lower rates of grade retention and special education placement were found to have instant cost benefits for public schools (Cannon et al., 2018; Meloy et al., 2019). The current expenditure per public school student per year is \$13,847, and the cost is doubled if a child is retained (USDOE, 2019b, para. 1). According to Xia and Glennie (2005), retention increases the possibility of future retention and consequently compounds the expenditure per retained student. Meloy et al. (2019) concluded early childhood programs that provide high-quality education and identify and address special needs in the early years can significantly reduce the costs to schools and society and can change the direction of children's lives into adulthood.

The Effects of State-Funded Early Childhood Programs

Forty-four states and the District of Columbia supported \$8.5 billion in funding for prekindergarten programs serving 1.5 million children (Friedman-Krauss et al., 2019, p. 14). The outcomes of state-funded early childhood programs associated with short-term academic improvements have been positive but mixed regarding the enduring impacts for children (Phillips et al., 2017). The only comprehensive research study of the Missouri Preschool Program was conducted by the MODESE, which commenced in 1998 and concluded in 2003 (Thornburg et al., 2003).

Two significant findings included the following: (a) Missouri Preschool Program participants performed better on child development assessments of social-emotional skills

and the cognitive skills of receptive language, letter-word recognition, and math application as compared to a group of children in non-funded state programs, and (b) children in high-quality preschool programs scored better on developmental assessments than children in lower-quality preschool programs (Thornburg et al., 2003).

Additionally, teachers with higher levels of education and higher salaries were found to provide greater levels of preschool educational experiences when compared to teachers with less educational attainment and lower salaries (Thornburg et al., 2003). Providing higher wages could ultimately lead to higher-quality programs ensuring young children are prepared to be successful upon entering school (Thornburg et al., 2003).

Recommendations included increasing funding support to elevate the quality of lower-rated programs as the researchers widely accepted that high-quality preschools impact school readiness (Thornburg et al., 2003). Also, the researchers strongly recommended House Bill 1519 support the Missouri Preschool Programs not to increase the program quality, but to increase the program's capacity so more children can be served and enter school ready to learn (Thornburg et al., 2003).

Like the Missouri Preschool Program, the Arkansas Better Chance Program is a state-funded program (Argue & Holland, 2017; Hustedt, Jung, Barnett, & Williams, 2015). The school readiness of children who participated in the Arkansas Better Chance program and children who did not attend the program were compared in a study (Hustedt et al., 2015). Children who attended the Arkansas Better Chance Program scored significantly better than children who did not participate as measured in the kindergarten readiness domains of language, math, and print awareness (Arkansas Department of Human Services, 2019; Hustedt et al., 2015). An additional study by the Arkansas

Research Center on the effects of the Arkansas Better Chance Program on later elementary academic outcomes showed statistically significant positive results on late-elementary assessments for Arkansas Better Chance participants as compared to non-participants (Argue & Holland, 2017). Jung, Barnett, Hustedt, and Francis (2013) found that at the end of first and second grade, attendance in the Arkansas Better Chance Program correlated with higher literacy, language, and math scores; however, at the end of third grade, higher scores were only apparent in literacy.

Three states—Florida, Georgia, and Oklahoma—have true universal preschool programs open to serve all four-year-olds regardless of parental income or other risk factors (Quinn, 2017; Rock, 2019). In relation to all 44 states funding preschool programs, Florida’s Voluntary Pre-Kindergarten Program serves the highest percentage of four-year-olds, 77%, with 175,000 students enrolled in 2017-2018 (Rado, 2019, para. 2; Friedman-Krauss et al., 2019, p. 68). Children are enrolled in a 300-hour summer school program or a 540-hour school year program, which every school district is required to offer (Friedman-Krauss et al., 2019, p. 68). The credential required for teaching in the summer program is a bachelor’s degree, while in the school year program, an associate’s degree in child development is the minimum required (Friedman-Krauss et al., 2019, p. 68).

There has been no formal study of the effectiveness of the Florida Voluntary Pre-Kindergarten Program, but a school readiness screening test given at the beginning of the 2018 kindergarten school year indicated only 53% of the pre-K students were ready for school (Rado, 2019, paras. 10-11). Friedman-Krauss et al. (2019), in the *State of Preschool Report 2018*, specified the Florida Voluntary Pre-Kindergarten Program

spends only \$2,177 per child, which is far below the majority of state-funded programs, and the program only meets two of the 10 quality standards benchmarks (p. 68). As cited by the NIEER (2019):

Nationally, we are disappointed by the lack of progress, said NIEER Founder and Senior Co-Director Steven Barnett, Ph.D. Florida has made pre-K available to all four-year-olds but without adequate standards or funding to ensure programs can offer a quality education – and quality is key to producing pre-K’s promised benefits. (para. 4)

Based on the NIEER report, there is a growing concern in Florida regarding the state-funded pre-K program’s low funding, inadequate standards of quality, and inability to prepare the state’s young children for success in school (Rado, 2019).

Established in 1995, Georgia, through its Pre-K Program, was one of the first states to offer a universal pre-kindergarten program to all four-year-olds from every income level (Early, Li, Maxwell, & Ponder, 2019; Peisner-Feinberg, Van Manen, Mokrova, & Burchinal, 2019). The program serves over 80,000 preschoolers for 6.5 hours each day during a 180-day school year (Early et al., 2019, p. 2; Lieberman, 2017, para. 1-3; Peisner-Feinberg, Schaaf, Hildebrandt, & Pan, 2015, para. 1; Peisner-Feinberg et al., 2019, p. 5). The classes are limited to 20 to 22 children with a lead teacher with at least a bachelor’s degree in early childhood development and one assistant with a child development associate’s degree (Early et al., 2019, p. 2; Lieberman, 2017, para. 4; Peisner-Feinberg et al., 2019, p. 5).

In 2011, the Georgia legislature authorized a sequence of studies to evaluate the Georgia Pre-K Program (Georgia Department of Early Care and learning, 2020a;

Lieberman, 2017; Peisner-Feinberg, Garwood, & Mokrova, 2016; Peisner-Feinberg et al., 2019). The 2011-2012 Georgia Pre-K Outcomes Study was developed to examine the quality of early childhood classroom experiences, learning outcomes, and determinants that impact stronger outcomes (Peisner-Feinberg et al., 2019). A random sample of 509 children in 100 Georgia Pre-K Program classrooms demonstrated significant gains in the skills of language, literacy, math, cognitive, and social-emotional (Cagle, 2014; Peisner-Feinberg, Schaaf, & LaForett, 2013, para. 2).

The majority of the Georgia Pre-K Programs (85%) assessed with the ECERS-R rated in the medium-quality range (Peisner-Feinberg et al., 2013, p. 18). The second study, the 2012-2013 Regression Discontinuity Design Study, was designed to evaluate the children's school readiness skills as compared to the children's readiness skills who had not participated in the Georgia Pre-K Program (Georgia Department of Care and Early Learning, 2020a; Peisner-Feinberg et al., 2019). At the beginning and end of kindergarten, assessments were given to 1,181 children including 611 Georgia Pre-K participants and 570 non-participants (Georgia Department of Early Learning, 2020a, para. 4; Peisner-Feinberg et al., 2019, p. 6).

The result of the assessments revealed the readiness skills of children who participated in the Georgia Pre-K program were significantly stronger in all domains than the children who had not participated (Cagle, 2014; Peisner-Feinberg et al., 2016). Additionally, from pre-K to the end of kindergarten, the children who attended the Georgia Pre-K Program made significant advancements in language, literacy, math, cognitive, and social-emotional skills (Deal & Jacobs, 2017; Peisner-Feinberg et al., 2016). Since the assessments were norm-referenced, the scores indicated the pre-K

children were progressing at a greater rate than normal growth progression (Peisner-Feinberg et al., 2016).

The third study began in 2013-2014 and was a longitudinal study taking place from 2013-2020 and from pre-K through fifth grade; the researchers followed 1,169 children to examine the short- and long-term effects of attending the Georgia Pre-K Program and the quality of classroom learning experiences (Georgia Department of Care and Early Learning, 2020a, para. 5; Peisner-Feinberg et al., 2016, para. 2; Peisner-Feinberg et al., 2019, p. 6). In the third year of the study, significant gains were revealed from pre-K through first grade in the domains of literacy, language, math, and social-emotional although the rates of growth were slower in first grade (Lieberman, 2017; Peisner-Feinberg, Mokrova, & Anderson, 2017; Peisner-Feinberg et al., 2019). The quality of learning strategies between child and teacher were higher in the pre-K sample than in the succeeding kindergarten and first-grade sample (Lieberman, 2017; Peisner-Feinberg et al., 2017). Also, children who had participated in high-quality Georgia Pre-K classrooms made greater gains in math and language skills in first grade (Peisner-Feinberg et al., 2017).

The fourth year of the study was focused on the results through second grade (Georgia Department of Care and Early Learning, 2020a; Peisner-Feinberg et al., 2019). The pattern of growth in most domain measures during pre-K, kindergarten, and first grade decreased in second grade (Georgia Department of Care and Early Learning, 2020b; Peisner-Feinberg et al., 2019). The initial gains in standard scores indicated that children participating in the Georgia Pre-K Program were progressing at a faster rate than normal from pre-K into first grade, and the decline in standard scores in second grade

indicated the children were growing at a slower rate than expected (Peisner-Feinberg et al., 2019). According to Peisner-Feinberg, Van Manen et al. (2019), “In other words, children were gaining more than a school years’ worth of knowledge during pre-k and kindergarten, about a school years’ worth in first grade, but often less than a school years’ worth in second grade” (p. 30).

The findings of the study’s fifth year indicated third-grade children who participated in the Georgia Pre-K Program scored higher on a standardized test in all academic areas as compared to children who did not participate in the program, although it must be acknowledged the gains were small according to conventional quantitative measures (Early et al., 2019; Jacobson, 2017). There was a greater improvement for economically disadvantaged children and dual-language learners after a year of pre-K than for advantaged English-proficient children (Jacobson, 2017; Peisner-Feinberg et al., 2019). The results of the effects of Georgia Pre-K participation reflects the findings of other researchers when examining the long-term effects of pre-kindergarten programs (Early et al., 2019). Phillips et al. (2017) stated the evidence is strong for large impacts of state-funded early childhood participation on school readiness, but the evidence is mixed for sustained benefits into elementary school.

Initiated in 1998, the Oklahoma state-funded early childhood program, like Georgia’s, is one of the oldest universal early childhood programs in the United States to serve all four-year-old children irrespective of income (Gormley, Phillips, & Anderson, 2017). Oklahoma’s state-funded pre-K programs have strict standards with a class limit of 20 children, and teachers must hold a bachelor’s degree and a certificate in early education (Wendler, 2018). In 2001, Georgetown University began a study that tracked

children who participated in the universal Tulsa Public Schools (TPS) Pre-K Program over time in the area of academic development (Gormley et al., 2017; Sanchez, 2017).

The Georgetown study was the first to examine the effect of a universal early childhood program on middle school performance (Gormley et al., 2017; Sanchez, 2017). The treatment group was defined as participating in the TPS Pre-K Program in 2005-2006 for at the minimum of half an academic year (Gormley et al., 2017). The TPS Pre-K studies have shown positive impacts for the state-funded program participants as compared to non-participants on kindergarten readiness and enduring effects on advanced elementary and middle school academic outcomes (Anderson & Phillips, 2017; Gormley et al., 2017).

Similar to other state-funded early childhood programs, standardized test scores for the TPS Pre-K Program faded out or diminished, especially in reading by third grade, but middle school students who participated in the universal pre-K program had higher math scores and were more likely to enroll before eighth grade in Algebra I than non-participants (Gormley et al., 2017; Sanchez, 2017). Gormley et al. (2017) found middle school students who participated in the TPS Pre-K Program were more likely to take honors classes and were less likely to be retained. Georgetown University professor and researcher, Gormley, has been studying Tulsa's early childhood program for 16 years and has calculated that for every dollar spent, four dollars are saved (Wendler, 2018). Some Oklahoma legislators do not value the investment and are looking to defund the state pre-K program (Wendler, 2018). Professor Gormley intends to continue the longitudinal study through high school and provide compelling research that the universal Oklahoma

Pre-K Program has left an enduring effect on the children of Oklahoma and justifies the expenditure (Wendler, 2018).

Summary

The purpose of this literature review was to examine the cause-effect relationships between early childhood program participation and school readiness and performance into adulthood. The theoretical framework of constructivism was presented. The biographical history of early childhood education dating back to Martin Luther was reviewed chronologically. The multidimensional aspects of school readiness were examined, which included the four conceptualized interpretations. In addition, the current neuroscience of early childhood development was reviewed. The early childhood longitudinal, meta-analytic, and state-funded research presented revealed high-quality preschool programs impact school readiness with positive outcomes that can have enduring effects into adulthood.

The methodology of this quantitative causal-comparative study is addressed in Chapter Three. An overview of the problem and purpose of the study is presented. The research questions and hypotheses are stated, and the design of the study is examined. Details of the population and sample of Missouri early childhood students are explained. A description of the DIAL-4 instrument used for this quantitative study is summarized with attention to reliability and validity. A concise review of the data collection and data analysis is presented. In addition, ethical considerations, which included confidentiality and anonymity, are explained.

Chapter Three: Methodology

According to Yoshikawa, Weiland, and Brooks-Gunn (2016), there are numerous reasons to invest in early childhood school readiness programs, ranging from the rapid brain development of preschoolers to the rise over the past decade of maternal employment to most importantly the gap in readiness between children of low-socioeconomic parents and children of wealthier, educated parents. Brooks-Gunn, Markman-Pithers, and Rouse (2016) indicated high-quality early childhood education has a positive effect on a child's school readiness and a longer-lasting positive impact into adulthood. A cost analysis of some programs shows for every dollar spent on early childhood education, a benefit return as high as \$17 can be realized (Karloly, 2016, p. 37).

In this chapter, the problem and the purpose of this study of the effect of the Missouri Preschool Program on school readiness are reidentified, and the research questions are restated. The instrumentation is explained in more detail and includes a closer look at the population and sample. Data collection procedures and data analysis are described, and ethical considerations are conveyed.

Problem and Purpose Overview

Nationally and at the state level, policymakers have realized that funding support for early childhood programs is the basis for success in school and is cost-effective (Brooks-Gunn et al., 2016; Morrison, 2017). A high-quality state early childhood grant program was established in Missouri through House Bill 1519 in 1998 (MODESE, 2018a). The *State of Preschool 2017 National Institute for Early Education Research Annual Report* stated Missouri is falling short nationally in providing funding for the

Missouri Preschool Program and is ranked 38th in allocated spending out of 44 state-funded programs (Friedman-Krauss et al., 2018, pp. 111-112).

The purpose of this quantitative study was to examine the school readiness skills of children who participated in a Missouri Preschool Program as compared to the school readiness skills of their peers who did not participate in a Missouri Preschool Program. Only one comprehensive study of the effects of the Missouri Preschool Program was completed in 2003 (Thornburg et al., 2003). Then, Thornburg et al. (2003) concluded the Missouri Preschool Program was of high-quality in preparing preschool children for success in kindergarten, but the need was to increase funding so more children could attend. The basic premise of this research study was to provide current evidence-based data on the effects of the Missouri Preschool Program on the preparedness of children to attend kindergarten. Furthermore, educators, community leaders, and policymakers will have current data to make informed decisions on the effectiveness of the Missouri Preschool Program.

Research questions and hypotheses. The following questions and hypotheses guided this quantitative causal-comparative study:

1. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of motor for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

H1₀: There is no statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of motor for children who participated in a

Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

H1_a: There is a statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of motor for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

2. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of concepts for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

H2₀: There is no statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of concepts for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

H2_a: There is a statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of concepts for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

3. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of language for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

H3₀: There is no statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of language for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

H3_a: There is a statistical difference between the DIAL-4 scores for the kindergarten readiness skill domain of language for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program.

4. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness domain of self-help provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program?

H4₀: There is no statistical difference between the DIAL-4 scores for the kindergarten readiness domain of self-help provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program.

H4_a: There is a statistical difference between the DIAL-4 scores for the kindergarten readiness domain of self-help provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program.

5. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness domain of social-emotional provided by parents whose children

participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program?

H5₀: There is no statistical difference between the DIAL-4 scores for the kindergarten readiness domain of social-emotional provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program.

H5_a: There is a statistical difference between the DIAL-4 scores for the kindergarten readiness domain of social-emotional provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program.

Research Design

This study on the effects of the Missouri Preschool Program on school readiness followed a quantitative non-experimental, causal-comparative research design which “compares two or more groups in terms of a cause (or independent variable) that has already happened” (Creswell & Creswell, 2018, p. 12). Non-experimental, causal-comparative research is also termed *ex post facto* research since the independent variable has already occurred and cannot be manipulated (Ary, Jacobs, Irvine, & Walker, 2019; Boudah, 2020; Fraenkel et al., 2019; Johnson & Christensen, 2020; Mills & Gay, 2019). The secondary data, DIAL-4 scores, were collected from a purposive sample of two groups, Missouri Preschool Program participants and non-Missouri Preschool participants. The cause or consequences of already existing differences between the two sample groups are presented (Fraenkel et al., 2019; Mertler, 2018). The results of this causal-comparative study indicate whether there is a difference between the two

independent variables, students who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program, as measured by the dependent variable, DIAL-4 numerical data in the domains of motor, cognitive, language, self-help, and social-emotional (Ary et al., 2019; Fraenkel et al., 2019; Mills & Gay, 2019).

Population and Sample

The population is the larger group of interest possessing common characteristics to which a researcher wishes to generalize the results of the study (Bluman, 2018; Mills & Gay, 2019). The population for this quantitative study included school districts in the southwest Missouri geographic area that have participated in the Missouri Preschool Program. In southwest Missouri, 17 schools were currently participating in the Missouri Preschool Program, with a total of 21 active Missouri Preschool Program classrooms (MODESE, 2019a).

Purposive sampling was used to determine the school districts selected to participate in this quantitative research study since specific criteria and demographics must be met (Alvi, 2016; Etikan, Musa, & Alkassim, 2016; Fraenkel et al., 2019). A purposive sample is a nonprobability sample and can be representative of the population since the researcher clearly judges the characteristics and demographics (criteria) of the sample to be studied as representative of the population (Alvi, 2016; Ayres, 2019; Creswell & Creswell, 2018). The two districts selected were considered a homogeneous purposive sample in that they both possessed the characteristic of actively participating in the Missouri Preschool Program for the last two school years and utilized the DIAL-4 as a kindergarten screening instrument (Ayres, 2019; Etikan et al., 2016; Fraenkel et al.,

2019). The free/reduced-price meal percentages for the two districts were comparatively high and ranged from 55% to 60% (MODESE, 2018c).

The preschool participants were of an age eligible to attend kindergarten, according to Missouri Law Section 160.053 (MODESE, 2018b). The law states “a child is eligible for admission to kindergarten if the child reaches the age of five (5) before the first day of August of the school year beginning in that calendar year” (MODESE, 2018b, para. 1). With Missouri Preschool Program class sizes generally consisting of 10 to 20 students approaching kindergarten entrance, the selected districts were able to provide adequate sample numbers. From the school districts selected, a sample of 167 secondary data scores were collected from 90 Missouri Preschool Program participants and 77 non-Missouri Preschool Program participants in all five school readiness skill domains of the DIAL-4: motor, cognitive, language, self-help, and social-emotional.

Instrumentation

Secondary data from the DIAL-4 were utilized for this causal-comparative study. The DIAL-4, developed by Pearson Education, is a screening device individually administered and designed to test a young child’s skills in the five domains of motor, concepts, and language as well as self-help and social-emotional as measured by a parent questionnaire (Hamilton, 2014; Mardell & Goldenberg, 2016b; Moodie et al., 2016; Pearson Education, Incorporated, 2018). The DIAL-4 has been normed on a national representative sample and provides standard scores and percentile ranks by age (Hamilton, 2014; Moodie et al., 2016; Pearson Education, Incorporated, 2018).

The domain of motor assesses the skills of throwing, hopping, skipping, block building, thumb finger coordination, cutting, and writing (Coughlan, 2015; Mardell &

Goldenberg, 2016a). A child's ability to point to body parts, color knowledge, rote counting, concepts, sorting, and shape identification are assessed in the domain of concepts (Coughlan, 2015; Mardell & Goldenberg, 2016a). The domain of language assesses the knowledge of personal information, speech articulation, naming of objects, letters and sounds, and problem-solving (Coughlan, 2015; Mardell & Goldenberg, 2016a). The self-help development domain assesses through a parent questionnaire everyday skills such as dressing and feeding, and the social-emotional development domain assesses through a parent questionnaire the skills needed to build relationships and how the child feels about him or herself (Coughlan, 2015; Mardell & Goldenberg, 2016a).

The National Educational Goals Panel and the National Association for the Education of Young Children early childhood standards and domains align with the five domains of the DIAL-4 instrument: motor, concepts, language, self-help, and social-emotional (Mardell & Goldenberg, 2019; Pearson Clinical Assessment, 2019). Mardell and Goldenberg (2019) stated, "These alignments with key early childhood panels and associations demonstrate Pearson's commitment to the improvement of early childhood education" (p. 7). The DIAL-4 was normed on a national representative sample and provides standard scores and percentile ranks by age (Pearson Education, Incorporated, 2018).

Reliability. Reliability is the consistency of a measure, and the most essential form of reliability is an instrument's internal consistency, which is the consistency of responses across items on the instrument (Crossman, 2019b; Fraenkel et al., 2019; Mills & Gay, 2019). The DIAL-4 internal consistency was computed using the formula for

reliability by Guilford (Mardell & Goldenberg, 2016a). Both the English and Spanish versions of the DIAL-4 had internal consistency reliability scores that demonstrated the assessment had a moderate to strong stability coefficient of 0.80 across all domains (Hamilton, 2014; Mardell & Goldenberg, 2016a, p. 54; Moodie et al., 2016, p. 12).

Validity. Validity simply means an instrument accurately measures what it is supposed to measure (Loyal, 2016; Mills & Gay, 2019). In quantitative research, a more precise definition of validity is whether or not valid inferences and conclusions can be drawn from the data collected from an instrument (Creswell & Creswell, 2018; Fraenkel et al., 2019). The studies by Pearson regarding content and construct validity of the DIAL-4's measure of basic developmental skills provided strong evidence of validity (Hamilton, 2014; Mardell & Goldenberg, 2016b; Moodie et al., 2016). The DIAL-4 was compared with the DIAL-3 and six other screening instruments, which provided moderate to strong correlations in scores for concurrent validity (Hamilton, 2014; Mardell & Goldenberg, 2016b; Moodie et al., 2016). The DIAL-4 instrument meets an acceptable level of reliability and validity for this research study, which promotes outcomes for consistency and accuracy.

Data Collection

The following is the sequential order in which the secondary data for this quantitative study were collected. Communication was either electronically or hand-delivered to superintendents of the selected schools in the southwest Missouri geographical area participating in the Missouri Preschool Program asking for consent to collect secondary de-identified data in all five domains of the DIAL-4. The consent letter (see Appendix A) with the research information sheet (see Appendix B) included a

request to categorize into two groups the Missouri Preschool Program students and non-Missouri Preschool Program students for the 2017-2018 and 2018-2019 school years.

After approval from the Lindenwood Institutional Review Board (see Appendix C), the de-identified secondary data were collected from the school districts that consented to provide the DIAL-4 scores. The data were gathered initially by certified personnel in each district who had administered the DIAL-4 instrument for the purpose of kindergarten screening. The advantages of collecting secondary data in this quantitative study, other than convenience and availability, included the sheer volume and depth of data that could be collected and the level of expertise and reduction in bias that could be maintained for the collection process by professionals rather than an independent researcher (Crossman, 2018; Foley, 2018).

Data Analysis

The cause or consequences of the difference, if any, between two already existing purposive sample groups, the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group, were presented in this study. The purposive sample groups were assumed to be normally or approximately normally distributed in view of the fact the DIAL-4 instrument was normed on a nationally representative sample (Pearson Education, Incorporated, 2018). The data sets were checked for outliers, which are extremely low or high values in a data set (Fraenkel et al., 2019; Kovach & Ke, 2016; Taylor, 2019). No strong outliers appeared; therefore, no scores were omitted from the data sets.

Descriptive statistics were used to summarize the data collected from all five domains of the DIAL-4 of the two sample groups into a more decipherable form (Johnson

& Christensen, 2020). The descriptive statistics calculated included the measures of central tendency—the mean, median, and mode (Bluman, 2018; Crossman, 2019a; Mills & Gay, 2019). Measures of central tendency allowed the data to be summarized in a frequency distribution by one number (Fraenkel et al., 2019; Mills & Gay, 2019). The mean is comparatively the most-utilized measure of central tendency and is described as the mathematical average of a data set (Fraenkel et al., 2019; Johnson & Christensen, 2020; Mills & Gay, 2019). The median is considered the midpoint, or 50th percentile, of a data set when the data are arranged in chronological order, descending or ascending (Bergin, 2018; Johnson & Christensen, 2020). The mode is defined as the number which occurs most frequently in a data set (Bergin, 2018; Fraenkel et al., 2019; Johnson & Christensen, 2020). In addition, to summarize the variance of the study sample data, the standard deviation measure was calculated for each group to determine the extent of the scores being relatively homogeneous in relation to the means (Bergin, 2018; Bluman, 2018; Hargrave, 2019; Johnson & Christensen, 2020; Maheshwari, 2018).

From the statistical measures obtained, a *t*-test was performed to analyze the data collected and to test each research question for significant differences (Johnson & Christensen, 2020; Kenton, 2019). Fraenkel, Wallen, and Hyun (2019) stated, “The most commonly used test in causal-comparative studies is a *t*-test for differences between means” (p. 373). As the two samples were independent and were taken from two normally or approximately normally distributed sample groups, and it was presumed the variances were unequal, an independent sample *t*-test was used (Mills & Gay, 2019). The hypotheses reflect an assumption that there exists a difference; however, the assumption is nondirectional. (Bergin, 2018; Fraenkel et al., 2019; Mills & Gay, 2019). Microsoft

Excel technology was used to analyze the data and test the differences of the means on all five domains of the DIAL-4 scores of the independent samples (Bluman, 2018). The level of significance needed to reject the null hypotheses was 5%.

Ethical Considerations

An informed consent form containing a description of the purpose of the research study and any potential risks, including the option to withdraw at any time from participation in the study, was distributed to each participating school district.

Confidentiality. All data collected were secured with pertinent documents in a locked file. All electronic files were saved to a personal desktop computer on a secured site. All electronic files and hard-copy documents will be kept secure for three years after the conclusion of the study and will then be deleted and destroyed (see Appendix D).

Anonymity. Any discussion of identifying demographics of the school districts selected, such as free/reduced-price meal percentages, were noted as approximations. To protect the identity of all participants, the secondary data were assembled and coded by independent professionals from each school district.

Summary

Chapter Three included an account of the problem and purpose, a description of the research design, and a presentation of the research questions and hypotheses. The study was characterized as a quantitative causal-comparative study with a purposive sampling of participants from two selected school districts with homogenous characteristics. The DIAL-4 instrument to measure school readiness was described with attention to reliability and validity. In addition, the data collection and data analysis for

this causal-comparative study were explained in detail. Ethical considerations were discussed in reference to confidentiality and anonymity.

In Chapter Four, the results of the data analysis are presented for this quantitative causal-comparative study which compared two independent samples, Missouri Preschool Program participants and non-Missouri Preschool Program participants. The measures of central tendency and the standard deviations for all five domains of the DIAL-4 instrument of the two independent data score sets are reported. A two-tailed *t*-test of statistical significance was calculated to compare the two independent samples on all five domains of the DIAL-4 instrument, and the results are presented for the *t*-stat, *t*-critical, and *p* value.

Chapter Four: Data Analysis

The purpose of this quantitative causal-comparative study was to examine the school readiness skills of four-year-old children who participated in the state-funded Missouri Preschool Program as compared to the school readiness skills of their peers who did not participate in the Missouri Preschool Program. The readiness skills assessed included the domains of motor, concepts, language, self-help, and social-emotional as measured by the Developmental Indicators for Assessment of Learning-Fourth Edition (DIAL-4) (Pearson Education, Incorporated, 2018).

The focus of current research has been on early childhood education's effect on school readiness for kindergarten, especially when it comes to disadvantaged children (Attanasio et al., 2016; Joughin, 2018; Ma et al., 2015). An abundance of research continually shows that children who participate in high-quality, state-funded early childhood programs acquire greater kindergarten readiness skills than those children who did not participate, especially for low-income and ethnically diverse children (Ansari & Winsler, 2016). The Missouri Preschool Program was established in 1998 with the passage of House Bill 1519, a state-funded grant fund supporting quality early childhood programs and giving priority to programs serving disadvantaged children (MODESE, 2018a).

Only one comprehensive study of the Missouri Preschool Program has taken place, which was from 1998 to 2003 (Thornburg et al., 2003). The results showed the Missouri Preschool Program was of high quality and the readiness skills of the children who participated in the program were significantly better than those of peers who did not

participate (Thornburg et al., 2003). Funding for the program has decreased, and the number of four-year-olds served has diminished over the last few years (Friedman-Krauss et al., 2018). From the results of this current and relevant evidence-based study, Missouri educators, community leaders, and government policymakers can become better informed to reevaluate the state-funded Missouri Preschool Program and the future of the program's funding and requirements to ensure all children enter school ready to learn.

Data Collection Description

After approval by the Lindenwood University Institutional Review Board all secondary data from the five domains of the DIAL-4 screening instrument for the academic years 2017-2018 and 2018-2019 were collected and de-identified by certified personnel from the consenting districts. Two sets of secondary de-identified data included Missouri Preschool Program participants and non-Missouri Preschool Participants. Title I Program participation data were requested to be excluded from the non-Missouri Preschool Program data sets as the same curriculum and standards were being implemented in Title I classrooms as in Missouri Preschool Program classrooms.

Sample Description

The preschool participants in the purposive samples were of age eligibility to attend kindergarten for the 2017-2018 and 2018-2019 school years. Missouri law states a child must be five years old on or before the first day of August of the school calendar year to be permitted to attend kindergarten (MODESE, 2018b, para. 1). The purposive sample group of age-eligible children to attend kindergarten numbered 167 children, including 90 Missouri Preschool Program participants and 77 non-Missouri Preschool Program participants (see Figure 3).

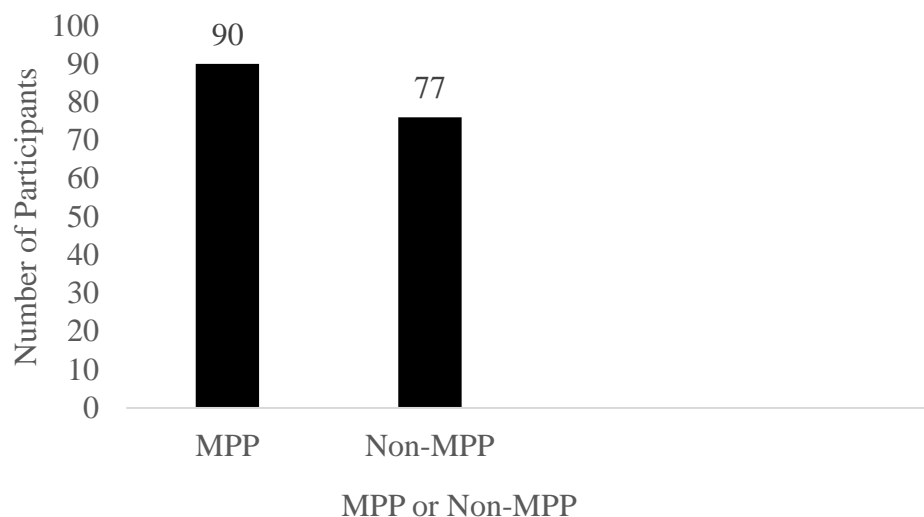


Figure 3. Number of Missouri Preschool Program participants and non-Missouri Preschool Program participants.

Quantitative Analysis

Descriptive measures were utilized to present a summary of the data sets. To summarize the variance of the data sets, the standard deviation was calculated which took into the calculation every score in the distribution (Mills & Gay, 2019). From the descriptive statistical measures gathered, a two-tailed *t*-test of statistical significance was performed to analyze the data and test for significant differences between the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group for all five domains of the DIAL-4 screening instrument (Johnson & Christensen, 2020; Kenton, 2019).

The level of significance was set at $\alpha = .05$. The *t*-stat and *t*-critical were also calculated. For any *t*-stat greater than the *t*-critical, the null hypothesis was rejected, and the means of the Missouri Preschool Program data set and the non-Missouri Preschool

Program data set were considered to be significantly different (Bluman, 2018; Center for Teaching and Learning, University of Toronto, 2017).

Measures of Central Tendency

Research question one. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of motor for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

For the domain of motor skills, the mean (27.54), median (29), and mode (32) of the Missouri Preschool Program sample group were greater than the mean (22.66), median (29), and mode (25) of the non-Missouri Preschool Program sample group. Summarizing the variance for each sample group, the standard deviation for the Missouri Preschool Program sample group was 5.24, and the standard deviation for the non-Missouri Preschool Program sample group was 6.85 (see Table 1).

Table 1

Measures of Central Tendency for the DIAL-4 Domain of Motor

Group	<i>n</i>	<i>M</i>	<i>Mdn</i>	<i>Mode</i>	<i>SD</i>
MPP	90	27.54	29	32	5.24
Non-MPP	77	22.66	23	25	6.85

Research question two. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of concepts for children who

participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

For the domain of concepts skills, the mean (26.5), median (28), and mode (30) of the Missouri Preschool Program sample group were greater than the mean (21.75), median (22), and mode (18) of the non-Missouri Preschool Program sample group. Summarizing the variance for each sample group, the standard deviation for the Missouri Preschool Program sample group was 5.35, and the standard deviation for the non-Missouri Preschool Program sample group was 6.52 (see Table 2).

Table 2

Measures of Central Tendency for the DIAL-4 Domain of Concepts

Group	<i>n</i>	<i>M</i>	<i>Mdn</i>	<i>Mode</i>	<i>SD</i>
MPP	90	26.5	28	30	5.35
Non-MPP	77	21.75	22	18	6.52

Research question three. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of language for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

For the domain of language skills, the mean (24.47), median (28), and mode (25) of the Missouri Preschool Program sample group were greater than the mean (19.09), median (19), and mode (19) of the non-Missouri Preschool Program sample group. Summarizing the variance for each sample group, the standard deviation for the Missouri

Preschool Program sample group was 5.53, and the standard deviation for the non-Missouri Preschool Program sample group was 6.81 (see Table 3).

Table 3

Measures of Central Tendency for the DIAL-4 Domain of Language

Group	<i>n</i>	<i>M</i>	<i>Mdn</i>	<i>Mode</i>	<i>SD</i>
MPP	90	24.47	25	25	5.53
Non-MPP	77	19.09	19	19	6.81

Research question four. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness domain of self-help provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program?

For the domain of self-help skills, the mean (35.84), median (35), and mode (35) of the Missouri Preschool Program sample group were greater than the mean (33.99), median (34), and mode (32) of the non-Missouri Preschool Program sample group. Summarizing the variance for each sample group, the standard deviation for the Missouri Preschool sample group was 4.84, and the standard deviation for the non-Missouri Preschool sample group was 6.07 (see Table 4).

Table 4

Measures of Central Tendency for the DIAL-4 Domain of Self-Help

Group	<i>n</i>	<i>M</i>	<i>Mdn</i>	<i>Mode</i>	<i>SD</i>
MPP	90	35.84	35	35	4.84
Non-MPP	77	33.99	34	32	6.07

Research question five. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness domain of social-emotional provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program?

For the domain of social-emotional skills, the mean (44.17), median (44), and mode (44) of the Missouri Preschool Program sample group were greater than the mean (41.57), median (41), and mode (40) of the non-Missouri Preschool Program sample group. Summarizing the variance for each sample group, the standard deviation for the Missouri Preschool Program sample group was 6.05, and the standard deviation for the non-Missouri Preschool Program sample group was 7.44 (see Table 5).

Table 5

Measures of Central Tendency for the DIAL-4 Domain of Social-Emotional

Group	<i>n</i>	<i>M</i>	<i>Mdn</i>	<i>Mode</i>	<i>SD</i>
MPP	90	44.17	44	44	6.05
Non-MPP	77	41.57	41	40	7.44

Two-Tailed *t*-Test for Significance

From the statistical measures gathered, a two-tailed *t*-test of statistical significance was performed to analyze the data and test for significant differences between Missouri Preschool participants and non-Missouri Preschool participants in all five domains of the DIAL-4.

Research question one. The *t*-stat for the DIAL-4 domain of motor was 5.10 and the *t*-critical value was 1.98. The level of significance was set at $\alpha = .05$, and the significance value of $p < .001$ was reported between the two independent samples, the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group.

Research question two. The *t*-stat for the DIAL-4 domain of concepts was 5.09 and the *t*-critical value was 1.98. The level of significance was set at $\alpha = .05$, and the significance value of $p < .001$ was reported between the two independent samples, the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group.

Research question three. The *t*-stat for the DIAL-4 domain of language was 5.54 and the *t*-critical value was 1.98. The level of significance was set at $\alpha = .05$, and the significance value of $p < .001$ was reported between the two independent samples, the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group.

Research question four. The *t*-stat for the DIAL-4 domain of self-help was 2.16 and the *t*-critical value was 1.98. The level of significance was set at $\alpha = .05$, and the significance value of $p = .033$ was reported between the two independent samples, the

Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group.

Research question five. The t -stat for the DIAL-4 domain of social-emotional was 2.45 and the t -critical value was 1.98. The level of significance was set at $\alpha = .05$, and the significance value of $p = .016$ was reported between the independent samples, the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group (see Table 6).

Table 6

Summary of Two-Tailed t -Test Data for the DIAL-4 Five Domains

Domains	t -Stat	t -Critical	p
Question 1: Motor	5.10	1.98	< .001*
Question 2: Concepts	5.09	1.98	< .001*
Question 3: Language	5.54	1.98	< .001*
Question 4: Self-Help	2.16	1.98	.033*
Question 5: Social-Emotional	2.45	1.98	.016*

Note. p values < .05 are denoted with * to indicate significance.

Summary

Data were collected and analyzed from a sample of 167 children eligible for kindergarten to form two independent samples, 90 Missouri Preschool Program participants and 77 non-Missouri Preschool Program participants. Descriptive statistics were calculated for all five domains of the DIAL-4 to summarize the measures of central tendency and the standard deviations for the two data sets of participants. From these

statistical measures of central tendency and the standard deviations, a two-tailed *t*-test was performed to determine if there was a statistically significant difference between the data sets for all five domains of the DIAL-4 assessment: motor, concepts, language, self-help, and social-emotional. The $\alpha = .05$ level was established and the *t*-stat, *t*-critical, and *p* value were stated.

Chapter Five commences with a summary of the study's major findings and conclusions drawn from the data analysis for each question and corresponding hypothesis. A discussion of the current early childhood education research with implications for future practice is presented. Recommendations for modifications to this study for additional future research are described. Finally, a summary of the dissertation is reviewed.

Chapter Five: Summary and Conclusions

In Chapter Five, the main components of this study are reviewed and a description of the major components of how early childhood education affects school readiness are presented. This study was designed to identify a significant difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domains of motor, concepts, language, self-help, and social-emotional for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program. The findings from the data analysis in Chapter Four are stated for each research question. Supporting current and relevant literature are described in the following sections. Conclusions, implications, and recommendations for further research are provided.

Findings

The data presented in Chapter Four were statistically analyzed, and the findings are described in this section. The findings for each research question were determined following analysis of the data.

Research question one. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of motor for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

For research question one, the t -stat for the DIAL-4 domain of motor was 5.10, which was greater than the t -critical of 1.98; therefore, the null hypothesis was rejected (Bluman, 2018; Center for Teaching and Learning, University of Toronto, 2017). With the level of significance set at $\alpha = .05$, the significance value of $p < .001$ was reported,

which indicated a significant statistical difference was found between the means of the two independent samples, the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group for the DIAL-4 domain of motor.

Research question two. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of concepts for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

For research question two, the t -stat for the DIAL-4 domain of concepts was 5.09, which was greater than the t -critical of 1.98; therefore, the null hypothesis was rejected (Bluman, 2018; Center for Teaching and Learning, University of Toronto, 2017). With the level of significance set at $\alpha = .05$, the significance value of $p < .001$ was reported, which indicated a significant statistical difference was found between the two independent samples, the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group for the DIAL-4 domain of concepts (Bluman, 2018; Fraenkel et al., 2019).

Research question three. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness skill domain of language for children who participated in a Missouri Preschool Program and children who did not participate in a Missouri Preschool Program?

For research question three, the t -stat for the DIAL-4 domain of language was 5.54, which was greater than the t -critical of 1.98; therefore, the null hypothesis was rejected (Bluman, 2018; Center for Teaching and Learning, University of Toronto, 2017). With the level of significance set at $\alpha = .05$, the significance value of $p < .001$ was

reported, which indicated a significant statistical difference was found between the two independent samples, the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group for the DIAL-4 domain of language (Bluman, 2018; Fraenkel et al., 2019).

Research question four. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness domain of self-help provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program?

For research question four, the t -stat for the DIAL-4 domain of self-help was 2.16, which was greater than the t -critical of 1.98; therefore, the null hypothesis was rejected (Bluman, 2018; Center for Teaching and Learning, University of Toronto, 2017). With the level of significance set at $\alpha = .05$, the significance value of $p = .033$ was reported, which indicated a significant statistical difference was found between the two independent samples, the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group for the DIAL-4 domain of self-help (Bluman, 2018; Fraenkel et al., 2019).

Research question five. What is the difference, if any, between the DIAL-4 scores for the kindergarten readiness domain of social-emotional provided by parents whose children participated in the Missouri Preschool Program and parents whose children did not participate in the Missouri Preschool Program? For research question five, the t -stat for the DIAL-4 domain of social-emotional was 2.45, which was greater than the t -critical of 1.98; therefore, the null hypothesis was rejected (Bluman, 2018; Center for Teaching and Learning, University of Toronto, 2017). With the level of

significance set at $\alpha = .05$, the significance value of $p = .016$ was reported, which indicated a significant statistical difference was found between the two independent samples, the Missouri Preschool Program sample group and the non-Missouri Preschool Program sample group for the DIAL-4 domain of social-emotional (Bluman, 2018; Fraenkel et al., 2019).

Conclusions

The Missouri Preschool Program is a state grant-funded program to provide Missouri schools the opportunity to establish a high-quality early childhood program with priority given to programs serving disadvantaged children (MODESE, 2018a). Even though Missouri policymakers, educators, and community leaders continue to emphasize the value of publicly funded early childhood programs, funding has continued to decrease for the Missouri Preschool Program, and the number of four-year-olds served has diminished (Friedman-Krauss et al., 2018). In addition, a comprehensive evaluation of the Missouri Preschool Program has not been conducted in over 17 years (Thornburg et al., 2003).

This quantitative causal-comparative study was designed to examine the school readiness skills of four-year-old children who participated in a Missouri Preschool Program as compared to the school readiness skills of their peers who did not participate in a Missouri Preschool Program as measured by the DIAL-4. The basic premise of this research study was to provide current evidence-based research on the effect of the Missouri Preschool Program on school readiness so policymakers can make informed decisions on the program's future viability with regard to funding and ensuring all children come to school ready to learn. Unquestionably, Missouri has an interest in

ensuring investments in the Missouri Preschool Program produce strong outcomes in readiness for school.

The findings of the causal-comparative study were statistically significant for school readiness for the Missouri Preschool Program sample as compared to the non-Missouri Preschool Program sample. The de-identified scores of the Missouri Preschool Program participants when compared to the non-Missouri Preschool Program participants showed greater gains in all five school readiness domains of the DIAL-4: motor, concepts, language, self-help, and social-emotional. The independent *t*-tests for the domains of motor, concepts, and language indicated a statistical significance between mean scores of Missouri Preschool Program Participants and non-Missouri Preschool Program participants. Also, statistical significance was reported between Missouri Preschool Program participants and non-Missouri Preschool Program participants in the domains of self-help and social-emotional. It should be noted the scores for the self-help and social-emotional domains were provided through scored parent questionnaires of the DIAL-4 instrument.

These findings are consistent with numerous longitudinal, meta-analytic, and state-funded studies documenting the value of quality early childhood programs not only for promoting school readiness but providing long-lasting positive effects, especially for children who are economically disadvantaged (Bakken et al., 2017; Ferguson, 2018). Improving school readiness is the most-cited objective of early childhood programs (Phillips et al., 2017). School readiness is a concept that is multidimensional and includes competency in language, literacy, cognition, motor, self-help, and social-

emotional skills to enable a child to enter kindergarten ready to learn (Bakken et al., 2017; Black et al., 2017; Mead, 2016; Phillips et al., 2017).

Implications for Practice

A mounting body of research over the past decades from multiple disciplines – neuroscience, early childhood development, and economics—has demonstrated the significance of high-quality early childhood programs to effectively prepare children for entrance to school and lead to a positive trajectory for life and cost-benefits to society (Bakken et al., 2017; Black et al., 2017; Brooks-Gunn et al., 2016; Devercelli, 2017; Rand Corporation, 2018). As a result of this high-quality early childhood program study, significant differences were identified between Missouri Preschool Program participants and non-Missouri Preschool Program participants in all five school readiness domains of the DIAL-4 instrument: motor, concepts, language, self-help, and social-emotional. These results align with and add evidence to the early childhood research that high-quality early childhood education has a profound effect on the multidimensional domains of school readiness, especially for disadvantaged children (Bakken et al., 2017; Ferguson, 2018).

The implications for practice, based on the findings from this study, are that participation in a high-quality early childhood program will not only ensure school readiness but significantly have a cost-benefit to society and lead children on a trajectory to enduring positive effects in adulthood (Bakken et al., 2017; Black et al., 2017; Brooks-Gunn et al., 2016; Devercelli, 2017; Rand Corporation, 2018). The research indicated not only that participants in high-quality early childhood programs provide their children with a more stable home life with financial security, but there is an intergenerational

effect where a high number of the participants' offspring acquire the same positive benefits (Heckman & Karapakula, 2019b; Jacobson, 2019; Mongeau, 2019). Findings from cumulative studies suggest implementing high-quality early childhood programs like the Missouri Preschool Program “can contribute to lifting multiple generations out of poverty” (Heckman & Karapakula, 2019a, p. 25).

Providing legislation and funding for the support of school readiness through quality early childhood programs is a vital task of practitioners and policymakers. Across the nation, local and state budgets are becoming very tight especially for early childhood programs that are outside the funding formulas for kindergarten through 12th grade (NCSL, 2018). Policymakers recognize the importance of the sensitive periods of early brain development and the critical value of quality early childhood programs, but require data-driven evidence to justify their decisions for future funding and program design (NCSL, 2019a).

Recommendations for Future Research

The Missouri Preschool Program is a grant-funded early childhood program established in 1998 with the passage House Bill 1519, giving priority to programs serving large numbers of low-socioeconomic children (MODESE, 2018a). In the initial year of the establishment of the Missouri Preschool Program, 54 districts were grant-funded (Barnett et al., 2016). It would be interesting to conduct a longitudinal study of a select sample group of the original three- and four-year-old students, who would now, 22 years later, be 25 and 26 years old, respectively. A large body of research is consistent in indicating high-quality preschool not only produces positive outcomes for school readiness but sets children on a trajectory to positive outcomes through high school and

into adulthood (Bakken et al., 2017; Black et al., 2017; Brooks-Gunn et al., 2016; Devercelli, 2017; Rand Corporation, 2018).

A variety of data could be collected on school readiness for entrance to kindergarten, elementary, middle school, and high school for academic achievement, retention and special education placement, high school and college graduation rates, crime and prison incarceration rates, levels of income, and homeownership. The challenging aspect of this longitudinal study would naturally come from being able to ascertain an original list of Missouri Preschool Program participants and non-participants and then to have access to them in adulthood, as attrition would be a factor. A possible outgrowth of a longitudinal study would be to calculate the cost-benefit as measured by the cost for retention and special education placement, crime and imprisonment, social welfare programs, and the income earnings and tax benefits as compared to the Missouri Preschool Program investment.

There are many reasons to invest in early childhood programs varying from the rapid brain development of preschoolers to the gap in readiness between children of low-socioeconomic parents and children of wealthier, educated parents. The HighScope Perry Preschool Project, the North Carolina Abecedarian Project, and the Chicago Child-Parent Project contributed to the ever-increasing evidence that high-quality early childhood programs are advantageous for disadvantaged children and make a significant difference in the school readiness skills and future lives of children from low-socioeconomic and ethnically diverse families (Ansari & Winsler, 2016; Meloy et al., 2019). It might be valuable to conduct a causal-comparative research study comparing the school readiness skills in all five domains of the DIAL-4 instrument of disadvantaged

Missouri Preschool Program participants as compared to the readiness skills of non-disadvantaged Missouri Preschool Program participants.

The disadvantaged sample group criteria for selection would be eligibility for free and reduced price meals and the non-disadvantaged sample group criteria would be non-eligibility for free and reduced price meals. The DIAL-4 instrument would be administered prior to entrance to the four-year-old Missouri Preschool Program and then prior to entrance to kindergarten. Statistical analysis would be performed to determine if there is a significant difference between the secondary de-identified scores of the disadvantaged participants prior to preschool and prior to entrance to kindergarten. Similarly, statistical analysis would be performed to determine if there is a significant difference between the secondary de-identified scores of the non-disadvantaged participants prior to entrance to the Missouri Preschool Program and prior to entry to kindergarten. It would be valuable to compare the Dial-4 pre- and post-scores of the disadvantaged participant sample group to the advantaged participant group to ascertain if there were any differences in the growth of school readiness in each of the five domains.

Early childhood education is often cited as benefiting students not only in the domains of motor, concepts, and language, but in the domains of social skills and emotional development. The DIAL-4 instrument has sections that evaluate a child's motor, concepts, and language skills through some specific exercises. In addition, there are two sections that evaluate the level of self-help skills and social-emotional development through a questionnaire to be completed by not only parents but teachers.

In this study of the effect of the Missouri Preschool Program on school readiness,

secondary de-identified data for all five domains of the DIAL-4 instrument were collected. For the domains of self-help and social-emotional, the scores from the questionnaire completed by parents were included. It would be valuable to conduct a study that included the scores of kindergarten teachers on the DIAL-4 questionnaire for the self-help and social-emotional domains for Missouri Preschool Program participants and non-participants to see if there is a significant difference between them. A focus group could be an additional step to assess the kindergarten teachers' perceptions of the effect of Missouri Preschool Program participation on school readiness, expressly in the areas of self-help and social-emotional skills as compared to children who do not have prior preschool experience.

Summary

The key priority of policymakers, educators, and researchers has been how to develop the necessary skills in youth to meet the challenges of the 21st century with the answer pointing squarely to providing high-quality early childhood programs to ensure young children enter kindergarten with adequate school readiness skills (Ferrarello, 2017; Phillips et al., 2017). The concept of early childhood education, which came to the United States from Europe in the 20th century during the Industrial Revolution, was introduced in Chapter One (Lipoff, 2011). The early childhood movement was chronicled from the passage of the Elementary and Secondary Education Act by President Johnson in 1964 to President Bush's reauthorization with the passage of the No Child Left Behind Act in 2002, and finally to the passage of the Every Student Succeeds Act by President Obama in 2015 (USDOE, 2016). Each reauthorization prioritized the

belief that every child should enter school ready to learn and committed investments to high-quality early childhood programs.

A background history and description of the Missouri Preschool Program was presented. The Missouri Preschool Program was established in 1998 with the passage of House Bill 1519 to give schools the opportunity to establish a high-quality early childhood program with priority given to serving children from low-socioeconomic families (MODESE, 2018a). The theory of constructivism was introduced as the guiding framework. The purpose of the study to examine the school readiness skills of four-year-old children who participated in a Missouri Preschool Program as compared to the school readiness skills of their peers who did not participate in a Missouri Preschool Program was presented. The problem that there has not been a comprehensive research study of the effect of the Missouri Preschool Program since 2003 and that the funding and number of children served has diminished was described. The five research questions with corresponding hypotheses were stated. The significance to provide current and relevant evidenced-based results was introduced.

Chapter Two included an in-depth review of the theory of constructivism. Two of the most prominent constructivist theorists of the 20th century were Piaget and Vygotsky (Aljohani, 2017; Ekpenyong & Edokpolor, 2016; Ozturk, 2016; Thompson, 2018). The constructivist approach of discovery learning is deeply rooted in the research of Piaget and Vygotsky and was chosen as the theoretical framework to guide this study (Dalcour, 2019; Suhendi & Purwano, 2018; UK Essays, 2016). The biographical history of early childhood education was chronicled, highlighting prominent figures in the development of early childhood education.

The multidimensional aspects of school readiness and the neuroscience of brain development were explained. A review of longitudinal, meta-analytic, and state-funded research studies was presented. Increasing evidence of the indispensable contributions of high-quality early childhood education to school readiness, brain development, later academic success, positive outcomes in adulthood, and national economic growth through the reduction of placement in remedial education, reduction in crime, reduction in spending on anti-poverty programs, increased earnings of participants, and participants enlarging the skilled workforce were reviewed (Black et al., 2017; Devercelli, 2017). Early childhood education, especially for disadvantaged children, ensures children enter kindergarten ready to learn and sets them on a trajectory to long-term positive outcomes in adulthood, ensuring health and wellbeing later in life.

An overview of the methodology was provided in Chapter Three. The problem and purpose of this study were reviewed, and the research questions and hypotheses were restated. This study was conducted to examine the school readiness skills of children who participated in a Missouri Preschool Program as compared to the school readiness skills of their peers who did not participate in a Missouri Preschool Program as measured by the DIAL-4 instrument in all five domains: motor, concepts, language, self-help, and social-emotional.

The research design of this non-experimental causal-comparative study was explained and referred to as ex post facto research. The population included school districts in southwest Missouri that participated in the Missouri Preschool Program, and the sample was composed of the DIAL-4 scores of 167 children from two school districts. The DIAL-4 screening instrument was described, which included strong

measures of reliability and validity. The data collection of secondary de-identified data and the data analysis were explained. Descriptive statistics were used to calculate the measures of central tendency and the standard deviation for each purposive sample group. The measures of central tendency and the standard deviation summarized the de-identified secondary data sets of the two sample groups collected from the five domain scores of the DIAL-4. The research design included a two-tailed *t*-test to test for significant differences between the means of the two data sets for each of the DIAL-4 domains. Ethical considerations were outlined with a description of confidentiality and anonymity specifics.

In Chapter Four, the analysis of the data was presented. A brief review of the data collection, population and sample, and quantitative data analysis were presented. For each research question, the results of the measures of central tendency were stated for the data sets for each purposive sample group. From the statistical measures obtained, a two-tailed *t*-test was performed to analyze the de-identified data sets collected and to test each research question for significant differences with α set at .05. The *p* value was reported for each domain of the DIAL-4 which included motor, concepts, language, self-help, and social-emotional.

The findings were highlighted in Chapter Five. The data analysis revealed a significant difference between Missouri Preschool Program participants and non-Missouri Preschool Program participants in each of the DIAL-4 domains: motor, concepts, language, self-help, and social-emotional. Conclusions were drawn that this study reflects the overwhelming evidence of research that high-quality early childhood programs have a profound impact on school readiness.

The indisputable implication of this study for practice is that high-quality early childhood programs, like the Missouri Preschool Program, will not only provide young children with school readiness skills but will set children on a path to long-term positive outcomes in adulthood, which in turn is a cost-benefit to society and the national economy (Bakken et al., 2017; Black et al., 2017; Brooks-Gunn et al., 2016; Devercelli, 2017; Rand Corporation, 2018). The neuroscience of brain development indicates a child's brain grows at an exceedingly fast rate from birth to the age of five (Bales, 2019; Robinson et al., 2017). Not only are high-quality early childhood programs essential to brain development, school readiness, and long-term outcomes, but the establishment of programs that educate and guide parents to assist in the development of their children from birth to entrance to school is vital for those positive outcomes to come to fruition (Black et al., 2017; Devercelli, 2017).

Several recommendations for future research were presented, including a longitudinal study comparing a sample group of the initial 1998 Missouri Preschool Program participants to their peers who did not attend a Missouri Preschool Program on a variety of collected data such as school readiness skills, retention and special education placement numbers, academic achievement, high school and college graduation rates, adult incomes, and homeownership. An additional recommendation was to conduct a causal-comparative study comparing school readiness skills as measured by the DIAL-4 between a sample group of disadvantaged Missouri Preschool Program participants and Missouri Preschool Program participants who did not come from low-socioeconomic families. A study of kindergarten teachers' perceptions of the effect of the Missouri Preschool Program on social skills was recommended. The formation of a focus group of

kindergarten teachers was suggested to assess perceptions of the Missouri Preschool Program with regard to the effect on school readiness, especially in the areas of self-help and social-emotional.

The question asked consistently by practitioners and policymakers is how to provide for the nation's youth to meet the challenges of the 21st century. The answer lies directly in providing high-quality early childhood programs to ensure children enter school ready to learn. The results of this study are a reflection of the overwhelming evidence that high-quality early childhood education not only has an impressive positive effect on school readiness but can put children on a trajectory to positive outcomes in adulthood with favorable intergenerational effects. The mounting positive early childhood education research translates into an optimistic future and cost-benefit to society.

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Appendix A

Permission Letter

(Date)

RE: Permission to Conduct Research in (School District)

To (Superintendent):

I am writing to request permission to conduct research in the (School District). I am currently pursuing my doctorate through Lindenwood University and am in the process of writing my dissertation. The study is entitled *The Effect of the Missouri Preschool Program on School Readiness*.

I am asking permission for you to provide de-identified scores in the five domains of the DIAL-4 kindergarten screening instrument separated into two groups, Missouri Preschool Program participants and non-Missouri Preschool participants, for the school calendar years of 2017-2018 and 2018-2019. If you agree, please sign below, scan this page, and email back to me, Madeline Allin, at [REDACTED].

Your approval to conduct this study will be greatly appreciated. I would be happy to answer any questions or concerns that you may have regarding this study.

Sincerely,

Madeline J. Allin

Doctoral Student at Lindenwood University

Approved by:

Print name and title here

Signature

Date

Appendix B

LINDENWOOD

Research Information Sheet

You are being asked to participate in a research study. We are conducting this study to determine the effect of the Missouri Preschool Program on school readiness. During this study, you will be asked to provide de-identified scores from the DIAL-4 screening instrument divided into two groups, Missouri Preschool Program participants and non-Missouri Preschool participants, for the school calendar years of 2017-2018 and 2018-2019. It will take about 30 minutes to one hour to complete this study.

Your participation is voluntary. You may choose not to participate or to withdraw at any time.

There are no risks from participating in this project. There are no direct benefits for you participating in this study.

We will not collect any data which may identify you.

We will do everything we can to protect your privacy. We do not intend to include information that could identify you in any publication or presentation. Any information we collect will be stored by the researcher in a secure location. The only people who will be able to see your data include members of the research team, qualified staff of Lindenwood University, and representatives of state or federal agencies.

Who can I contact with questions?

If you have concerns or complaints about this project, please use the following contact information:

Madeline J. Allin
[REDACTED]

Dr. Shelly Fransen
[REDACTED]

If you have questions about your rights as a participant or concerns about the project and wish to talk to someone outside the research team, you can contact Michael Leary (Director - Institutional Review Board) at 636-949-4730 or mleary@lindenwood.edu.

Appendix C Institutional Review Board Approval

From: irb@lindenwood.edu <irb@lindenwood.edu>
Sent: Tuesday, November 12, 2019 12:36 PM
To: Grover, Kathy <KGrover@lindenwood.edu>; MA264@lindenwood.edu <MA264@lindenwood.edu>; Fransen, Shelly <SFransen@lindenwood.edu>
Subject: IRB-20-61 - Initial: Exempt - Approved

Nov 12, 2019 12:36 PM CST

RE:
 IRB-20-61: Initial - The Effect of the Missouri Preschool Program on School Readiness

Dear Madeline Allin,

The study, The Effect of the Missouri Preschool Program on School Readiness, has been Approved as Exempt.

Category: Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).
 The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

The submission was approved on November 12, 2019.

Here are the findings: **Regulatory Determinations**

- This study has been determined to be minimal risk because the research is not obtaining data considered sensitive information or performing interventions posing harm greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

IRB Discussion

- This study entails collection of de-identified secondary data. The application has been revised to reflect this research design, and as such, does not include any consent materials. In this case, the PI is only receiving anonymized data from the providers described in the application.

Sincerely,
 Lindenwood University (lindenwood) Institutional Review Board

Appendix D

Safeguards

Confidentiality.

1. All data are secured, and pertinent documents are in a locked file under the personal supervision of the researcher.
2. All electronic files pertinent to the study are secured on a personal secure network site with a strong protected password.
3. All electronic files and hard-copy documents will be kept secure for three years after the conclusion of this study when all files and documents will be destroyed.

Anonymity.

1. Any discussions of identifying demographics of the school districts selected, such as free/reduced-price meal percentages, were noted as approximations.
2. To protect the identity of all participants, the secondary data were assembled and de-identified by encrypting or coding the students' names and scores by independent professionals from each school district.

Overall.

1. Each participating school district's superintendent received an Informed Consent Form along with a Research Information Sheet describing the purpose of the research study, the explanation of no risks involved with participation, assurance of no identifying information being included, and the option of withdrawing from the study at any time.
2. Contact information was provided if further information was needed or if complaints needed to be lodged regarding this study.

Vita

Madeline Allin retired after 25 years in the field of education. She holds a Bachelor of Science degree in Elementary Education from the University of Missouri in Columbia, Missouri; a Master of Education degree in Elementary Administration from Missouri State University in Springfield, Missouri; and an Educational Specialist degree in Elementary Administration from Missouri State University in Springfield, Missouri.

Madeline has had a varied career in education. She taught first, second, and sixth grades in Illinois and Missouri school districts. She then transitioned into an elementary principal role in Thayer, Missouri, followed by elementary principalships in Sparta and Forsyth, Missouri. Madeline retired in 2014 from Rogers Public Schools in Rogers, Arkansas, as the Director of Competitive Grants in Central Administration. During her tenure at Rogers Public Schools, Madeline provided technical assistance with regard to grant writing for the Arkansas Department of Education and the Department of Health and Human Services.

Throughout her career, Madeline has been an advocate of early childhood education and has worked to develop high-quality early childhood programs through government and private grant opportunities. She has had the opportunity to serve on both national and local community not-for-profit boards and foundations focused on enhancing the lives of children. Madeline holds a lifetime commitment to making a difference in the lives of children.