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Differences in At-Risk Children's Preschool Assessment by Teachers' Level of Education

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This is to certify that the doctoral study by

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Walden University
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Abstract

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MS, University of Rochester, 2012

BS, University of Nigeria, 1995

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Despite state requirements, standards, and recommendations from various early childhood agencies, huge differences exist in levels of education held by teachers of 4-year-olds in early childhood classrooms, which may affect the quality of service they offer to children as well as students' performance on assessments. This quantitative study determined whether significant differences existed between assessment scores of at-risk children taught by teachers with different levels of education and years of experience using standardized assessments (Teaching Strategies GOLD [TSG] and Phonological Awareness Literacy Screening [PALS]). The theoretical framework for this study was Bronfenbrenner's ecological theory of human development. Data were analyzed using a descriptive and 1-way multivariate analysis of variance (MANOVA). Pretest and posttest data were collected from an archived database of TSG and PALS assessment scores of 142 at-risk Prekindergarten 4 children who were taught by 18 different Prekindergarten 4 teachers at a local Head Start site. A 1-way MANOVA multivariate test indicated that assistant teachers' level of education was statistically significant at $p = .012$. A univariate 1-way ANOVA indicated that no statistically significant difference was found among the groups of dependent variables. It is recommended that attention be focused on teacher practice and teacher-child interaction backed with adequate professional development, rather than levels of education and experience. This study may support the hiring of committed teachers who can turn knowledge into practice and use data to inform their practice to unlock the potential of at-risk children.

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Dedication

I dedicate this study to all at-risk and youngest children all over the world. You represent the driving force and future of every nation, community, neighborhood, and families. My dedication goes to every intentional teacher committed to genuinely unlocking the potentials of our youngest children. Despite the low pay and little appreciation for the work you do, you did not walk out on the children or get discouraged. I salute your courage and dedication. I appreciate God for the skills of determination and resilience He used my father to build in me, this was a tough journey for me but the skills helped me through. Though my dad left so soon, I lived to fulfill his dream. My final dedication is to my mother, what you did not achieve, I have accomplished in your lifetime.

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Chapter 1: Introduction to the Study

Teachers' levels of education have been identified as encompassing not only formal education, but also credentials and experiences (Falenchuk, Periman, McMullen, Fletcher, & Shah, 2017). With over 60% of children under age 6 regularly attending one type of child care center or another in the United States (Mamedova & Redford, 2015), the relevance of early childhood learning in children's development becomes significant, but children's experiences vary in quality across programs and classrooms within center-based programs (Lin & Magnuson, 2018). The variation in the quality of services offered to children in early childhood education (ECE) programs has raised concern among researchers and policymakers. As a result of this concern, there has been a focus on improving ECE quality, driven by the aspiration that higher quality ECE will better support children's early academic and social skills (Burchinal et al., 2016). Some efforts to increase the quality of ECE have involved attempts to increase teachers' levels of education to include content knowledge and pedagogy, which are recognized as providing a foundation of positive interactions and enrichment experiences to support children's learning (Buettner, Hur, Jeon, & Andrews, 2015; National Association for the Education of Young Children [NAEYC], 2016).

The National Institute of Early Education Research (NIEER) included teachers' level of education (with a minimum of a bachelor's degree in early childhood or a related field) as one of 10 benchmarks for evaluating the yearly state of Prekindergarten (Barnett et al., 2016, 2017). For efficient performance in early care settings, NAEYC standards mandate that all lead teachers and assistant teachers in NAEYC accredited child care

centers between the years 2006 and 2020, including Head Start centers, must acquire a baccalaureate degree (NAEYC, Criterion 6.A.05-12, 2015). The American Academy of Pediatrics (AAP) and American Public Health Association (APHA) have recommended a minimum of a bachelor's degree for early childhood educators (AAP & APHA, 2015). The AAP and APHA (2015) have further suggested that at least 50% of all assistant teachers and teacher aides should have or be working on either a Child Development Associate (CDA) credential or an equivalent (AAP & APHA, 2015). To ensure a quality program, the study state requires all Prekindergarten 4 and 5 (Pre-K 4, Pre-K 5) teachers to have a state license in early childhood and a bachelor's degree in early childhood (Department of Public Instruction [DPI], 2017).

Despite findings from previous studies, as shown below, and current state requirements that teachers must hold a bachelor's degree in ECE or child development (CD) when teaching Pre-K 4 and 5, huge differences still exist between the levels of education of staff who teach 4-year-olds in early childhood centers. National data show that only 35% of all early childhood teachers hold a bachelor's degree or higher (Mamedova & Redford, 2015; Whitebook, McLean, & Austin, 2016). Researchers have shown that the quality of most preschool child care centers is neither high enough to meet the needs of children from high-risk backgrounds nor sufficient to prepare such children for school readiness (Landry et al., 2017). This problem of a lack of degreed teachers in early childhood centers may affect the quality of service offered to children and have a negative effect on assessments concerning school readiness performance scores. This may subsequently create a deficiency in learning as children transition to kindergarten

(Lin & Magnuson, 2018), especially for at-risk children who have been described as having impediments in behavior and intellectual development in comparison to their peers from high-socioeconomic-status families (Bellows et al., 2017; Laundry et al., 2017; Peeters & Sharmahd, 2015).

Through this study, I sought to determine whether differences in teachers' levels of education and experience lead to differences in at-risk children's scores on standardized readiness assessments. Addressing the lack of research in this area could promote positive social change, as evidence garnered from this study could be useful in identifying the levels of education that teachers need to serve at-risk children effectively. This knowledge could inform schools' and child care centers' prerequisites for hiring preschool teachers in at-risk preschool communities. Data from this study offer insight into what levels of education could be considered high quality for centers serving at-risk prekindergarten children.

In Chapter 1, I discuss the background of the study, the problem statement, and the purpose of the study. The research question and hypothesis for this study are stated, and the theoretical framework of the study is identified. I further discuss the nature of the study, definitions used in the study, assumptions, and the scope of delimitations. The limitations of the study are identified, and the significance of the study is highlighted. I conclude Chapter 1 with a summary of the main points discussed and a transition to Chapter 2.

Background

Since the onset of the 21st century, child development (CD) has evolved, and knowledge about early childhood (EC) has progressed beyond what was known in the 19th and 20th centuries. CD has become more complex, and requirements for teachers' levels of education to teach specific age groups in early learning centers are different from those of earlier centuries (Bowman, 2011; Weinert, Linbry, Attig, Freund, & Linberg, 2016). In light of the changes evolving in EC and CD, effective teaching that will lead to children's success will require 21st-century teachers to have diversified knowledge of an extensive range of courses and topics (Bowman, 2011; Weinert et al., 2016).

Data at the national level indicate that in child care centers, 35% of EC teachers hold a bachelor's degree or higher, while 17% hold an associate's degree, 28% have some college credits, 18% hold a high school diploma or equivalent, and 1% did not complete high school (Whitebook, McLean, & Austin, 2016). At licensed home-based child care centers in the United States, 15% of teachers hold a bachelor's degree or higher, 16% have an associate's degree, 34% have some college credits, 29% have a high school diploma, and 5% did not complete high school (Whitebook et al., 2018). At nonlicensed home-based day care centers serving three or fewer children (unlisted), 15% of teachers hold a bachelor's degree or higher, 9% have an associate's degree, 24% have some college credits, 27% hold a high school diploma or equivalent, and 25% did not complete high school (Whitebook et al., 2016). The differences in teachers' levels of education enumerated above may influence the quality of care offered to at-risk children

and may subsequently affect efforts to meet the national preschool benchmarks set by NIEER (Barnett et al., 2016, 2017). The influence of the quality of care offered by teachers of varied levels of education may be especially apparent for at-risk children from low-income families, who may need teachers with more instructional strategies to identify and focus on curriculum content and self-regulation, rather than just providing enriched learning environments and resources (Claire-Son, Kwon, Jeon, & Hong, 2013).

"At-risk" children are children from poverty or from low-income or disadvantaged families who exhibit delays in intellectual and behavioral development when compared to children of high socioeconomic status (Bellows et al., 2017). Researchers have shown that the quality of most preschool child care centers is neither adequate to meet the needs of children from high-risk backgrounds nor sufficient to prepare them for school readiness (Landry et al., 2017). Landry et al. (2017) further reported that in Head Start, a few small positive effects have been recorded in social and intellectual skills across prekindergarten, but children's abilities in relation to these skills have not persisted in first grade. Intervention programs offered in Head Start for at-risk preschoolers have often yielded mixed outcomes and recorded few improvements in cognitive, literacy, and socioemotional skills required for school readiness (Burchinal et al., 2016). Findings have shown that children exposed to better quality ECE programs tend to score higher on measures of numeracy, receptive vocabulary, and school readiness when compared to children exposed to lower quality ECE (Cote et al., 2013). The role of diverse screening instruments and assessment tools used in measuring preschoolers' quality of ECE and progress was therefore significant to this study.

Head Start assessments are required to track preschoolers' progress by using the Teaching Strategy Gold (TSG) assessment for cognitive, language, physical, and social-emotional development; literacy; and content learning areas including mathematics, science and technology, art, and social studies (Office of Head Start, 2017). The Phonological Awareness Literacy Screening (PALS) is required to measure children's capability in alphabet knowledge, name-writing, print and word awareness, rhyming, and nursery rhyme awareness (Milwaukee Public School, 2017).

Though teachers with higher levels of education and credentials in ECE do play a contributory role to the success of previous research projects, it remains unclear whether the same levels of education suffice to teach at-risk children from poverty and low-income families. Successful longitudinal studies such as the Perry Preschool Study (1962) have tended to credit their success to well-qualified licensed teachers who have bachelor's degrees in ECE. The success of the Perry program was also attributed to a low-class size and better pay. The Perry teachers served no more than eight highly at-risk children from low-income families at a time and visited families to discuss the children's development (Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010; High Scope Research Foundation, 2016). Similarly, the Tulsa Head Start study's (2007) success was attributed to teachers who had a bachelor's degree in EC or CD and were certified in EC and compensated with the pay of public school teachers (Barnett, 2011; Office of Head Start, 2017). Likewise, the New Jersey Abbot Program (1999) was instituted to give children the opportunity to become contributing members of society and achieve personal success. Testimonials to the success and high quality of this program were the use of teachers with

EC or CD degrees and the use of certified teachers and assistants for each class, with a maximum class size of 15. Teachers in these settings were qualified to implement a developmentally appropriate preschool curriculum in accordance with the New Jersey Department of Education Program Expectation Standards of Quality (Farrie & Weber, 2014; Frede, Jung, Barnett, Lamy, & Figueras, 2007).

Lack of knowledge about CD and its applicability may be challenging for teachers whose area of specialization may not be ECE or related fields (Barnett et al., 2017; Totenhagen et al., 2016). Different levels of education among teachers in preschool settings may influence the quality of programs offered to children (Barnett et al., 2016, 2017; DPI, 2017; Office of Head Start, 2017). Researchers have found that well qualified EC graduates can support, role model for, and mentor other teachers, and/or children by using pedagogical knowledge to act with courage and purpose in propelling positive social change and quality improvement (Sims & Waniganayake, 2015).

Other researchers' findings indicate that rather than relying on higher levels of education for teachers, ongoing professional development and the introduction of a coaching model approach should be considered to improve teacher pedagogy toward high performance related to children's outcomes (Gomez, Kagan, & Fox, 2015; Totenhagen et al., 2016). Professional development also becomes imperative to promote higher standards and hone the skills of teachers with minimal levels of education (Bleach, 2014; Epstein, 2014; Lino, 2014). Other researchers have argued that research findings and theories supporting classroom pedagogy may not be taught in depth during EC training and professional development as compared to during formal college education (Buettner

et al., 2016). In a meta-analysis, Kelley and Camilli (2007) found a significant difference in quality outcomes of teachers with a higher level of education such as a bachelor's degree than those with lower degrees or credentials. However, the recent meta-analysis of Falenchuk et al. (2017) found no evidence that teachers' levels of education matter when teaching preschoolers.

Despite government and policy requirements that teachers possess higher levels of education, the gap in research on practice indicate differences exist regarding the needed levels of education for preschool teachers in EC centers, especially those serving at-risk students. Considering that at-risk children have the challenge of cognitive and behavioral developmental delays (Bellows et al., 2017), this study was needed to ascertain the influence of differences in teachers' levels of education and at-risk children's scores on standardized readiness assessments.

Problem Statement

The problem identified in this study was that despite state requirements, standards, and recommendations from various EC agencies, substantial differences exist in levels of education among teachers who teach 4-year-olds in EC classrooms (Barnett, 2003; Barnett et al., 2016, 2017; DPI, 2017).Variance in educational experience may affect the quality of service offered to children (Lin & Magnuson, 2018) and influence assessments. For maximum performance of students in Pre-K 4 and 5 classrooms, all lead teachers assigned to these classes are required by the study state to have a bachelor's degree and a state license in ECE (DPI, 2017). Teachers' diverse levels of education in preschool settings may influence the quality of programs offered to children (Barnett et

al., 2016, 2017; DPI, 2017; Office of Head Start, 2017). Researchers have shown that the quality of most preschool child care centers is neither high enough to meet the needs of children from high-risk backgrounds nor sufficient to prepare these children for school readiness (Landry et al., 2017). The lack of degreed teachers in these EC centers may affect the quality of service offered to children and have a negative effect on assessments dealing with school readiness performance, which may subsequently create a deficiency in learning as the children transition to kindergarten (Lin & Magnuson, 2018). This is especially concerning for at-risk children, who have been described as having delays in cognitive and behavioral development when compared to children from high-income families (Bellows et al., 2017; Landry et al., 2017; Peeters & Sharmahd, 2015). All teachers are also expected to undergo at least 25 hours of annual professional development and training and to be on the state registry of qualification and professional development ladder (Wisconsin Early Care and Professional Development, 2017).

National data show that only 35% of all EC teachers hold a bachelor's degree or higher (Whitebook, McLean & Austin, 2016). In the study state, only 27.1% of lead teachers have a bachelor's degree, out of which 14.4% have degrees in ECE, with 12.7% holding a bachelor's degree in other fields (DPI, 2017; Early Childhood Association, 2017). Additionally, 8.2% of assistant teachers have a bachelor's degree, out of which 1.7% have degrees in ECE and 6.5% hold degrees in other disciplines (DPI, 2017; Early Childhood Association, 2017). Master's degrees in EC are held by 2.2% of lead teachers and 0.4% of assistant teachers (DPI, 2017; Early Childhood Association, 2017). State statistics reveal that 22.5% of lead teachers have associate's degrees, out of which 18.6%

are in EC; 3.9% of lead teachers, and 2.8% of assistant teachers have associate's degrees in fields other than EC; 10% of assistant teachers have associate's degrees, with 7.2% being in EC; 30.9% of lead teachers, and 47.6% of assistant teachers have some college credits; and 17.4% of lead teachers, and 33.8% of assistant teachers have a high school diploma or less. In effect, differences exist in the levels of education of lead and assistant teachers who teach Pre-K 4 across the nation and state (Early Childhood Association, 2017; Whitebook et al., 2016). The gap in research on practice involved difference between teachers' levels of education and at-risk children's scores on standardized readiness assessments.

Purpose of the Study

Given huge differences in levels of education among teachers assigned to at-risk Pre-K 4 classrooms, the purpose of this quantitative study was to determine whether differences exist among teachers' levels of education with regard to teachers' respective at-risk Pre-K 4 children's scores on standardized readiness assessments (i.e., Teaching Strategies GOLD [TSG, n.d.] and Phonological Awareness Literacy Screening [PALS, 2004]). TSG focuses on measuring cognitive, physical, social-emotional, and language development domains as well as content areas. Similarly, PALS assesses prekindergarten students' name-writing, alphabet knowledge, beginning sound awareness, print and word awareness, rhyming, and nursery rhyme awareness. Assessment results were compared to determine whether significant differences existed in outcomes among at-risk children who were taught by teachers with different levels of education. Teachers' levels of

education constituted the independent variable, while the dependent variable was at-risk Pre-K 4 students' scores from TSG and PALS standardized assessments.

Other researchers have argued that irrespective of the levels of education, exposure to professional development, training, coaching, and mentoring can change the pedagogy of teachers (Gomez et al., 2015; Scarinci, Rose, & Webb, 2015). Falenchuk et al. (2017) described teacher education as a dynamic catalyst of the types of interaction and activities (e.g., level of intellectual stimulation) that children experience directly from EC programs, thereby influencing their performance. Researchers have reported that the power of high-quality professional development can positively reflect on classroom practices, which may in turn influence child performance (Piasta et al., 2015; Totenhagen et al., 2016). Similarly, other findings have revealed that pedagogical support provided over time and developed by specialized coaches has been observed as an effective means to create insightful thinking on practice and to create innovative knowhow and practice when working with at-risk children (Peeters & Shamahad, 2014). Multiple researchers have indicated that high-quality professional development (PD), and coaching are sufficient for teachers to meet the high-quality expectation (Gomez et al., 2015; Piasta, Logan, Pelatti, Capps, & Petrill, 2015; Totenhagen et al., 2016). Insight garnered from this study revealed how teachers' levels of education contributed to the quality of education offered to at-risk children, specifically in terms of their influence on assessment scores.

Research Question(s) and Hypotheses

The following quantitative research question guided this study: How do assessment scores differ among at-risk children who are taught by teachers with different levels of education and years of experience?

The null hypothesis was as follows: There is no significant difference among assessment scores when at-risk children are taught by teachers with different levels of education and years of experience.

The alternative hypothesis was the following: There is a significant difference among assessment scores when at-risk children are taught by teachers with different levels of education and years of experience.

Theoretical Foundation

The theoretical framework for this study was Bronfenbrenner's (1979) ecological systems theory of human development. The theory describes the importance of interrelated ecological levels, conceived of as nested systems, involved in human development. The *microsystem* is described as the setting within which an individual behaves at a given time, while the *mesosystem* constitutes the developmental niche of the individual within a given period of development. The *exosystem* represents the indirect contexts involving the developing person, while the *macrosystem* represents the highest level of ecology of human development involving the influence of government, public policy, and culture. The *chronosystem* represents the place of time within the systems, as time cuts across all of the components of human development (Bronfenbrenner, 1979; Nasiopoulou, Williams, Sheridan, & Hansen, 2017).

Nasiopoulou et al. (2017) described ecological theory from an interactive perspective in which a developing individual is influencing and is being influenced by the environment in continuous interaction. From this viewpoint, it is through interaction that prekindergarten teachers, as developing individuals, construct knowledge and values and acquire tools to incorporate learning into practice (Nasiopoulou et al., 2017). This theory was used to inform the problem statement through an examination of whether differences in teachers' levels of education play a significant role in at-risk children's scores on standardized readiness assessments. Bronfenbrenner's ecological theory guided the purpose of this study, which was to ascertain whether teachers' levels of education play a significant role in PALS and TSG performance scores of at-risk 4-year-old preschoolers at a local Head Start site. The research question was informed by ecological systems theory in that it targeted the difference, if any, between teachers' levels of education and at-risk children's scores on standardized readiness assessments.

Nature of the Study

This quantitative study determined whether a difference existed between teachers' levels of education and at-risk children's scores on two standardized readiness assessments, TSG and PALS. I used a quantitative approach for the study because I sought to quantify the difference between two or more variables, comparing the independent variable to the dependent variable's statistical data (Creswell, 2014). A multivariate analysis of covariance (MANCOVA) was appropriate for this study to ensure an accurate analysis of the mean difference between two variables that included a covariate (Huberty & Petoskey, 2000). A one-way MANCOVA was suitable for this

study to determine if any difference existed between the group levels of the independent variables that had two or more continuous dependent variables with a covariate (Huberty & Petoskey, 2000). Specifically, I compared teachers' levels of education and years of experience (independent variables) and at-risk children's scores on standardized readiness assessments (dependent variable) to determine if any difference existed between teachers' levels of education, years of experience, and at-risk Pre-K 4 children's performance on TSG and PALS Fall pretest and TSG and PALS Winter posttest data. TSG and PALS Fall assessments were administered as pretests in November 2017. Pre-K 4 children fell below TSG expectations and did not meet the benchmark for PALS (TSG, 2017; PALS, 2017). The Winter TSG and PALS assessments were administered as posttests in the month of February 2018. Both tests were taken by Pre-K 4 at-risk children in a local Head Start located in a Midwestern state in the United States.

The target populations were 142 Pre-K 4 at-risk children and 18 Pre-K 4 teachers in a Head Start program. There were nine classrooms at the research site with a ratio of 17 to 20 children to 2 teachers in each classroom. The study used alphanumeric codes to protect the identity of each child and classroom and numeric codes to protect the teachers. The data identifying teachers' levels of education were collected from archived teacher information in the Child Plus database at the local Head Start, while the archived TSG and PALS assessment scores of at-risk Pre-K 4 children were collected from the local Head Start site. TSG performance covers objectives for cognitive, physical, social-emotional, and language development as well as other content areas including literacy, mathematics, and other learning concepts. The PALS assessment measures Pre-K 4

children in name-writing, alphabet knowledge, beginning sound awareness, print and word awareness, rhyming, and nursery rhyme awareness. The study included comparison of the fall assessment of TSG and PALS to the TSG and PALS Winter assessment to determine if there had been improvement in performance. The fall assessment represented the pretest, while the winter assessment was the posttest.

TSG and PALS assessments are criterion-referenced tests because they measure children's scores or performance based on set benchmarks (Creswell, 2012; Lodico, Spaulding, & Voegtle, 2010). TSG and PALS screenings are standardized instruments that have demonstrated consistency of scores. These two standardized instruments are considered valid because each measures what it was designed to measure and states how it measures it. The reliability of the instruments is evident in the consistency of scores obtained by using the same instrument at different occasions under other variable assessment conditions with different sets of equivalent items (Center for Educational Measurement & Evaluation, 2011; Invernizzi, Juel, Swank, & Meier, 2013). Validity and reliability of TSG and PALS were supported by studies that included large samples (n = 10,963, n = 20,970 for TSG) and (n = 21,592 for PALS) of diverse children and teachers all across 48 states in the United States and the District of Columbia (Center for Educational Measurement & Evaluation, 2011; Huang & Konold, 2014; Invernizzi et al., 2013; Lambert, Kim, & Burts, 2014).

A descriptive analysis of the scores was performed to determine the mean and standard deviation (*SD*), which revealed the variability of the scores. A MANCOVA was used to test the hypothesis and answer the research question. The data were intended to

be subjected to statistical tests of the 10 assumptions that are critical to running a one-way MANCOVA. MANCOVA enables researchers to test a hypothesis using group comparison of data with one or more independent variables on two or more dependent variables with a covariate (Creswell, 2012).

A qualitative methodology was not appropriate for this study because qualitative methods are characterized by the use of flexible forms of data collection such as observation, interviewing, and document analysis to generate data, rather than by testing hypotheses or using standardized instruments as data sources (Lodico et al., 2010).

Definitions

At-risk children: Children from poverty or low-income families who consistently exhibit delays in cognitive and behavioral development when compared to children from high-income families (Bellows et al., 2017).

Child Development Associate (CDA): CDA is an early childhood credential that indicates evidence of competency skills and knowledge for teachers working with young children (Goble, Horm, Atanasov, Williamson, & Choi, 2015).

Head Start: A federally funded preschool program for children from very low socioeconomic status homes (Landry et al., 2017).

Phonological Awareness Literacy Screening (PALS): This is a diagnostic and screening literacy instrument used to assess alphabet knowledge, name-writing, print and word awareness, rhyming, and nursery rhyme awareness in Pre-K 4 children (Invernizzi, Sullivan, Meier, & Swank, 2004).

Prekindergarten: This term is used interchangeably with *preschool*. It represents the initial early learning setting attended by children aged 3 to 4 years (Lin & Magnuson, 2018).

Teachers' level of education: Teachers' level of education is identified as encompassing teachers' education, credentials, and experiences (Falenchuk et al., 2017).

Teaching Strategy Gold (TSG): This is a computer-based online system used in assessing children from birth to kindergarten that has proven to be consistently valid and reliable over time (Lambert, Kim, & Burts, 2014, 2015).

Assumptions

To ensure a precise and reliable data, it was assumed that the children's archival data received from the local Head Start was accurate and consistent. Based on this premise it was assumed that teachers were trained to enter TSG and PALS assessment scores appropriately into the local Head Start database. It was also assumed that teachers were trained to offer the assessment tests appropriately to at-risk children and that the test was offered under a suitable condition. These assumptions were paramount to ensure the data was reliable enough to produce the expected result. Another underlying assumption was that the teacher information saved in the Child Plus database was accurate and up to date regarding teachers' levels of education, training, years of experience, and other PD information. This assumption was made because Child Plus database information were under stringent quality control and was managed and supervised by the compliance and quality assurance department. It was also assumed that the children's population at the local Head Start was 100% at-risk children. This assumption was made because Head

Start programs serves children from disadvantaged and low-income families who are considered at-risk, (Claire-Son et al., 2013; Laundry et al., 2017). I made this assumption to ensure the children represented homogenous population of at-risk children which was the primary goal of this study. These assumptions were necessary due to the nature of a quantitative study and dependence on such external factors, and factors that could not be controlled by the research, such as those noted above.

Scope and Delimitations

The specific parameters that bounded the scope of this study and limited its generalizability were that the study included Pre-K 4 teachers and children who were all considered at-risk children. These participants were chosen to determine the difference between the two variables. This quantitative study compared archival pretest and posttest assessment scores to determine the difference, if any, between teachers' levels of education, years of experience, and the TSG and PALS assessment scores of at-risk Pre-K 4 children (Creswell, 2012). In alignment with requirements for quantitative studies, the archived TSG and the PALS assessment scores for fall served as the pretest while the winter assessment scores were used as a posttest for the study. Considering the sample size of the study, the generalizability of the study was limited to the homogenous population of this study or a similar homogenous population. The study did not involve cause and effect as in an experimental study, but rather took a comparison approach.

Limitations

Several limitations of this study should be noted. First, the database from which teachers' levels of education and information were assessed was dependent on archival

data and may be subject to inaccuracies. To address this limitation, this study focused on Pre-K 4 at-risk children, therefore, Pre-K 3 assigned to a 4-year-old classroom were excluded from the study because PALS was specifically designed to measure 4-year-old children (Invernizzi, Sullivan, Meier, & Swank, 2004). These 3-year-old children will have a TSG score but no PALS score, so they were excluded from this study. To further address possible inaccurate data, I performed data cleansing which included the removal of children with incomplete scores in PALS or TSG. Data cleansing ensured all children included in the study has two test scores in PALS and TSG assessments. Second, in regard to teachers' levels of education, training, and PD, teachers' database for PD credits may be subject to errors if there were wrong inputs or information from the site director and education managers who enter teacher information into Child Plus database. Child Plus is an application software where all teachers', families,' and children's information are saved by the local Head Start site. To allay the limitation, information from the database was verified from the names of teachers identified on the data sheets of PALS and TSG for each classroom. Teachers' names and information were checked to ensure these matched the appropriate classroom. An additional limitation related to the measure of quality employed for this study. Although both TSG and PALS assessments are widely used measures of children's performance and progress, these may not capture all the quality of care related to teachers' levels of education when working with at-risk children. Therefore, this study focused on the set parameters of TSG and PALS assessments expectations and did not generalize to other assessment tests that were similar to TSG and PALS.

Being a quantitative study, the research data focused on quantifying an occurrence in which there were dependent variables, but utilizing archival data prevented the me from having an individual experience with the participants and manipulating the independent and dependent variables. Since interaction with participants was not possible, there was a thorough examination of the data to ensure a valid and reliable result. The use of a quantitative MANCOVA design allowed for comparing the difference between the independent and dependent variables while controlling for covariates (Creswell, 2012; Lodico et al., 2010). Randomization of subjects are impossible in this study because children were already assigned to specific classrooms and teachers, therefore, the results of this study were reported based on comparing differences in variables and no cause and effect may be determined for these results. Quantitative data require large samples to achieve desired results, but lack of resources may affect data and may hinder the explanation of complex issues especially if data is not robust enough (Creswell, 2012). Large sample size and randomization in quantitative study may potentially allow the generalization of the study to a more heterogeneous population. The minimal sample size of the variables in this study may limit the generalization of the result to homogenous population similar to that which is being studied. Hence, the result of this study was not generalized to a heterogeneous population of any kind.

To further address possible errors in teachers' levels of education from Child Plus database, teachers were matched up to the corresponding classrooms taught and teachers' levels of education was classified into five categories. Each teacher was assigned into a

category based on their level of education. I addressed possible bias for data collected for teachers' years of experience by sorting teachers' years of experience into three categories; 0-5 years of experience, 5-10 years of experience and 10 years and above, then I matched each teacher based on their category of years of experience in EC, CD, related or unrelated field as included in the data. Every teacher fell into one of the five categories of levels of teacher education and three categories for the years of experience and were matched to the corresponding classroom.

Significance

In this study, I sought to address a potential gap in research on practice by investigating whether differences exist between teachers' levels of education, years of experience, and at-risk children's scores on standardized readiness assessments. In that all Pre-K 4 teachers at the local site received the same PD and training, coaching, and mentoring but had varying levels of education, this study played a vital role in determining whether teachers' levels of education and years of experience influenced the assessment scores of at-risk Pre-K 4 children in the state (NAEYC, 2016; United Nations International Children Emergency Fund, 2017).

It is significant to note that during the Fall 2017 assessments, Pre-K 4 scores at the local Head Start site fell 48% below benchmark on the TSG assessment; 61% below benchmark for PALS name-writing; 79% below benchmark for PALS beginning sound awareness, 71% below benchmark for print and word awareness in PALS; and 63% below benchmark for rhyming and nursery rhyme awareness. Several researchers have indicated that EC teachers' knowledge of CD is a vital component of class quality in

early care education (Barnett et al., 2017; Claire-Son et al., 2013; Goble, Horn, Atanosov, Williamson, & Choi, 2015).

Other researchers have shown how the quality of child care can create positive social outcomes for children (Buettner et al., 2016; Sims & Waniganayake, 2015). Researchers (Claire-Son et al., 2013; Early et al., 2006; Falenchuk et al., 2017) have also determined that other factors beyond teachers' levels of education determine child outcomes. Nevertheless, NAEYC requires that EC educators have "a minimum of four to five years of postsecondary education" (Falenchuk et al., 2017, p. 2). Young Star (2017), the body responsible for Quality Rating and Improvement Systems (QRIS) in early childhood education, "identifies teachers' levels of education as a significant parameter" (para. 2).

To promote positive social change, evidence garnered from this study was useful in identifying levels of education and experience that teachers need to serve at-risk children. This knowledge could allow schools and child care centers to ascertain potential prerequisites for preschool teachers in at-risk preschool communities. The findings generated provide insight into the levels of education needed by teachers of at-risk prekindergartners and the significance of the levels of education in the children's learning process.

Summary

This quantitative study determined whether a difference exists between teachers' levels of education, years of experience, and at-risk children's scores on standardized readiness assessments. Given that at-risk children may be prone to developmental delays

and may exhibit behavioral challenges (Bellows et al., 2017), this study may inform administrators and policy makers about the levels of education necessary for those teaching children who are at risk. Some researchers have indicated that teachers' education and training play a huge role in the quality of children's ECE experiences (Gomez et al., 2015), while others have determined that other factors beyond teachers' levels of education are key determinants of child outcomes (Claire-Son et al., 2013; Early et al., 2006; Falenchuk et al., 2017)). The insight generated may influence the school district, the department of public instruction, and the Head Start program to reexamine hiring policies, and/or enforce compliance with regard to hiring teachers with the needed levels of education for Head Start and similar agencies. In the next chapter, I present an in-depth examination of the literature connected to this study topic. Chapter 2 contains an overview and addresses the literature search strategies and the theoretical foundation for this study. The literature review in Chapter 2 builds on the foundation laid in Chapter 1.

Chapter 2: Literature Review

The problem identified in this study is that despite state requirements, standards, and recommendations from various EC agencies, huge differences exist in the levels of education held by teachers in 4-year-old early childhood classrooms (Barnett, 2003; Barnett et al., 2016, 2017; DPI, 2017). This problem may affect the quality of service offered to children (Lin & Magnuson, 2018). High-quality EC experiences have the capacity to advance students' academic skills and learning associated behavior, especially for children from low-income families (Burchinal et al., 2016; Lin & Magnuson, 2018). To guarantee a rich and qualitative education and experience was offered to Pre-K 4 and 5, teachers' levels of education were identified as a core function of structural quality in ECE (Falenchuk et al., 2017). In the study state, Pre-K 4 teachers were required to have a state license and a bachelor's degree in EC, CD, or a closely related field. However, a shortage of qualified teachers resulted in assigning teachers with lower qualifications to teach Pre-K 4 classrooms. So, despite state requirements, lack of state-qualified teachers created a difference in the levels of education of teachers assigned to teach Pre-K 4 in different programs in a large urban city located in a Midwestern state of the United States. Considering the importance of teachers' levels of education in structural quality, as indicated by the benchmark of the NIEER and previous research findings, this problem may affect the quality of service offered to children (Lin & Magnuson, 2018) and have an effect on assessments.

The purpose of this quantitative study was to investigate whether a difference exists between teachers' level of education as required by the state and TSG and PALS

standardized readiness assessment scores of at-risk Pre-K 4 children. The TSG assessment focuses on cognitive, physical, social-emotional, language development, and content areas, and the PALS assessment measures specifics such as name-writing, alphabet knowledge, beginning sound awareness, print and word awareness, and rhyming and nursery rhyme awareness.

At-risk children may be described as children from poverty or low-income or disadvantaged families who consistently exhibit delays in cognitive and behavioral development when compared to children from high-income families (Bellows et al., 2017). The quality of early education offered to at-risk children from low-income families serves as a cautionary factor to ensure their proper development and school readiness (Claire-Son, Kwon, Jeon, & Hong, 2013; Paulk, Seaton, & Yuille, 2017). Researchers have revealed that teachers with higher levels of education equivalent to certification, college degrees, and teaching experiences tend to provide early learners with high-achieving classroom experiences, which appear to accelerate children's learning skills (Manning, Garvis, Flemming, & Wong, 2017; Tayler, Cloney, & Niklas, 2015). These findings are supported by Torrence's theory (1974), which indicates that "an individual's education level is an indicator influencing the person's creative thinking expression and capability" (Setiawan, 2017, p. 40).

However, some researchers have shown mixed evidence that contradicts prior conclusions that higher levels of teacher education predict better classroom quality or greater gains for preschoolers (Early et al., 2006; Falenchuk et al., 2017; Kelley & Camille, 2008; Lin & Magnuson, 2018). This lack of association has resulted in scholars

asking questions about how teachers' levels of education are connected to greater gains and outcomes for children (Buettner, Hur, Jeon, & Andrews, 2015; Pelatti, Dynia, Logan, Justice, & Kaderavek, 2016). Other researchers have identified the role of teachers' levels of education in child outcomes, greater gains, and school readiness (Claire-Son et al., 2013; Falenchuk et al., 2017; Setiawan, 2017; Sims & Waniganayake, 2015). Other researchers have also investigated the performance of at-risk children using various standardized instruments and methods (Bellows et al., 2017; Claire-Son et al., 2013; Landry et al., 2017; Pellatti et al., 2016), but researchers have not investigated whether different levels of teacher education influence at-risk preschoolers' assessments using instruments such as TSG and PALS.

The major sections of Chapter 2 contain the literature search strategy, the theoretical foundation for the study, and a discussion about teachers' levels of education as a major component of structural quality and how it connects to process quality in early childhood to attain proficiency. Teachers' levels of education are discussed based on education levels, licensure or certification, and different types of professional development. The literature review reflects the work of researchers who held the view that teachers' levels of education do influence preschool assessments (Barnett et al., 2016, 2017; Lin & Magnuson, 2018; Setiawan, 2017). The literature review further covers mixed findings from meta-analyses on teachers' levels of education (Early et al., 2006; Falenchuk et al., 2017; Kelley & Camille, 2007; Manning, Garvis, Flemming, & Wong, 2017). Further sections include findings that reveal that PD and teacher-child interaction matter, irrespective of teachers' levels of education (Bleach, 2014; Early et al.,

2006; Gomez et al., 2015; Scarinci, Rose, Ree, & Webb, 2015). In exploring professional development, I address coaching, mentoring, preservice training, and in-service training. The review of literature further examines at-risk children's performance and barriers to achieving maximum development. Other sections include literature and findings about the PALS tool and the TSG instrument. Chapter 2 addresses the consolidation of literature and contains a summary and conclusions, including a transition to Chapter 3.

Literature Search Strategy

A search was conducted for research studies related to the influence of teachers' levels of education and qualifications on EC classrooms and Head Start in relation to at-risk children. The materials found included peer-reviewed journal articles and other publications that used qualitative, quantitative, and mixed method approaches. The databases explored included EBSCO, Education Resource Information Center (ERIC), Education Complete, Education Full Text, SAGE, Thoreau, Taylor and Francis, Springer Link, Science Direct Elsevier, Google Scholar, ProQuest, PsycINFO, Direct Science, Boolean Phrase, JOSTOR, Routledge, University of Rochester, National Institute of Early Education Research articles, United Nations International Children's Emergency Fund database, and Academic Search. Key terms used included *teacher qualification, teacher education, teacher level of education, teachers' level of education, preschool, preschoolers, prekindergarten, at-risk, at-risk children, high-risk, low-income children, disadvantaged children, preschool assessment, Head Start, Head Start screening, Head Start assessment, Teaching Strategies GOLD (TSG) screening assessment, TSG assessment, Phonological Awareness Literacy Screening (PALS) assessment, PALS*

assessment, early childhood education, structural and process quality, quality, high quality preschool, high quality preschool indicator, ecological theory, Bronfenbrenner ecological theory, early academic skills, teacher training, professional development, coaching, coaching model, in-service training, government report, early childhood report, and *research institute reports.* Literature was searched from 2015 to 2018 in the English language using full text and peer-reviewed journals. Seminal papers from the Harvard Center for the Developing Child and the National Institute of Early Education Research, U.S. Census Bureau, High Scope Research Foundation, and National Center for Education Statistics were also reviewed. Based on the keywords used, some older peer-reviewed articles and theoretical works were found and used as supporting materials.

Theoretical Foundation

The theoretical framework for this research study was Bronfenbrenner's theory of ecological systems (1979). The theory stemmed from Bronfenbrenner's study of human development. The theory states that human development is influenced by different types of interconnected environmental systems in which an individual develops (Bronfenbrenner, 1979). The theory identifies five connected systems that relate and interact with a child: the microsystem, mesosystem, exosystem, macrosystem, and chronosystem. Having considered other theories, I opted for ecological theory because it uses the lenses of relationships and interactions of a developing child with his or her environment. The ecological theory is suitable for investigating the influence of teachers'

levels of education in at-risk children's assessment because it explains the role of interaction in a relationship.

Bronfenbrenner (1979) described the microsystem as the closest setting in which an individual child is embedded, suggesting that it involves the relationship and interaction of a child with his or her surroundings. Other structures such as peers, parents, family, school, child care, teachers, neighborhood or community, and religious group interact together with the child in the microsystem as the mesosystem. In advancing their work, Bronfenbrenner and Morris (2006) further described the relationship at the microsystem level as bidirectional, in that it impacts toward and away from the child. Accordingly, the mesosystem represents the set of microsystems constituting the developmental niche of an individual within a period. This may include the child and parent or family, child and teacher, child and church or place of worship, and neighborhood (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006). Elements of the exosystem, such as a parent's workplace situation, represent contexts that may not interact with the child directly but may influence the child indirectly by influencing behavior and development because they affect the child's parents. The macrosystem represents the superordinate level of the ecological theory of human development and signifies the impact of structures such as culture, policy makers, and the government on the developing child. Bronfenbrenner stated further that all other interactions within other levels of the ecology of human development are influenced by the macrosystem. The chronosystem represents the influence of time over all components of the ecology of

human development; hence, change is a fundamental feature of all systems (Bronfenbrenner, 1979).

Considering the influence of relationships and interaction in the growth of a developing child, the theory of ecological systems was relevant to my research study because the teacher is one of the structures nested within the mesosystem interacting directly with the child and in close proximity to influence the child's development. Research findings have shown that children learn best through interaction with their teachers (Early, Maxwell, Ponder, & Pan, 2017; Pianta, La Paro, & Hamre, 2008). The macrosystem also represents the role of government and policy makers in identifying and regulating the right level of education for teachers of at-risk children. I considered Vygotsky's theory of the zone of proximal development for this study, but the theory was insufficient in covering the comprehensive interactive relationship between teachers' levels of education and at-risk preschool assessment, which was critical in the investigation of this study.

With the premise that the ecological theory was formulated to examine the developmental process as the primary mechanism that drives an individual's development, Nasiopoulou, Williams, Sheridan, and Hansen (2017) viewed ecological theory from an interactive perspective in which a developing individual influences and is influenced by the environment in a continuous interaction. In their quantitative latent class analysis of the effect of teachers' profiles on Swedish preschools, Nasiopoulou et al. examined survey data from 698 preschool teachers from 46 Swedish municipalities gathered between 2012 and 2013. Their findings revealed that it is through interaction

that prekindergarten teachers, as developing individuals, construct knowledge and values and acquire skills to incorporate learning into practice (Nasiopoulou et al., 2017). Their research study indicated that specialized knowledge and responsibilities are needed in a preschool teacher's professional profile. The research findings further indicate that all preschool teachers need different kinds of continuous professional development to have an effect on children. The authors identified the knowledge acquired by teachers as important for preschoolers, preschool quality, and preschool teachers' professional development in Sweden. From a structural perspective, the research result serves as a guide to identifying quality, where preschool staff serve as salient workers responsible for the quality of children's learning. The categories of teachers found in Sweden indicate that preschool teachers' professionalism is a multidimensional and relational process associated with continuous sociopolitical changes in the macrosystem as described by Bronfenbrenner (1979).

Similarly, a correlational research study conducted to compare parents and teachers as variables in the development of at-risk children described the Bronfenbrenner theory of ecological systems as a person-environment relationship. In alignment with the ecological theory, the research study viewed the teacher and parent as structures embedded in the microsystem interacting to shape the individual child's life. (Landry et al., 2017). The study combined high-quality instructional strategies with responsive training for teachers and parents to improve school readiness for high-risk preschoolers. The researchers considered the introduction and result of the instructional strategies to parents as a paradigm representing the role of exosystem on a developing child. Landry et

al. (2017) concluded that providing congruent teachers and emotionally responsive parents who interact appropriately with high-risk preschoolers produces cognitively stimulating practices that optimize school readiness.

From this viewpoint, ecological theory supports the investigation of how teachers' levels of education influence the level of teacher-child interaction as structures of the system and the extent of this role in the assessment results of at-risk preschoolers. Ecological theory related to this study because it identified the role of relationships and positive interactions between the systems and the developing child. Teachers are part of the mesosystem interacting with a developing child for a possible outcome. In examining a possible difference between teachers' levels of education and at-risk children's assessments, the research question built upon the role of interaction and relationships among contextual structures within the systems by investigating how teachers' levels of education influence at-risk children's standardized assessment scores by comparing the independent variable group levels to the dependent variables. The findings from the research question further revealed the gradient of learning that occurs among children based on teacher-child relationship, interaction, and application of knowledge. The research question challenged the theory in addressing whether teachers' levels of education play a significant role or offer a kind of interaction significant enough to influence at-risk children's assessment scores. In alignment with the work of Bronfenbrenner (1979), Landry et al. (2017), and Nasiopoulou et al. (2017), the alternate hypothesis stated that teachers' levels of education do have a significant impact on at-risk children's scores, while the null hypothesis indicated that there was no significant

difference between assessment scores of at-risk children when taught by teachers with different levels of education and years of experience.

Teachers' Levels of Education as a Measure of Structural Quality

In constructing and measuring the variables for classroom quality, two extensive components have been indicated to include structural and process qualities. Teachers' levels of education were established as one of the most significant magnitude of structural quality because of teachers' skills which include levels of education, professional development, and specialized training (Falenchuk et al., 2017; Pelatti, Dynia, Logan, & Kaderavek, 2016). On the other hand, process quality revolves around teacher-child interaction which is considered significant because of the linkage to child outcome (Lin & Magnuson, 2017; Slot, Bleses, Justice, Markussen-Brown, & Hajen, 2018). Teachers' levels of education were also identified as one of the 10 benchmarks of structural quality relating to child outcome in the yearly Pre-K evaluation by NIEER (Barnett et al., 2016, 2017). In their meta-analysis and systemic review of teachers' levels of education and child outcomes in some preschool aged classrooms in a child care center, Falenchuk et al. (2017) categorized teachers' levels of education as comprising teacher education levels, credential, and experience. Based on various terms used in the discipline, prior research study identified a lack of definition of teachers' levels of education or professional development (Claire-Son et al., 2013).

Though structural quality is identified as significant in the role of teachers' levels of education and other indicators such as class size and ratio, (Lin & Magnuson, 2018; Sims & Waniganayake, 2015), yet other investigation of structural and process quality,

and the effect on children's growth in language and preliteracy skills of Danish preschools, reported complexities of relationship between structural and process quality in child outcomes (Slot et al., 2018). The researchers further reported that contrary to prior investigations from the United States "and one comparison study in 10 countries, they found few direct connections of structural teacher and classroom features regarding growth in children's skills" were found (p. 594). Considering the complexities and mixed findings reported in past findings, the effect of teachers' levels of education has not been specifically addressed in relationship to the performance, or outcome of at-risk preschool children using specific assessment or screening tools such as PALS and TSG. This study identified the diverse literature on teachers' levels of education as a major component of structural quality.

Teacher Qualifications: Education Levels and Licensure

Research evidence show that participation in early learning yield positive outcome for children, families, and society at large (Buettner et al., 2015; Garvin & Manning, 2015; Melhuish et al., 2015). Children who attend early childhood centers were also found to become productive and healthy adults (Sims & Waniganayake, 2015). Preceding research findings also attributed the success of rigorous preschool programs such as Tulsa Oklahoma Head Start research study, High Scope/ Perry Preschool Program, Chicago Parent-Teacher Program, Abecedarian Project, and the New Jersey Abbot Program to the provision of qualified teachers having a minimum of a bachelor's degree in EC or CD, and teacher certification as a distinct indicator of quality leading to better outcome in child care centers (Barnett, 2003, 2007, 2011; Bowman, 2011; Claire-

Son et al., 2013; Farrie & Weber, 2014; Frede, Jung, Barnett, Lamy, & Figueras, 2007; Heckman et al., 2010; High Scope Research Foundation, 2016; Lin & Magnuson, 2018). For example, following the 1998 Supreme Court's decision about Abbott vs Burke, indicating that children residing in economically disadvantaged school district otherwise considered as at-risk children must have access to high quality early childhood, Abbott school district identified teachers' levels of education of at least a bachelor's degree as prerequisite credential for preschool teachers (Ryan & Ackerman, 2004). While enrollment increased from its inception in 1999, the program has served 40,500 preschoolers from 2005-2006 in a variety of settings including public schools, Head Start and private child care centers (Farrie & Weber, 2014). With the increased quality of teachers not lower than a bachelor's degree and a New Jersey teacher certification, the Abbott Preschool Longitudinal Effect Study (APPLES) demonstrated that children who attended the program in any EC setting demonstrated improvement in math, language, and literacy through the end of their kindergarten year and children who attended as Pre-K 3 and 4 outperform those who attended only in Pre-K 4 (Barnett, Jung, Youn, & Frede, 2013; Frede, Jung, Barnett, Lamy, & Figueras, 2007).

Likewise, another research study examined the influence of academic levels of education on ECE teachers' creativity (Setiawan, 2017). The findings reported that availability of qualified staff is a clear indicator of success in early childhood centers. In fact, teachers with higher levels of education such as a bachelor's degree possess higher pedagogy of instructional support to promote children's creativity, language, and cognitive development through regular communication and extensive feedback resulting

in life application (Pelatti et al., 2016; Setiawan, 2017). Using the ecological model, (Connor, Son, Hindman, & Morrison, 2005) identified the complex effects of teachers' levels of education and similar attributes, including classroom practices and experience and the intricate effects on first graders' vocabulary and initial reading outcomes. The findings report that though "teachers with higher levels of education interacted more responsively with students but, astoundingly, their students were weaker in early reading skills by first grade" (Connor et al., 2005, p. 343). The authors used a structural equation modeling design to determine if a relationship exist between their variables. Results revealed that teachers who created a warm and responsive preschool environment, and who spend supplementary time in developmentally appropriate academic activities establish dynamic vocabulary and decoding skills which is transferred and retained by their students in first grade.

The content analysis of CD curricular in United States also indicate bachelor's degree programs tend to concentrate on knowledge and instructional strategies, curriculum, observation, and assessment while associate degree programs is more inclined towards practices including classroom and program management (Buettner et al., 2016). Other research findings reveal that teacher's discipline or specialization appear to play a vital role in the quality of education degree or college level (Barnett, 2016, 2017; Claire-Son et al., 2013; Melhuish et al., 2015; Totenhagen et al., 2016). For example, a multilevel pathway was used to examine multiple channels of teachers' levels of education, including teachers' level of education, teacher degree, teaching certification, teaching experience, coaching, and in-service training and their link to children's

outcome (Claire-Son et al., 2013). Claire-Son et al. (2013) reported that teachers who majored in EC provided higher quality background for learning and social-emotional needs in the classroom. Some research findings posited that teachers who specialize in CD or EC have a strong fundamental knowledge of CD and are able to integrate children's developmental trajectories and classroom experiences (Barnett et al., 2017; Goble, Horn, Atanosov, Williamson, & Choi, 2015; Weinert, Linberg, Attig, Freund, & Linberg, 2016). In agreement with this assertion and to guarantee a qualitative education is offered to Pre-K, a bachelor's degree in ECE or CD is listed as one of the 10 benchmarks of NIEER for assessing preschool performance in the 50 states and its territories (Barnett, 2016, 2017).

Extant research studies also propose that the quality of child care can influence positive social outcomes for children (Buettner et al., 2016; Burchinal et al., 2016; Sims & Waniganayake, 2015; Whitebook et al., 2016). Similarly, Vygotsky (1978) theory which posits that "children learn from their peers" (Purtell & Ansari, 2018, p. 1), investigated the implication of teachers' levels of education and classroom quality on classroom age composition and Pre-K school readiness, Purtell and Ansari, (2018) reported that teachers' levels of education excluding their experience showed a moderation, in that mixed age classrooms in the Head Start classroom taught by teachers of higher levels of education indicate no association with decreased literacy gains among older children.

Some recent research studies propose that the quality of teacher-child interaction seems more critical in improving children's cognitive and socio-emotional development

rather than the teachers' levels of education (Early, Maxwell, Ponder, & Pan, 2017; Nasiopoulou et al., 2017). Accordingly, Early et al. (2017) defined teacher-child interactions as the" daily routine and exchanges that occurs between teachers and children" (p.58). Further research findings argue that effective teaching and subsequent learning outcome result from teacher-child sensitive interaction to promote children's language and literacy outcomes rather than the teachers' levels of education, materials or activity (Hatfield, Burchinal, Pianta, & Sideris, 2016; Nasiopoulou et al., 2017). Teaching certification or license constitute another form of teachers' levels of education which contribute positively to children's outcome but the standard of teaching credentials may vary in different states (Ackerman, 2004; Claire-Son et al., 2013) and it cannot be ascertained if certified teachers who finished required courses do provide higher quality practices than teachers who did not (Claire-Son et al., 2013). The lack of association reported may denote a lack of connection between certification and instructional practices and consequently may suggest that teacher certification and child outcome linkage may be causal based on selection factors (Claire-Son et al., 2013).

Over the years, extensive meta-analysis which allow the quantitative synthesis of results from different empirical studies that focus on the same topics have been conducted (Kelley & Camilli, 2007). For instance, Early et al. (2006) explored their meta-analysis from the data of Pre-K funded centers obtained from the National Center for Early Development and Learning (NCEDL) Multi State Study of Pre-K. The study included 237 Pre-K classrooms of over 800 children randomly selected from six states that has well established Pre-K programs. The meta-analysis utilizes several days of

classroom observations, thorough assessment of children's academic skills in the Fall and Spring of the academic year, and teacher's questionnaire. The research study considered the years of education, highest degree, bachelor's versus no bachelor's degrees, role of college major, state teaching certification, and CDA credential as covariates. The findings reported few associations between any of the measures of education, credential, major, and classroom quality or child outcome (Early et al., 2006).

Yet another meta-analysis examined the effect of teachers' levels of education on early childhood programs (ECP). Kelley and Camilli (2007) examined 32 nonexperimental studies which were of two discrete types. There were 18 comparative studies which allow the reader to determine from two or more categories of teachers, while 14 were correlational implying that those did not allow for comparison across the group or ultimately among groups. The results were reported as correlations between teachers' levels of education in years and child outcome. The findings found a small positive effect but significant result among teachers with a bachelor's degree when compared to teachers with a lower education level. However, Barnett, (2011) argued that the only means by which teachers' levels of education will produce a larger gain in CD and learning is when there are changes in thought process that will lead to changes in practice and consequently children's experiences.

Using a larger sample and a NCEDL, and NCEDL and NIEER combined instruments to assess 2,439 participating children from 671 Pre-K classrooms from 11 states, another research study found a negative relation between higher teachers' levels of education and children's literacy skills (Mashburn et al., 2008). Still trying to identify the

effect of teachers' levels of education as a key factor in structural quality, Howes et al. (2008) conducted mixed methods study utilizing extensive assessment and observation using the Classroom Assessment and Scoring System (CLASS) with a larger sample of 3000 children, four per classrooms, from 70 randomly selected state funded Pre-K from 11 states. Authors reported that children showed higher educational gains when they experience quality instruction or teacher-child interaction than by the level of education or credential of teachers or other structural quality.

In a more recent meta-analysis which focus on the relationship between teachers' level of education and quality of early childhood education offered to children in Australia, 2023 unique studies on the effect of teachers' levels of education and the quality of EC environment were identified, 80 samples were obtained and a total of 48 was eligible for inclusion in the meta-analysis. Data analysis was conducted using a Comprehensive Meta-Analysis 2.0, which is a more sophisticated software. In similarity to Kelley and Camilli (2007), the criteria for selection was based on studies that uses comparison and correlational approach to examine the relationship between teachers' levels of education and early childhood quality and outcome. However, the included samples utilized a different form of instrument such as the Early Childhood Environmental Rating Scale (ECERS) and the revised version (ECERS-R), and the Infant Toddler Environmental Rating Scale (ITERS), and the revised version (ITERS-R). Result demonstrated that the relationship between teachers' levels of education and ECE quality indicate a positive correlation that was statistically significant (Manning et al., 2017).

Another recent meta-analysis by Falenchuk et al. (2017) examined the education levels of teachers in preschool aged classrooms in child care centers and the effect on child outcomes. Of the 823 research studies that were reviewed for eligibility; 39 met the inclusion criteria, however the research study reported that the review was affected by the variation in how teachers' levels of education was defined, how education was measured and how child outcome was assessed. Findings indicate that association between staff education and child outcome are nonexistent to the borderline positive. The authors identified certain positive and very weak association between teachers' levels of education and children's vocabulary and letter word identification, and no significant association with a mathematical outcome. Consequently, the findings concluded teachers' levels of education was not a major key driver of child outcome (Falenchuk et al., 2017). According to Barnett, (2011), results from research on effect of teachers' levels of education are mixed because researchers do address different questions using different methods and different model requirement that connects learning outcome and possible input related to the early learning process. Barnett (2011) argued that differences in education levels may not consider all facets of teacher quality, and for diverse reasons, the effect of a bachelor's degree may differ from state to state or within a particular area.

Extant research findings reported evidence of policy documents such as "New Teachers for a New Century by NIEER in year 2000, Eager to Learn by Bowman et al., 2001" (Ryan & Ackerman, 2004, p. 2), as prior indicators of calls on EC education college faculties to step up specific content knowledge of higher education curriculum relating to knowledge in CD that are relevant to the needs of teachers and the population

they serve. Congruently, in the quest to examine college teacher curricula content and the implication on teacher degree and levels of education, Buettner et al. (2016) questioned, "What are we teaching the teachers" (p. 155)? The findings reported that while bachelor's program focus on knowledge, associate degree content pay attention on practice, hence findings highlighted undertaught areas which may affect teacher pedagogy of teaching developmentally appropriate activities and promotion of social-emotional learning development (Buettner et al., 2016).

In the same dimension, another quantitative study which investigated Danish preschool teachers also questioned teachers' performance based on teacher's levels of education, major, and credential related to classroom structural quality and children's academic gains in Pre-K (Slot et al., 2018). Using the CLASS observation tool, findings reported minimal gain and outcome for Pre-K in language and preliteracy skills. Based on the research study outcome, authors suggested the value of consistent preservice and in-service training for teachers (Slot et al., 2018). To meet up with the evolving requirements of ECE for Pre-K, and to bridge the gap in research on practice, it is paramount to reinforce preservice training such that they reflect in the way teachers are prepared for instructional practices to support children's development and possible outcome (Buettner et al., 2016; Markussen-Brown et al., 2017; Slot et al., 2018; Wiseman & Al-bakr, 2013). The use of varied PD for preschoolers such as coaching, mentoring, and college courses using a consistent curriculum were further suggested as effective in increasing children's performance (Markussen-Brown et al., 2017).

Preference of Professional Development as an Indicator of Teacher Quality

Teachers' levels of education have been identified as encompassing not only formal education, but also credential and experiences (Connor et al., 2005; Falenchuk et al., 2017). Though this definition excluded the role of PD, Musgrave (2010) in his research study about educating the future educators towards ECE identified "profession as that which includes training and education which most often connote quality" (p. 437). However, prior research studies view quality as a complicated issue which resist a definition (David, 2004; Urban, 2008), but quality in ECE include a highly educated workforce with a commitment to ongoing continuing PD (Musgrave, 2010). While some authors agree that higher teachers' levels of education or possession of a teaching license play a contributory role in child outcome (Barnett, 2003, 2011, 2016, 2017; Manning et al., 2017; Setiawan, 2017). Other body of knowledge acknowledge that teachers' levels of education, or having a bachelor's degree is necessary, but may not be adequate in producing the expected classroom outcome (Bowman, 2011; Fuller, 2011; Kagan & Gomez, 2011; Pianta, 2011). Other researchers argued that irrespective of the levels of education, PD training was sufficient to hone the skill of teachers for effective performance (Gomez et al., 2015). Gomez et al. (2015) categorized PD into preservice and in-service and identified three pathways into accessing PD to include higher education of a Bachelor of Arts (BA), Bachelor of Science (BS), Associate of Arts (AA), or Associate of Science (AS), or competency-based credentials such as obtaining a CDA credential or credential from the National Board of Professional Teaching Standards (NBPTS), and experience, or ongoing PD. Rather than considering the independent factor

of teachers' levels of education, other authors propose the lenses of PD through preservice training, in-service training, co-teaching, mentoring, coaching, and other strategies that enhances the quality of service offered by Pre-K teachers (Peeters & Sharmahad, 2014; Piasta et al., 2015; Scarinci et al., 2015; Totenhagen et al., 2016). Other researchers proposed that high quality child outcome evolve from positive teacher-child interaction (Early et al., 2017).

Existing literature support that providing high quality PD do positively enhance classroom performance of teachers (Kelemen, 2014; Murphy, Scantlebury, & Milne, 2015; Shannon, Snyder, & McLaughlin, 2015; Wooland, 2017) which can further influence children's outcome (Bleach, 2014; Epstein, 2014; Hatfield et al., 2016; Piasta et al., 2015). Newman and Wright (2010) propose that high quality PD is a dynamic process which allow teachers to practice new and reflective teaching with the utmost goal of improving instruction for young children, especially children from less advantaged families. There is also precise research evidence on the effect of PD on children's linguistic productivity, complexity, and improvement in math and science learning opportunities (Bleach, 2014; Piasta et al., 2012).

Using a randomly selected sample of 49 teachers in their quantitative research study, Piasta et al. (2012) conducted an experimental study on the effect of PD on preschool teacher's conversational response and linguistic productivity and complexity. Research result indicated that trained teachers used meaningful communication strategies to facilitate learning all year round. Children in the treatment classroom, representing classrooms that has PD, (n = 25) showed greater linguistic productivity and complex

vocabulary acquisition in their talk than children in the control group (n = 24). This finding suggest that PD may transform teachers' conversation and the ability to use language to expand children's use and response to complex linguistic concepts. A similar investigation to support Pre-K children's math and science skill examined the effect of PD for EC educators (Piasta et al., 2015) using a sample of 65 educators who were randomly selected and assigned to a 10.5days (64 hours) of training on math and science or another alternative topic. While PD substantially impact the provision of science learning opportunities, such was not the case in mathematics. Result suggested that notable effort is required to promote math and science skills for children from a young age by providing adequate and qualitative PD in science and math for teachers.

Based on the recent initiative that effective learning for preschoolers occur through teacher-child interaction, other researchers argue that offering teachers PD opportunities on teacher-child interaction using the Classroom Assessment Scoring System (CLASS) can promote teacher pedagogy and strategies (Casbergue, Bedford, & Burstein, 2014; Pianta, Hamre, & La Paro, 2008). For example, using a large sample of 486 teachers in 336 schools and centers, Early et al. (2017) investigated the improvement of teacher-child interactions using a randomized controlled trial intervention of two types of PD aimed at strengthening teacher-child interaction. Each randomly selected teacher is assigned to one of three groups; Making Most of Classroom Interaction (MMC) where small group of teachers meet for five days of instructional support or My Teaching Partner (MTP) where teachers worked one on one with a coach using videotaped observation of teaching, then review and receive feedback or a control group. Each group

receive a CLASS visit before and after the intervention from a trained, independent blinded observer. Findings from the pretest and posttest of each group disclose a significantly higher posttest scores on emotional and instructional support and marginally higher posttest scores in classroom organization when compared to the control group. MTP group reported a significantly higher scores on classroom organization when compared to the control group. Findings indicate the essence of large scale interventions to improve the quality of teacher-child interactions in child care centers.

With the increased use of CLASS assessment all over the United States, Casbergue et al. (2014) conducted a CLASS reliability training as PD to improve teacher-child interaction relationship for effective learning opportunity for preschool teachers. The authors thought it is essential for teachers to be trained in the understanding of the tool by which they will be judged. The investigation involves CLASS reliability training as an initial PD for preschool teachers participating in an Early Reading project. The study was conducted within an Early Reading Project involving seven preschool classrooms in urban public schools. All schools served high poverty populations as evidenced by more than 90.5% children receiving free or reduced lunch. All the teachers were highly educated and certified. Though the domains where teachers indicate room for improvement differs, findings reveal that the use of CLASS reliability training did jumpstart changes in teacher's behavior across all domains of CLASS.

In another 2010 mixed method research investigation on the effect of continuing training for preschool teachers and centers, Pineda-Herrero, Belvis, Morenoo, and Ucar, (2010) investigated all the teachers in the four autonomous communities who have

utilized continuing training in the last three years. Result indicated that preschool educators are satisfied with continuing training and the transfer of training to their jobs, but there is little evidence of real and effective transfer to the classroom which indicated reasons for further study.

Coaching: A Dynamic Component of Professional Development

Some research findings propose that teacher attributes such as college degrees and credentials are not the best predictor of children's performance (Early et al., 2017; Gomez et al., 2015; Pianta, 2011; Neuman & Wright, 2010; Zan & Donegan-Ritter, 2014). The authors argue that some teachers without college degrees do intuitively interact with children to bring desired result. Essentially, "Coaching is identified to include systematic and cyclical processes of collaborative goal-setting related to practice implementation providing repeated practice implementation opportunities in job-embedded contexts and engaging in guided reflection with explicit feedback about implementation" (Shannon et al., 2015, p. 291). Coaching is considered focused on supporting and implementing instructional practices associated with positive developmental and learning outcomes for young children (Brown & Inglis, 2013; Shannon et al., 2015) including at-risk children faced with learning challenges or those with identified disabilities (Artman-Meeker, Fettig, Barton, Penney, & Zeng, 2015; Shannon et al., 2015; Zan & Donegan-Ritter, 2014). Researchers have shown quantitative evidence about the positive outcome of PD especially when coaching is included (Hatfield et al., 2016; Shannon et al., 2015). Other body of knowledge propose that coaching bred teachers engage children in rich language, vocabularies, and content rich

and purposeful instructions to promote the success (Neuman & Wright, 2010; Piasta et al., 2015) especially of children from less advantaged families, who are less likely to experience stimulating environments in their homes, neighborhood or environment (Neuman & Wright, 2010).

In a mixed method approach, Neuman and Wright (2010) investigated the effect of two forms of PD (coursework and coaching) on Pre-K teachers' use of early language and literacy practice. The study has a moderately large sample of 148 teachers from multisite in six urban cities in between the fall of 2007 and spring of 2008. Group one was assigned to coursework, group two to coaching and group three was the control group. The result of pretest and posttest examined teachers' knowledge, literacy practices, and language quality. Analysis showed no significant improvements between groups on knowledge of literacy or early language but teachers who received coaching made significant improvements both immediately and five months after. Teachers who received coursework made no significant improvements. Results indicated that coaching seems to be a more effective type of PD for EC educators.

In another sample of 60 teachers, Zan and Donegan-Ritter (2014) investigated the impact of a one-year model of PD using reflection, coaching, and mentoring as a technique to enhance teacher-child interaction in four Head Start classrooms. PD intervention consist of monthly cycle of video-based self-reflection, peer coaching, mentoring, and bimonthly workshops focused on CLASS structures. Education supervisors were trained and supported by project staff to lead teachers in coaching sessions. The sample for the intervention group was 38 and 22 represent the comparison

group. Monthly changes were recorded in the quality of teacher-child interactions as measured by CLASS. Irrespective of the levels of degree and whether teachers have a degree or not, findings reveal that when teachers are provided with multiple opportunities to engage in diverse PD practices, using a validated observational measure, they can effectively develop and implement instructional practices (Zan & Donegan-Ritter, 2014).

Using Bronfenbrenner's ecological theory and utilizing a qualitative focus group approach to gain understanding into preschool teachers' insight about web based self-coaching versus on-site expert coaching practice, Shannon et al. (2015) explored the perspectives of 21 certified teachers in three district schools located in three different states. The PD involved 16.5 hours of workshops ranging from four to six weeks, provision of job aids, and 16 weeks of on-site coaching or 16 weeks of prompts to engage in self-coaching using a project-developed website. According to the findings," teachers who received on-site coaching had sustained opportunities to understand the use of embedded instructional practices in the context of a supportive coaching relationship using regular constructive feedback, which facilitated the improved level of implementation" (p. 306). Conversely, "teachers in the web-based comparison group reported that self-coaching in a web-based delivery format require individual participants to have a strong grasp of the content, self-motivation, and technological self-efficacy to successfully access the available supports "(p. 306). The authors proposed that teachers are situated within multifaceted environmental systems, hence, PD providers require knowledge about the relevant and peculiar needs of teachers in terms of their values, beliefs, classroom, and organization framework. Therefore, considering the evolving state

of ECE, it is pertinent for ECE administrators, and coaches to consider what teachers need to know, what teachers will be able to implement, and how to simplify learning experience as the necessary parameters in their coaching or PD experience (Shannon et al., 2016).

Researchers have reported that children gain language, literacy, and executive functioning skills when they experience higher quality teacher-child interactions and instruction (Burchinal, Xue, Tien, & Auger, 2011; Hatfield et al., 2016; Mashburn et al., 2008; Weiland, Ulvestad, Sachs, & Yoshikawa, 2013). In a recent qualitative study examining the thresholds association between the quality of teacher-child interactions and preschool children's school readiness skill, Hatfield et al. (2016) recruited an initial of 434 teachers from multi sites with varying degrees, but 357 completed the phase of the study. Recruited teachers were serially and randomly assigned into any of the four groups; course only, coaching only, course and coaching, and the control group. Analysis of result suggest children demonstrate higher inhibitory control and phonological skills when classrooms are rated a six or higher on emotional support. Children attending the classrooms of teachers in coaching and courses group recorded attribute of warm emotions and positive expressions, response to teacher's cues, and autonomy among children. In classrooms where teachers relay clear behavioral expectation and provide maximum learning opportunities, and classroom organization, children's skill in literacy were higher than when features were less frequent (Hatfield et al., 2016).

Mentoring as an Approach of Professional Development

Another form of PD that have received attention is mentoring. "Mentoring is a dynamic system of guidance and support which provides opportunity for reflective practice based on on-going training and PD for teacher's development" (Lino, 2014, p. 206). Some research findings propose that child care centers supported by mentors has the potential to assist novice teachers in the development of practical professional knowledge (Carter & Francis, 2001) and support teacher's professional learning (Shanks, Robson, & Gray, 2012). In a quantitative approach by Wooland (2017), a cross sectional survey-based questionnaire was sent out to 435 teachers from 29 preschools in Norway and a total of 284 was returned. Teachers were asked a four-item question associated with mentoring and the social support received based on a four Likert Scale question. The result indicated that social support increases the occurrence of mentoring provided at work for employees with a higher level of education, and having a higher education moderates this relationship as compared to those without such education.

Preservice and In-Service Training: An Evolving Process of Teacher Quality

In-service has been identified as a form of PD for trained teachers. According to Lino (2014), in-service is distinguished from preservice not by the content or methods but to hone the skills of trained teachers to be more effective in their career and the changing need of the society. In this respect, in-service trainings target teachers' technical skills so as to broaden their theoretical and practical structure within their knowledge of the curriculum, content, and pedagogy (Spodek & Saracho, 2003). For instance, Scarinci et al., (2015) reported teacher's evidence of gaining confidence of knowledge to promote

language development after in-service training. Likewise, Stormont, Reinke, and Herman (2011) has previously identified confidence as a fundamental factor of skills and knowledge. In fact, EC educators who gained confidence in their training have been found to intensify their effort in promoting language development in child care centers (Green, Peterson, & Lewis, 2006), and have actually put these skills into practice (Stormont et al., 2011).

Scarinci et al. (2015) gave an explicit evidence of investigating the effect of in-service program on promoting language development in young children by selecting a sample of 42 ECE teachers in a mixed method pilot study approach conducted by a speech pathologist. The teachers work with children less than 5-year-old and the class size ranges from five to more than 16 children in a setting located in a lower socioeconomic area. The pilot research entails two studies, first the EC educators attended the in-service program, and completed a pretest and posttest questionnaire, another subgroup of five teachers who also attended the in-service participated in a second study involving a pretest and video test observation of their knowledge of child language development and strategies to promote language development. Findings show evidence that educators gained confidence in performing their roles. Though not statistically significant, the video recording group covered the use of seven out of eleven language development strategies covered in the in-service training (Scarinci et al., 2015). It is also important to note that there are growing evidence indicating that lack of a preservice training can be compensated for by an in-service training (Fukkink & Lont, 2007; Pianta, Mashburn, Downer, Hamre, & Justice, 2008). Though there are evidences

on the significance of in-service training for child care center teachers (Epstein, 2014; Gomez et al., 2015; Lino, 2014; Scarinci et al., 2015) but research on the actual content and format of in-service training relevant to teachers working with at-risk population is lacking.

Developmental Trajectories and Performance of At-Risk Children

At-risk children were described as children from poverty or low-income families who consistently exhibit delays in cognitive, motor skill, and behavioral development when compared to children from high-income families (Bellows et al., 2017; Coley, Votruba-Drzal, Collins, & Cook, 2016). Given the usually low developmental skills exhibited by children from low-income families (Claire-Son et al., 2013; Desimone & Long, 2010; Sektnan, McClelland, Acock, & Morrison, 2010), simple emphasis on providing content from the standpoint of cognitive domain, including math, and early literacy may be insufficient (Claire-Son et al., 2013) except if supported by social and emotionally sustained environment that focus on social and cognitive skills to capture the often exhibited classroom behavior, and lack of self-regulation skills of at-risk children (Claire-Son et al., 2013; McClelland & Wanless, 2012). In view of existing evidence about the importance of high quality classrooms that meet the need of at-risk children (Brown, Molfese, & Molfese, 2008; Claire-Son et al., 2013; Logan, Piasta, Justice, Schattschneider, & Petrill, 2012) and the fundamental goal of Head Start in preparing low-income children for school readiness (U.S Department of Health and Human Service, 2010), it becomes critical to address the issue of teachers' levels of education

and appropriate PD as significant indicators to the performance and success of at-risk children (Claire-Son et al., 2013; Landry et al., 2017).

Researchers have established that center-based EC education fosters gains in cognitive skills for low-income, or at-risk children, and there is limited knowledge regarding the diverse arrangements in child care centers (Claire-Son et al., 2013; Cote et al., 2013; Landry et al., 2017; Lin & Magnuson, 2018). Other researchers have proposed that center based early education care in Pre-K 4 and 5 assist in raising the school readiness skills of economically disadvantaged children (Barnett et al., 2016, 2017; Yashikawa et al., 2013). Evidence of mixed results in behavioral skills show center-based child care is linked with high quality reading, math, and language scores when compared to parent, or home care settings (Coley, Votruba-Drzal, Miller, & Koury, 2013; Votrubal-Drzal, Coley, Koury, & Miller 2013).

To ascertain the development of cognitive behavioral skills of children from low-income families, Coley et al. (2016) compared the quality of teachers and instruction offered to at-risk children in public, private, and informal preschool programs in a national sample of economically disadvantaged children. The study had a large sample of 4,250 low-income children from the national representative of Early Childhood Longitudinal Study Cohort (ECLS). The study tested the associations between the different types of early education arrangements and children's development. Result showed public school centers and Head Start had the most educated, and highly trained teachers, and consequently the most enriched learning resources and activities and appropriate global quality. However, adjustment for differential selection in early care

setting using propensity score weighting revealed at-risk children attending private child care centers had increased math, language, and reading skills at age 5. Children attending Head Start and public-school centers also showed improved math and reading skills in comparison to children experiencing home parental care. The study found no difference in behavioral skill as reported by Votrubal-Drzal et al. (2013). Their report supported the need for enhanced access to center based centers for at-risk children as suggested by previous studies (Barnett, 2004; Barnett, et al., 2017; Claire-Son et al., 2013; Landry et al., 2017).

Findings from the United States Department of Health and Human Services and Administration for Children and Families (USDHHS & ACF, 2010) regarding Head Start Impact Study revealed that classroom experience alone does not suffice to ensure children from economically disadvantaged background will be ready for school success. Rather, they recommended a greater commitment to effective parent program could facilitate the process (USDHHS & ACF, 2010). Actually, a recent finding reported that though Head Start value parent involvement, but Head Start parent programs have not demonstrated established efficiency (Cooper & Lanza, 2014). Landry et al. (2017) suggest that "children from low socioeconomic status such as is represented in Head Start programs are faced with life challenges such as illness, frequent moves, multiple parent jobs etc. that prevent them from staying consistently focused and engaged in a program" (p. 50).

Landry et al. (2017) investigated the improvement of school readiness of high-risk preschoolers by combining two high quality instructional strategies with responsive

training for teachers and parents in a quantitative study. The study evaluated the effect of two interventions, one in a Head Start classroom (Early Education Model-TEEM) and another targeted at parents in the child's home (Play and Learning Strategies- PALS). The research study focused on how the variables will result in enhanced capability of at-risk 3 - 5-year-old children's school readiness. With a moderate sample of 77 classrooms, teachers were randomly assigned to a TEEM (n = 39) or No TEEM control group (n = 38). Most teachers have a bachelor's or higher degree and TEEM included several PD including a two-day initial general training introducing teachers to TEEM and classroom framework, in-class coaching, coursework, progress monitoring, and provision of instructional resources. Teachers were also trained on the use of Progress Monitoring Systems and CIRCLE Screening Assessment to measure and track children's progress to inform their instruction. Six to eight children in each classroom were also randomly assigned to have their parents receive PALS (n = 314; 210 after attrition) or No PALS condition (n = 309; 221 after attrition). Hence, there were four groups: TEEM/PALS, TEEM/No PALS, No TEEM/PALS, and No TEEM/No PALS.

With the goal of providing children with a consistent responsive practice in both school and home environment, teachers and parents receive trainings to use strategies and responsive ways that support at-risk children's readiness skills. The result reveals the intervention group of teachers; TEEM, showed greater gains in language and literacy instructional practices, and sensitivity when compared to the teachers in the control group, however, there were few significant findings for children's cognitive outcome. Parents who received PALS, the intervention treatment also indicate greater increase in

play and book reading contexts across the board and evident responsive behavior when compared to the control group of No PALS/No TEEM. As evident in the interactive observation of parents, children whose parents receive intervention showed greater gains in the measures of print knowledge, self-regulation, and social and language skills when compared to the control group of No PALS. Though combination of TEEM by teachers and PALS by parents showed increased engagement in shared book reading, such evidence did not cut across cognitive and social outcomes necessary for at-risk children. Accordingly, the research study proposes that irrespective of the levels of education, teachers of at-risk children will need a more sustained intervention to adopt instructional practices of high quality standard that is adequate to effect child outcome or improved performance (Landry et al, 2017).

As an evidence of delay in motor skill development often exhibited by at-risk children, Bellows et al. (2017) conducted a longitudinal quasi-experimental study aimed at determining the status of Fundamental Movement Skill (FMS) performance of low-income, at-risk preschoolers. There were two intervention and two control studies in four rural Head Start centers. Two Head Start centers serve as the intervention group and another two serve as the control group, both serving children aged 3 to 5-year-old. To ensure all children were at-risk children, children diagnosed with developmental disabilities such as cerebral palsy or Down syndrome were excluded from the study. The intervention group received the Food Friends Fun with New Food Nutrition and Might Moves (MM) physical activity programs in the preschool class, and a booster program in kindergarten class and first grade representing a two year follow up. Preschool teachers

implement MM physical activities four days in a week for 15-20 minutes per day for over 18 weeks in preschool classrooms, totaling 72 lessons. Every week, teachers introduce and focus on different aspect of FMS including stability, locomotor, object control skills, and movement were incorporated into every part of the lesson. As part of the 2-year follow-up, 'booster' activities were conducted in kindergarten and first grade for 15-20 minutes by research assistant students and extension to sustain the behavioral changes cultivated in preschool. The Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2) was utilized to assess the FMS. The BOT-2 subtest for balance, running, speed and agility, upper limb coordination as object control (OC) skills, and strength were administered at baseline.

Postintervention was administered in preschool, and a one-year follow up at kindergarten, and two years follow up at first grade. To assess changes in FMS over time, a repeated measure of analysis of variance (ANOVA) were performed on the two groups as the in-between factor and total point score for the BOT-2 subtest at each assessment period. Baseline results show that compared to the norm-referenced sample, at-risk preschoolers in this study have developmental delays in both balance and OC skills. MM intervention during preschool resulted in significant longitudinal improvements in preschooler's OC skills such that intervention children's object control skills were similar to the norm referenced sample by the end of first grade. Conversely, children in the control group still experienced significant developmental delays in OC skills by the end of first grade. Both the intervention and control groups have developmental delays in balance skills at the end of first grade, implying there were no intervention effects on

locomotor speed or strength skill. This study is consistent with previous literature suggesting that at-risk children have developmental delays in the domains and FMS (Liu, Hamilton, & Smith, 2015; Morley, Till, & Ogilvie, 2015; Votruba-Dral et al., 2013). Moley et al. (2015) further suggest that preschoolers from high socioeconomic families perform better on FMS than preschoolers from low socioeconomic families.

Viewing from a different lens, attention has been focused on developing higher-level reasoning, critical thinking, and communication skills of preschool children, but science and engineering domains where these skills could be promoted are frequently untaught and untested in Pre-K (Zucker et al., 2016). Likewise, another research study noted that to ensure high quality instruction for young children, there has been increased focus on the role of assessment of preschool students, however engineering and science remain largely untested for young children (Landry et al., 2017). Utilizing a moderate sample of 327 children from predominantly low-income backgrounds, Zucker et al. (2016) examined the psychometric properties of a new screening instrument in science and engineering skills. Pre-K teachers were from two districts schools-based Pre-K programs, four Head Start centers, and five private child care centers. Teachers from the district school Pre-K were certified, and had a bachelor's degree, while Head Start teachers had bachelor's degree, and teachers from the five private child cares are holders of high school diploma, and associate degrees. The result indicates adequate psychometric properties across all examined areas including a strong concurrent correlation. Both science measures were reported as moderately correlated with children's general vocabulary knowledge and usage.

History and Validity of Phonological Awareness Literacy Screening (PALS)

The 2008 report of the National Early Literacy Panel indicated that predictor of later reading success as ability to recognize letters, awareness of speech and sounds, alphabet knowledge task, rhymes, and beginning sound awareness (Lonigan & Shanahan, 2008; Shanahan & Lonigan, 2010). To assist teachers to plan targeted literacy instruction for optimal learning experience, the report further propose the use of assessment tools that provide valid and consistent information about children's developmental trajectories in the area of emergent literacy. Prior research findings also draw attention to the significance of emergent literacy skill and understanding development at Pre-K as a critical basis for acquiring formal reading skills (Norwalk, DiPerna, Lei, & Wu, 2012). Preschool children who exhibit deficiency in language and early literacy skills often fail to attain the same expectation with their peer group (Cabell, Justice, Logan, & Konold, 2013), and are subject to future reading failure (Huang & Konold, 2014; Justice, Bowles, & Skibbe, 2006; Norwalk et al., 2012). Children from low socioeconomic family or children who lives in poverty are prone to increased risk of reading difficulties because of multiple interconnected risk issues which may lead to future academic failure (Cadima, McWilliams, & Leal, 2010; Norwalk et al., 2012).

Furthermore, children from low socioeconomic family often have limited access to books, literacy resources, and fewer high-cognitive conversation within their homes or with parents (Bradley, Corwyn, Pipes-McAdoo, & Garcia-Coll, 2001; Norwalk et al., 2012). Consequently, such children enter kindergarten with less language and literacy skills much lesser than their peers from homes with higher socioeconomic status (Huang

& Konold, 2014; Lennox, 2013). As these children continue in their growth continuum, immediate environmental factors including access to resources, the quality and amount of resources, and social capital usually create a wide gap between children from different socioeconomic classes (Huang & Konold, 2014).

These cumulative environmental factors combined with fewer emergent literacy skills in kindergarten often lead to the development of slower degree of reading skill by children from low-income families in kindergarten or first grade in comparison to children from more high-income background (Cabell et al., 2013; Norwalk et al., 2012; Tayler et al., 2015). Subsequently, children who did not meet the grade level reading objectives by the end of first grade may not likely meet or exceed expectation all through elementary education level (Cabell et al., 2013; Justice et al., 2006; Norwalk et al., 2012; Spira, Braken, & Fischel, 2005). However, though children from lower socioeconomic status such as in Head Start programs are known to be at a greater possibility for future reading or intellectual difficulties (Cabell et al., 2013; Cadima et al., 2010; Lennox, 2013), yet the population may not be totally categorized as homogenous (Norwalk et al., 2012).

Therefore, identifying and narrowing reading achievement gap will require the use of research-based assessment which can promote the recognition of children that are prone to future reading difficulties (Cabell et al., 2013; Huang & Konold, 2014; Justice et al., 2006; Shanahan & Lonigan, 2010). Consequently, PALS was birth by the University of Virginia to meet the overarching need of a literacy screening tool that meet the anticipated need of Pre-K 4 PALS and kindergarten PALS-K children (Huang & Konold,

2014). PALS assessment is a screening, diagnostic, and progress monitoring early literacy tool which serves as a response to improving early emergent literacy skill (Invernizzi, Landrum, Teichman, & Townsend, 2010). PALS can also be described as a criterion-referenced assessment designed to identify students who may be at-risk of future English reading difficulties and delays and was intended to help guide teachers in their instruction (Invernizzi, Juel, Swank, & Meier, 2003, 2004). Huang & Konold (2014) described phonological awareness as the "awareness of sounds in spoken (not written) words that is revealed by such abilities as rhyming, matching initial consonants, and counting the number of phonemes in spoken words" (p. 207). PALS for Pre-K covers three out of the four domains recommended by NELP in 2008 (Invernizzi et al., 2010). Analysis of increased implementation of PALS as an emergent literacy screening in Pre-K reveal PALS measures name-writing, print and word awareness, beginning sound awareness, rhyming, nursery rhyme awareness, alphabet knowledge, and phonological awareness (Invernizzi et al., 2010). Though PALS has been validated as a valid and reliable literacy screening tool, and widely adopted as a literacy screening tool over the years, yet, there are still limited research study and peer reviewed literature on the outcome of the use of PALS when compared to the outcome of PALS-K (Huang & Konald, 2014).

For example, in a quantitative latent analysis investigation of PALS-K for English Language Learners (ELL) and non ELL kindergartners, Huang and Konold (2014) administered PALS-K to a large sample of 2,844 children from economically disadvantaged homes, who also coupled as first time public-school kindergartners in the

Commonwealth of Virginia. Eligibility for economically disadvantaged homes was indicated by eligibility for free or reduced lunches, and children must have attended a Head Start, or publicly funded program such as Title I or Virginia Preschool Initiative (VPI) program in the previous year. To account that sample comprise mainly typical children from low-income or disadvantaged families, and to ensure the intended use of PALS-K, children with disabilities were excluded from the study. Overall, ELL students were 1,180 in number and non ELL were 1,482. PALS-K comprises two basic components; including the phonological awareness which consist of rhyme awareness and beginning sound awareness, and print related literacy skills as the second part consisting English alphabet recognition, English letter sound knowledge, invented spelling, and concept of words. Teachers administered PALS-K to students from the first six weeks of fall, towards the end of midyear, and the spring of kindergarten classes. Teachers validated the children on PALS-K online at the beginning of fall and entered the results into PALS-K online for interpretation. PALS online interpretation of results is represented as below expectation, meet expectation and exceed expectation. Result reveal that a hierarchical structure does provide the best data approximation and PALS-K support the use both with ELL and non ELL students. The interpretation support how teachers can identify the strength and weaknesses across all dimensions of PALS-K and subsequently develop remedial treatment plans or action goals for each child.

However, though PALS-K cover a wide scope of important early literacy skills, other details such as fluency, vocabulary, and comprehension are not assessed because

these skills may be less relevant for early emergent reading development (Huang & Konold, 2014; Invernizzi et al., 2010).

TSG: An All-Encompassing Valid and Reliable Screening Instrument

One of the primary criteria in a high-quality teaching practices include the use of an age appropriate child assessment (Lambert, Kim, & Burts, 2014, 2015; NAEYC, 2003). Lambert et al. (2015) postulated that well designed screening tool that are used appropriately and as intended can inform teacher pedagogy and improved child outcomes. Contrarily, assessment tools that do not reflect the evolving demographics in early childhood may result in inappropriate support and less effective learning experience for children (Barnett et al., 2010). Therefore, scientifically informed and research-based assessment, or screening tool is required to ensure all children are appropriately and fairly screened irrespective of cultural background, language, or disability (Qi & Marley, 2009). Likewise, Pena and Halle (2011) recommended the validation of assessment tool that cut across the diversity represented among children. Previous research study and theoretical framework also identified the tremendous influence of immediate environmental factors on a developing child and suggested the consideration of the contextual setting embedded around the child (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006). Therefore, maintaining an often and close communication with parents may provide the information needed by teachers to close the developmental circumstances surrounding the child (Bronfenbrenner & Morris, 2006).

The TSG assessment system is therefore considered “an authentic and formative teacher rating performance child observation tool, designed to measure the on-going

development and learning progress of children from birth to kindergarten across various domains including; social-emotional, physical, language, cognitive, literacy, mathematics, and English language acquisition" (Lambert et al., 2015, p. 49). Lambert et al. (2014) further affirm the tool can be used in combination with TSG curricula or any other curriculum. TSG include 38 objectives and dimensional rating scale which assist teachers to target assessment information through anecdotal observations, children's work sample, work, photos, recordings, video clips, and regular conversation with children, and their families (Lambert et al., 2015). Accordingly, GOLD is rather a formative assessment and not a test and it is not intended to be used as diagnostic or clinical instrument (TSG GOLD, n.d, 2006). Data collected from TSG may assist teachers in collecting more information or to gather more specific evaluation (Lambert et al., 2014, 2015), or assist teachers to individualize or scaffold children's learning (Early et al., 2010).

With an aim to offer evidence for the validity of the measure being assessed, Lambert et al. (2014), used TSG GOLD assessment system to analyze teacher ratings of the tracking of young children's growth and development. The research study used a large national sample of 21,592 children, aged between 12 to 59 months from 40 states and the District of Columbia. The children included in the sample were rated within the three TSG check points of online version of fall, winter, and spring of 2010-2011. As with the fall assessment, there were no sufficient data in the population to include children lesser than 12 months and older than 59 months in the study. Children of all races were represented in the norm sample. Prior to assessing the children, teachers

undergo two days training of an overview of the assessment and explored the 38 objectives of TSG and how children progress from birth through kindergarten. Teacher training included participation in large groups, video segment, evaluation of child portfolio, completing family conference forms, entering observation notes, uploading documentation samples, and tracking checkpoints online. In other to establish the interrater reliability of the measure, the study examined the correlations between the master trainer ratings and the ratings of the teachers using TSG measures. The result showed all correlations were above .90 with one exception that was above .80. In terms of growth and development, children experiencing disability showed slow progression when compared to typically developing children. Gender wise, girls tend to show some advantage over the boys and ELL Pre-K showed slow progress by fall session but exhibited a faster growth rate than their native English-speaking peers over time. Precisely, the research study reveals how TSG cover sensitivity to children's growth and age differences over time. Based on normal developmental progression, older children recorded higher scores than younger children during the three checkpoints.

In another extended quantitative longitudinal study further evidence was provided about the validity and reliability of TSG teacher rated scale scores. Lambert et al. (2015) addresses several psychometric issues as recommended by the National Research Council (NRC). The study used two national large samples, n = 10,963 and n = 20,970 from the 50 states, and the District of Columbia. The children were sampled from Head Start, private child care, and school-based sites with age range from 12 months to 59 months as at the time of the fall assessment of 2010-2011. Children received educational services in

618 different programs at 2,525 different centers located in all the regions of United States. Some centers use TSG Creative Curriculum and some did not. All categories of children from different races, ethnic, language background, gender, age groups, and economic status were represented, including children with IFSP and IEP. A total of 4,580 teacher rater were recruited to assess the children. Confirmatory factor analysis, classical and modern indexes of reliability, and interrater reliability were used to address the psychometric issues underlying the validity and reliability of TSG as the most widely instrument covering the heterogeneous sample of young children.

To further ascertain the concurrent validity of TSG, Lambert et al. (2015) examined a separate study within this study with another sample of 1,241 3 to 4-year-old children to account for teacher ratings and clustering effects. Result showed moderate associations were found between TSG scale scores and a direct measure. Lambert et al. (2015) propose the validity and reliability of the instrument but suggest the continuation of its measure of children's development and learning. The authors further propose that if TSG is used as intended, the measures embedded can assist teachers in providing developmentally appropriate learning experience for children, plan small group instruction, individualize for every child, and track children's progress (Early et al., 2017; Lambert et al., 2015).

Consolidation of Literature

Though higher teachers' levels of education and licensure has been reported as being responsible for the success and quality of previous programs such as the High Scope Perry Preschool Program, the Tulsa Oklahoma Head Start, Abecedarian Project,

and the Chicago-Parent Teacher Project, and the most recent and ongoing New Jersey Abbot Project (Barnett, 2003, 2007, 2011; Bowman, 2011; Claire-Son et al., 2013; Lin & Magnuson, 2018), yet research findings are mixed about what really matters and contribute to preschooler's high performance and child outcome. While some body of knowledge propose that possessing high pedagogy of instructional support do promote teachers' knowhow, language, creativity, and instructional strategies that can be transferred into teaching and practice to influence children's performance (Barnett, 2016, 2017; Connor et al., 2005; Pellatti et al., 2016; Setiana, 2017), yet some literature argue that degrees in ECE or CD play a significant role in teacher quality which eventually reflect in children's positive performance (Barnett, 2003, 2016, 2017; Claire-Son et al., 2013; Totenhagen et al., 2016). Some researchers further suggest that higher teachers' levels of education or teaching license play a positive contributory role in child outcome (Manning et al., 2017; Setiawan, 2017). Based on findings, some research outcomes concluded that teachers' levels of education are not the basic key to child outcome (Claire-Son et al., 2013; Falenchuk et al., 2017).

From a different perspective, research findings concluded that holding a bachelor's degree may not be sufficient in meeting the instructional teaching and practice required to meet the needs of Pre-K students (Bowman, 2011; Fuller, 2011; Gomez et al, 2015; Kagan & Gomez, 2011). Rather, these authors propose a point of view of active and ongoing PD. Other researchers argue that irrespective of teachers' levels of education, PD is sufficient to hone ECE teachers' skill (Gomez et al., 2015). Other advocates for PD suggested the combination of preservice and in-service training,

coteaching, mentoring, coaching, and other similar strategies that enhances the performance of Pre-K teachers is enough to influence children's learning experience positively (Peeters & Shamahad, 2014; Piasta et al., 2015; Scarinci et al., 2015; Totenhagen et al., 2016). From another perspective, some literature proposed that high quality child outcome and performance evolve from qualitative teacher-child interaction (Early et al., 2017; Pianta et al., 2008).

There have also been mixed outcomes from different meta-analysis research study about the efficacy of higher degrees in relation to high child performance (Early et al., 2006; Falenchuk et al., 2017; Howes et al., 2008; Kelley & Camilli, 2007; Manning et al., 2017; Mashburn et al., 2008). Early et al. (2016) used a fairly large sample and controlled for covariates including years of education, highest degrees, BA or no BA, and college major, but they found fewer associations between any measures of the variables. This outcome may probably depend on the state and selection of fewer states as samples. For instance, Mashburn et al. (2008) made their sample selection from the same NCEDL population as Early et al. (2006), but they included another population sample from NIEER and used a larger population of 671 samples from 11 states, yet they found a negative relation between higher teachers' levels of education and children's literacy skill. However, Kelley and Camilli (2007) used a minimal sample of 32 nonexperimental studies but recorded a small positive effect and significant result among teachers with a bachelor's degree when compared to teachers with lower degrees or credentials. With a larger sample of 3,000 children from 11 states but using a mixed method and CLASS as a means of measurement, Howes et al. (2008) reported that irrespective of the levels of

education, children experienced higher education gain when they experience quality instruction of teacher-child interaction. On another note, Manning et al. (2017) used a smaller sample of eligible 80 nonexperimental sample as Kelley and Camilli (2007) and a more sophisticated 2.0 meta-analysis software but used a different means of measurement including ECERS, ECERS-R, ITERS, ITERS-R, and recorded a significant result of higher teachers' levels of education to child outcome. Falenchuk et al. (2017) selected their 39 samples from PsycINFO, ERIC and Medline but the articles are observational in nature and are reported as subject to the inherent biases of the research design. The report indicated the study found some positive and very weak association between teacher education and children's vocabulary, and letter word identification but no significant association in math outcome. They concluded teachers' levels of education was not the basic key factor of child outcome. Nevertheless, they reported their results may have been hindered by the heterogeneity by which education was defined, how teacher education was measured, and how children's outcomes were assessed.

Responding to the mixed outcomes, Barnett (2011) argued that the only means by which teacher's levels of education will produce a lager gain in children's development and learning is when there are changes in thought process that will lead to changes in practice and consequently children's experiences. Barnett (2011) further propose that results from research on effect of teachers' levels of education are mixed because researchers do address different questions using different methods and different model requirement that connects learning outcome, and possible input related to the early learning process. Differences in education levels may not consider all facets of teacher

quality, and for diverse reasons, the effect of a bachelor's degree may differ from state to state or within a particular geographic location (Barnett, 2011).

There seems to be a consistent agreement about the definition and outcome of at-risk children or children from low-income, or disadvantaged families in terms of cognitive and developmental delays, social-emotional development, and the exhibition of challenging behavior (Bellows et al., 2017; Coley et al., 2016; Landry et al., 2017; Lin & Magnuson, 2018; Liu et al., 2016; Logan et al., 2012; Moley et al., 2015; Sektnan et al., 2010; Votruba-Dral et al., 2016; Zucker et al., 2016). However, to the best of my knowledge, having conducted an extensive literature search, no specific literature or peer reviewed article have addressed the type of teachers' levels of education or PD that meet the specific needs of at-risk children or bridge the existing gap between children from low and high-income families. There is also a gap in research on practice about the use and specific outcome of PALS or TSG screening tools for at-risk children. This study therefore found a gap in research on practice of identifying the type of teachers' levels of education and PD that suits the specific need of at-risk or disadvantaged children. Essentially this study added to the body of knowledge by investigating the difference that existed between teachers' levels of education and at-risk children's scores on standardized readiness assessment. The research question informed the study by identifying if there was a difference in assessment scores when at-risk children were taught by teachers with different levels of education.

Summary and Conclusions

The literature review reveals the importance of teachers' levels of education as a component of structural quality. Several literature findings identified and discussed the components of teachers' level of education. However, there were mixed outcomes about the role of teachers' levels of education in child outcome. Some body of knowledge acknowledge that teacher with higher levels of education are better skilled and have better instructional pedagogy to influence children's learning. Other literature findings did not find a difference between teachers' levels of education and child outcome. Some literature argues that teachers with specialization in ECE or CD influence preschoolers more positively because such teachers can apply their knowledge of CD to ECE.

The literature identified controlled for variables such as level of education, types of degree, major, and licensure, and teacher experience. Other literature addressed the difference in curricula of bachelor's and associate degrees and found some gaps in research on practice. The definition of at-risk children gave a clear indication that these categories of children will need more support to meet up with their advantaged peers. This research study found a gap in research on practice regarding the quality of teachers or level of teacher education that can best support, influence, and sustain at-risk Pre-K.

I included literature that identified on-going PD as an alternative to teachers' levels of education. While some researchers reported the effects of PD in empowering teacher's instruction, others were more specific about the type of PD that is more productive. In this section, I covered the use of preservice, in-service, mentoring, co-

teaching, and different types of coaching. Nevertheless, researchers did not specifically identify the type of PD that adequately support teachers of at-risk children.

To have an explicit idea of at-risk children, I included literature that discussed at-risk children from diverse settings. Since this study was investigating at-risk Pre-K assessment performance, as taught by teachers with varied levels of education, the literature review covers the validity and reliability of PALS and TSG standardized assessments. However, there is limited information in peer reviewed articles regarding PALS and TSG.

This quantitative and MANCOVA design study had the capability of broadening the knowledge and giving insight into the type of teachers' levels of education and experience that best meet the need of at-risk Pre-K 4 children. The insight garnered may bridge the identified gap in research on practice. The methodology was outlined and described in explicit details in Chapter 3.

Chapter 3: Research Method

The purpose of this quantitative study was to investigate whether a relationship exists between teachers' levels of education and at-risk children's scores on standardized readiness assessments. The archival assessment results from this study revealed the significant differences that occurred when at-risk children were taught by teachers of varying levels of education. This chapter covers the framework of the method of inquiry I used in addressing my hypothesis and research questions. I used a quantitative methodology and MANCOVA as the data analysis method. Using a MANCOVA allowed testing for accurate analysis of the adjusted means between three or more independent groups identified within the variables while controlling for a covariate (Huberty & Petoskey, 2000). This chapter specifically covers the methodology and research design employed in this study. The target population and sample size, type of instrumentation, type of data, and means of data collection are further addressed in this chapter. Issues of instrument validity and potential threats are discussed. Information on statistical analysis, methods of research design, and protection of participants is also included in this chapter. I discuss ethical issues related to the study, explain how I abided with Institutional Review Board (IRB) regulations, and conclude with a transition to Chapter 4.

Research Design and Rationale

The independent variables for this study were teachers' levels of education and years of experience, while the dependent variables were at-risk Pre-K 4 students' scores on the TSG and PALS standardized assessments. The TSG screens for performance in cognitive, physical, social-emotional, and language domains, and learning content areas

including mathematics, science and technology, arts, and literacy. PALS assessments cover name-writing, alphabet knowledge including upper and lower cases, beginning sound awareness, print and word awareness, rhyme awareness, and nursery rhyme awareness. Teachers' levels of education included bachelor's and advanced degrees, state license in ECE, bachelor's degree in ECE, and/or other related and unrelated fields, associate's degree in ECE, and/or other unrelated fields, some college credits in ECE, CDA, and high school diploma. All teachers received the same ongoing professional development and coaching support within the Head Start sites.

The research design for this study was MANCOVA. The use of MANCOVA was suitable for my study because my independent variables, teachers' level of education and years of experience, had more than one group, and the dependent variable included standardized assessment test scores of at-risk children from two different standardized instruments, with the controlled covariate, which is the field of study. It was determined that a MANCOVA would answer the research question by determining which of the groups of the independent variable contributed to significant differences in at-risk Pre-K 4 standardized assessment test scores on PALS and TSG. A MANCOVA would further identify whether teachers' years of experience contributed to significant differences in at-risk Pre-K 4 standardized assessment test scores on PALS and TSG. The controlled covariate revealed whether the teachers' field of study played a significant role in at-risk Pre-K 4 standardized assessment scores in PALS and TSG. As an omnibus test, MANCOVA allowed using a post hoc test to determine which of the group of teachers' levels of education and years of experience contributed to the statistical significance of

at-risk Pre-K 4 standardized assessment test scores on PALS and TSG. A one-way MANCOVA did reveal the means and statistical difference of each group of the independent variable in relation to the standardized assessment test scores of the dependent variable. MANCOVA allows group comparison of one or more independent variables when there are two or more dependent variables and a covariate (Creswell, 2012).

A one-way MANCOVA was appropriate for this study to determine if any difference existed between the group levels of the independent variable that had two or more continuous dependent variables and a covariate (Huberty & Petoskey, 2000). A MANCOVA could be used to test the hypothesis and answer the research questions to reveal the means and significant differences between variables that have a covariate, if any exist. The MANCOVA would compare teachers' levels of education to at-risk children's scores on TSG and PALS to identify if there was a significant difference between teachers' levels of education and children's assessment score improvement while controlling for teachers' field of study. A possible time and resource constraint consistent with MANCOVA involved the time required to conduct statistical tests associated with the 10 assumptions that the data needed to satisfy before conducting a one-way MANCOVA. The 10 assumptions are stated below, and the statistical tests are required for Assumptions 5 to 10 (Huberty & Petoskey, 2000).

Assumption 1: The two or more dependent variables should be measured at interval or ratio level, otherwise regarded as a continuous variable.

Assumption 2: The independent variables should consist of two or more categorical independent groups.

Assumption 3: The covariates must all be a continuous variable.

Assumption 4: The data are required to have independence of observations.

Assumption 5: There should be a linear relationship between the different pair of the dependent variables for each group of the independent variable, so I plotted a scatterplot matrix with LOESS lines of the dependent variable for each group of independent variables.

Assumption 6: There should be a linear relationship between the covariate of each dependent variable nested within the different groups of the independent variable, so a scatterplot matrix with LOESS lines was plotted for the dependent variable for each group of independent variables.

Assumption 7: There should be homogeneity of regression slopes between the covariate and each dependent variable. I used SPSS to check the homogeneity of regression slopes.

Assumption 8: Homogeneity of variance and covariance matrices is required. I tested the homogeneity of variance and covariance using Box's M test of equality of covariance matrices.

Assumption 9: There should be no univariate or multivariate outliers with the independent variable for each dependent variable. I used SPSS to detect possible univariate outliers by checking the standardized residuals and

used the Mahalanobis distance on SPSS to detect possible multivariate outliers.

Assumption 10: I used the Shapiro-Wilk test of normality to ensure that there was no multivariate normality (Huberty & Petoskey, 2000).

Furthermore, differentiating the group levels of the independent variable and their level of significance in one-way MANCOVA required a follow-up with a post-hoc test. Obtaining an accurate result using MANCOVA requires ample time.

This design choice could be used for advancing knowledge in the field because other studies in the past have examined the topic of teachers' levels of education and preschool children's outcomes without looking specifically at at-risk children. Such studies also had a focus on the impact or effect of teachers' levels of education on preschool children's outcomes or EC programs. This study focused on comparing the variables including a covariate using a MANCOVA to identify the differences. Similar studies have also used analysis of variance (ANOVA) and other designs (Barnett, 2004; Brown et al., 2008; Connor et al., 2005; Croninger, Rice, Rathbun, & Nishio, 2007) without considering the use of MANCOVA to identify the difference between two variables and the group levels within the variables with possible covariates. The use of ANOVA and other designs may not necessarily compare multigroup levels of the independent variable (Tonidandel & LeBreton, 2013; Wayne, 2014), but MANCOVA design allows a post hoc test, which could be used to specifically identify how multiple group levels of teachers' levels of education differ from each other and their levels of statistical differences while considering other covariates (Huberty & Petoskey, 2000).

Some studies have used assessment tests that measure a specific domain, but these tests may not be used consistently by the school or child care center to measure children's abilities over time. It is pertinent to note that TSG and PALS measure all of the domains and learning content required for school readiness (Huang & Konold, 2014; Invernizzi et al., 2010) and were used consistently in the study area. These tests were particularly important as formative assessments and diagnostic tools that could be used to identify at-risk children who are likely to encounter future reading or learning difficulties. Identifying potential problem areas can assist teachers in planning and individualizing instruction for at-risk children. More importantly, identifying the most suitable levels of education for teachers may generate teachers who can better tailor their efforts to the needs of at-risk children toward school readiness and better outcomes.

Qualitative methodology did not suit my study because the problems explored often need an understanding of a central phenomenon (Bogan & Biklen, 2007). Qualitative methodology is descriptive in nature, and the data collected are in word or picture form rather than in numbers. Qualitative methods always have a natural setting, are suited for smaller samples, and are more concerned with process than outcome (Bogan & Biklen, 2007; Creswell, 2014). Furthermore, variables of qualitative design may emerge after and not prior to investigation, as required in a quantitative study (Creswell, 2012). Meaning-seeking and exploration represent segments of a qualitative study (Lodico et al., 2010), and qualitative studies may be inductive in nature (Bogan & Biklen, 2007).

Similarly, mixed methods are more suitable when it becomes essential to collect, analyze, and understand a research problem from the perspective of a quantitative and qualitative research study (Creswell, 2012). In essence, both studies are used to inform each other as the researcher merges, integrates, links, and embeds the two studies into a single study. Mixed methods build the strength of a research study, and a qualitative research study could be used to build on a quantitative study so as to gain specific and more detailed information about statistical tests, data, or analysis. Mixed methods are better suited to situations in which the researcher has access to both quantitative and qualitative data (Creswell, 2012, 2014). Quantitative methodology allows comparison of data (Lodico et al., 2010). Analyzing scores from two standardized instruments, the TSG and PALS assessments, allows comparison between the test scores and teachers' levels of education.

Methodology

This section contains a description of the processes used in conducting this quantitative study. It consists of the description of the population, sampling and sampling procedures, archival data, instrumentation and operationalization of constructs, and the data analysis plan.

Population

The target population for this study consisted of all at-risk Pre-K 4 students and all Pre-K 4 teachers at the study site. The children's population at the study site was made up of 100% at-risk children, of whom 96% were African American, 1% mixed race, 2% unknown races, and 0% other races. In this population, 52% were female and 48% were

male (Head Start, 2017). The local Head Start site served children from birth to 5 years of age, with 24% of participants consisting of 4-year-olds; the primary language was English for 99% of program participants (Head Start, 2017). The 2016-2017 Study State Superintendent Advisory Committee report indicated that Pre-K 4 programs had spread across the state with children enrolled in public school districts, charter schools, Head Start programs, community, or faith-based centers, and private child care centers. The committee reported an estimation of 48,764 Pre-K 4 children across the study state in 400 classrooms (DPI, 2017). Nevertheless, it was noted that these different settings might constitute different population groups, which might not contain at-risk children. Therefore, for proper representation of at-risk children, this quantitative study focused on Pre-K 4 children from Head Start settings because Head Start is a federally funded program specifically serving at-risk children from low-income or disadvantaged families (Claire-Son et al., 2013; Landry et al., 2017).

The target population class size in the local Head Start Pre-K 4 had an average of 17 to 20 children in nine classrooms, with lead and assistant teachers who held varying levels of education (DPI, 2017; Early Childhood Association, 2017). The 2016-2017 Study State Superintendent Advisory Committee report further noted that 1,219 Pre-K 4 children were served under 36 Head Start grantees within the study state for the 2017-2018 school year (DPI, 2017). Out of the 1,219 Pre-K 4 children in the study state, the local Head Start had a total population of 761 children enrolled, and Pre-K 4 represented 24%, which was approximately 180 children out of the total population. The target

population for this quantitative study was the entire population of children represented in nine Pre-K 4 classrooms, and the lead and assistant teachers assigned to each classroom.

Sampling and Sampling Procedure

The reported 400 classrooms of Pre-K 4 across the study state may not entirely represent at-risk children (DPI, 2017). Therefore, attention was focused on a local Head Start serving low-income children. The three data sources for this study were archival. The first set of data was obtained from the TSG standardized assessment. To generate data from TSG, teachers took daily anecdotal notes on each child and entered them into TSG. At the beginning of the school year, teachers also created one individualized education goal for each child based on each domain and learning content: cognitive, social-emotional, physical, language, literacy, and mathematics. Teachers generated another goal for each domain once children mastered a set goal. Each domain comprised a list of objectives to be achieved, and teachers chose the goal for each child from the listed objectives. TSG was made up of 38 objectives, and teachers worked with the children to achieve these goals. Children's performances were entered as daily notes and matching pictures into TSG, and teachers were required to finalize with a checkpoint at the end of the fall, winter, spring, and summer sessions of each academic year. After each checkpoint, individual child reports, classroom reports, site reports, and organization reports could be generated from TSG to reveal individual children's performance, including strengths and weaknesses. These reports were saved in TSG and accessed by the study site administrators if they continued to maintain their license with TSG.

PALS is a literacy diagnostic and formative assessment required by the study state for all Pre-K 4 children. PALS measures Pre-K 4 children's performance in name-writing, alphabet recognition, beginning sound awareness, word print awareness, rhyme awareness, and nursery rhyming awareness. Using the PALS test content, teachers administer the test to Pre-K 4 children when windows are open in the study state district in November for the fall session, February for midyear, and May for the spring session. Teachers have 2 weeks to validate the children in their classrooms, administer the test, and enter the children's performance on a PALS hardcopy sheet and in the PALS online system before the window closes. Once the window has closed, PALS generates a children's report that can be assessed by the education managers and principal of the charter school for the study site under which Pre-K 4 children are classified. Teachers use children's reports to create individual plans to work toward better performance for each child.

Information on Pre-K 4 teachers' levels of education was accessed from Child Plus, the personnel database of the local Head Start, after seeking permission from the Head Start site. Teachers' information including levels of education, years of experience, and professional development and training attended were saved in a software known as Child Plus, which was managed by the education managers and site directors and maintained by the compliance quality assurance department. Pre-K 4 teachers' levels of education were categorized into Master of Science or Master of Art in EC or CD, Master of Science or Master of Art in a related field, or Master of Science or Master of Art in an unrelated field. Additional categories were bachelor's degree in EC or CD, bachelor's

degree in a related field, and bachelor's degree in a different field. Further categories included associate's degree in EC or CD, associate's degree in a related field, and associate's degree in a different field. Credentials were sorted for state certification or no state certification, some college credits, CDA, and high school diploma. Experience was sorted as 0-5 years, 5-10 years, and 10 years and above. This information was coded and entered into an Excel table format before it was transferred into Statistical Package for Social Sciences (SPSS) 24 for analysis.

These archival data were significant to my study because the selected local site serves at-risk children who were the major population for this study. The varied Pre-K 4 teachers' level of education suit the independent variable selected for this study. Having at-risk children's test scores from two assessment tests allowed for comparison of the test scores and the difference to teachers' levels of education. The availability of the fall and winter test scores from TSG and PALS present an opportunity to have a pretest and posttest without having to conduct an experimental study. The archival data was such that creates opportunity for data cleaning process; for example, 3-year-old children assigned to a 4-year-old classroom had a TSG score but no PALS score because PALS is designed for testing 4-year-old-children. Therefore, such children were eliminated from the study.

Archival Data

The data used for this study were archival. Being an archival data, the study did not recruit children or teachers. A homogenous population was considered to select a program serving mainly at-risk children, out of which Pre-K 4 classrooms, children, and teachers' data were selected. Pre-K 4 classrooms, children, and teachers archived data

was considered to be a true representative of the target population. A local Head Start was selected for archived data collection that suited this study for three reasons:

1. Head Start serves children from low-income families, who were considered to be at-risk (Bellows et al., 2016; Claire-Son et al., 2013; Landry et al., 2017).
2. Pre-K 4 teachers vary in levels of education and years of experience.
3. The program used TSG and PALS screening tools in measuring children's performance and the data was archived.

The original data from which the archival data was drawn were collected by teachers in November for the fall, February for the winter, and May for the midyear. Teachers' information was collected from information saved in the personnel section of Child Plus; a software where all teacher, family, and children's information were saved and maintained by the compliance and quality assurance department. Data from TSG were generated when teachers collect and enter children's notes, pictures and performance scores into TSG based on met goals. The goals met were based on set goals that align with the 38 TSG objectives under the cognitive, social-emotional, physical, language development, and literacy, and mathematics domains, and learning content. Teachers also collected daily anecdotal notes which were entered into TSG and do a final checkpoint at the end of fall, winter, spring and summer. Data reports was generated after each checkpoint and was saved in TSG for teacher and administrative access. The fall 2017 data served as the pretest and the winter 2018 data represent the posttest.

Data from PALS was originally generated from at-risk Pre-K 4 children classrooms. The list of 4-year-old at-risk children were sent to the school district where

they were registered and assigned into PALS web system managed by the principal of charter school and the education managers of the classrooms. Teachers validated the names of the children in PALS and administered the test package to the children by fall, mid-year and spring of each academic year during the period that the window is open. The principal of charter school under which 4-year-olds were categorized and the education manager had access into PALS system report.

The information on teachers' level of education and years of experience was accessed from the local Head Start Child Plus database after permission was granted by the agency and approval is received from IRB. The credentials were categorized as Master of Art (MA) or Master of Science (MS) in ECE or CD, MA or MS in a related field, MA or MS in an unrelated field, Bachelor of Art (BA) or Bachelor of Science (BS) in ECE or CD, BA or BS in a related field, BA or BS in an unrelated field, Associate of Art (AA) in ECE or CD, AA in a related field, AA in an unrelated field, college credits in ECE or CD, CDA, or a high school diploma and if they possess a state license in ECE or elementary education. Years of experience included 0-5 years, 5-10 years, 10 years, and above. Though teachers vary in their years of experience, they all receive the same PD, training, and workshops and each classroom was assigned a coach.

To obtain the archived data for at-risk Pre-K 4 children and teachers from the local Head Start, I sought permission for the study from the local Head Start program through a formal letter to the Vice-President of Programs. My letter included the title and purpose of the study. I included the significance of the study and the possible positive social change that may result from the study. My letter explained the type of research

method and design for the study and the essence of obtaining an archived data. I explained that the archival data scores will be subjected to statistical analysis to compare if there would be a significant change in the dependent variables (2017-2018 archived fall and winter improvement scores) based on the independent variables. My application for permission specified my interest for 2017-2018 Pre-K 4 TSG and PALS data and access to teachers' database to obtain information about their credentials. I further explained why I needed the fall and the winter results of both screening tools as pretest, and posttest assessments. I further explained the confidentiality of the data. I gave assurance of sharing the outcome of the study with the site upon completion. After receiving approval from the site and approval from IRB, I worked with the site directors and education managers of each classroom to access the data, then code all children, teachers, and classroom data and saved it in electronic format in a password protected computer. I retrieved the data from the coded electronic copy and entered it into SPSS for statistical analysis to test the hypothesis using a one-way MANCOVA. The raw data was kept in a locked closet and I had sole access to the closet. The raw and electronic copy of the data would be permanently deleted and destroyed 5 years after the defense and publication of my study. I would send a letter of appreciation to the site for giving me access to the data.

Instrumentation and Operationalization of Constructs

The standardized instruments used for the archived data of at-risk Pre-K 4 children of this study include the TSG (Teaching Strategies LLC, n.d.) and PALS tests (Invernizzi et al., 2004). This study did not include permission from the publisher because I did not use the instruments to collect data by myself, rather the data is archival.

My permission will focus on access to the archival data from the local Head Start. One of the preferences for using the local Head Start Pre-K 4 was because they had a form of assessment to measure and monitor the performance of the at-risk population they serve. The use of archived data of TSG and PALS was appropriate for this study because they were scientific, research-based instruments, and serve as a screening and diagnostic tool which can be monitored and improved on over time (Huang & Konold, 2014; Invernizzi et al., 2010). The instruments measure the developmental domain and learning content expected to prepare Pre-K 4 children for school readiness. Most importantly, there are research evidences of their reliability and validity over time as described below.

The reliability and validity of TSG was first initiated with a large national data of 21, 592 children collected in a 2010-2011 longitudinal study by the Center for Educational Measurement and Evaluation (CEME) at the University of North Carolina, Charlotte (Center for Educational Measurement and Evaluation, 2012; Lambert et al., 2014, 2015). The study addresses the construct validity of TSG; which ascertain if the instrument measures the theoretical construct it was intended to measure. The study used Rasch Partial Credit Model analysis to examine the properties related to the scale and scores for the six developmental domains (social-emotional, cognitive, physical, language, literacy and mathematics) in TSG. The analysis showed that the six developmental domains and scale scores are distinctly different from each other and measures the area it was intended to measure. The fit statistics report of each developmental area indicated 0.6 to 1.4, implying that each developmental domain effectively measures only one of the six domains. Person and item reliabilities of .8 or

higher are regarded as strong indicators of reliability, and person reliabilities of TSG varied from .90 to .97 and .99 for all the six scales (CEME, 2012).

Further analysis of the internal consistency reliability revealed a range of .94 for physical to .97 each for language and cognitive domains. These findings indicate strong evidence of reliability of TSG because the scores were higher than .8 (CEME, 2012; Lambert et al., 2015). The Educational Testing Service status report of TSG in 2012 acknowledged TSG as the most frequently used assessment measure in state-funded Pre-K initiative program. Therefore, it becomes critical to further examine its psychometric properties (Lambert et al., 2015). Though CEME (2012) found strong evidence for the construct validity, person and item, interrater, and the internal consistency reliabilities of TSG, they did not address significant issues of the concurrent validity (Kim, Lambert, & Burts, 2013; Lambert et al., 2014, 2015). However, the Tulsa, Oklahoma preschool research study and the state of Washington kindergarten classrooms investigated the concurrent validity of TSG (Decker, 2013; Soderberg, Stull, Cummings, Nolen, McCutchen, & Joseph, 2013). Findings from the Tulsa study showed TSG has a moderate to high correlations with the Bracken School Readiness Assessment (Decker, 2013; Lambert et al., 2015). Using a modified version of TSG, the state of Washington study indicated moderate correlations were found in the mathematics, literacy, and language domain of TSG when correlated to a battery of other established norm-reference instruments (Soderberg et al., 2013; Lambert et al., 2015).

In their longitudinal study to further authenticate the validity and reliability of TSG and its suitability for all children, Lambert et al. (2014) used a sample of 21,592

children from 40 states in United States and the District of Columbia to compare the growth of children that were ELL with their English-speaking peers. The 40 states were represented by children from the Western, Midwestern, Northeastern, and the Southeastern states of the United States and the population was similar to the U.S. Census Bureau population statistics of 2010. The population include 51.2% male and 48.8% female of ELL and English-speaking children drawn from 3,792 varying private child care centers, school-based sites, and Head Start sites in the United States. The interrater reliability of this study was examined by analyzing the correlations between the ratings of the teachers that used the measure (TSG) and the ratings of the master trainer. The correlations were reported as being above .90 with the exception of one measure which was above .80 but below .90.

PALS reliability and validity was authenticated through pilot testing between year 2000 and 2004 the year of publication. PALS ratings were compared to the ratings of reliability and validity of other standardized instrument created before PALS, but which serves similar purposes. For example, Test of Early Reading Ability-3 (TERA-3, 2001) which assesses the mastery of early development reading skill was compared to pilot 4 study. During the pilot 4 of 2003-2004, the correlation between the revised version of PALS-Pre-K and TERA-3 was medium to high and quite significant ($r = .71$, $p < .01$; $n = 70$). As evidence for the predictive validity, the 2003-2004 second longitudinal data analysis of 2,574 children collected in the spring of 2002, total scores were moderately high and significant ($r = 56$, $p < .01$). The use of Multiple Regression Analysis during reassessment of the same sample of children in first grade using PALS-Pre-K 1-3

indicated that PALS Pre-K significantly predicted variance of scores in the Fall of first grade outcome ($R^2 = .342$).

Using a large sample of 4,518 children comprising of at-risk children, and children who attend any public preschool program, Townsend and Konold (2010) examined the psychometric properties of PALS. There were 415 participating schools made up of 52% from Virginia Program Initiative (VPI), 11% from Head Start, VPI and Title 1 schools are 8%, Title 1 schools are 8%, and other programs are 11%. The sample consist of diverse ethnicity which include 49% Black, 37% White, 5% Hispanic, 3% Asian and Pacific Islanders, American Indians and Alaskan Natives represent < 1%, and 4% who did not identify their ethnicity. The sample comprises 47% males and 57% female children. The researchers employed the Exploratory Factor Analysis, Confirmatory Factor Analysis (CFA) and Multigroup CFA to analyze the structure of PALS Pre-K so as to determine its stability across gender. Findings reported PALS Pre-K accurately measures all PALS Pre-K area for both boys and girls. Authors also reported that the criterion-referenced nature of PALS Pre-K makes it simple for teachers to interpret without additional training. Researchers reported that PALS measures the fundamental component of emergent literacy for both boys and girls and diverse population of children (Townsend & Konold, 2010). Likewise, other research studies extend preceding psychometric studies on PALS Pre-K (Invernizzi et al., 2004; Townsend & Konold, 2010) who examined the measurement properties across gender.

PALS-K study (Huang & Konold, 2013) identifies the construct identification and multiple group comparison of Spanish speaking ELL and non ELL. Researchers seek

to identify the psychometric properties of PALS-K using a large sample of 2,844 first time public school kindergarten children. All children are from low-income families. There were 1,180 children designated as ELL because they spoke Spanish at home (44%), while 1,482 non ELL (56%) spoke English at home. Report shows ELL children scored five points lower out of the six point composite literacy levels. Of the Spanish speaking ELL, 97% were Hispanic, 3% were represented by two or more race or ethnicities. Out of the children identified as non ELL, 58% were Black, 27% were White, 7% were Hispanic, and 7% belong to other races. Analysis from the findings from this study support the use of PALS-K with ELL and non ELL children based on the hierarchical structure that indicate that all tasks produce equal measurement for both groups of children.

TSG was designed to measure children's development and learning which include cognitive, physical, socio-emotional, and language development and the content areas including literacy and mathematics, arts, social studies, and science and technology, and English language acquisition. Each domain and content areas are further represented as dimensions with outlined objectives. TSG is made up of 38 objectives and programs may choose to screen children in all the areas or select areas that meet the specific need of the program. The Head Start program used for investigation limits children's assessment to the cognitive, physical, socio-emotional, language development and literacy, and mathematics content areas. Teachers enter children's daily anecdotal notes into TSG online. Teachers also screen children in developmental and learning areas in the fall, winter and spring and finalize with a checkpoint at the end of each quarter. Using

computer-based TSG, teachers and administrators can access children's performance by running the individual child report or documentation which reveals children's performance. Aside from individual child report showing the strengths and weaknesses of each child present in a class, class reports, site reports, and organization reports can also be generated graphically or in tabular form based on the need of the organization. The instrument allow access to view a single report for a term or to run and compare results for the fall, winter and spring of each academic year.

The second instrument used to measure children's literacy skill is the PALS. More specifically, PALS was designed to screen and identify children that were at-risk of developing future reading difficulties. PALS is a research-based screening, diagnostic, and progress monitoring tool which allow teachers to individualize for a child based on the area of need. PALS was designed by the University of Virginia, (Invernizzi et al., 2004) and it measures Pre-K in name-writing, alphabet knowledge, beginning sound awareness, print and word awareness, rhyming and nursery rhyme awareness. Name writing have score range from one to seven, one being the lowest and seven the highest. PALS test for name-writing consist of scored sample writings that can be used in scoring each child's name writing.

Alphabet knowledge include knowledge of the upper and lower cases. Children were asked to touch each letter in sequence without getting off the track. The child may say I decline if the child does not know a letter and move on to other letters. Children can only proceed to the lower case if they are able to correctly identify 16 upper case letters. Scores are based on the total number of letters children can identify, with the highest

been 26 and lowest is zero. Lower case alphabets follow the same process as the uppercase alphabets but children who correctly name nine or more lower case letters proceed to letter sounds. There's a maximum score of 26 and minimum score of nine for children to proceed to letter sounds. For letter sounds, children were shown the alphabet upper case and they were asked to make the sound of the letter. If children do not know, they may skip the question, there's a maximum score of 26, with one for each letter answered correctly, and an expectation of four to eight score to meet developmental expectation. For the beginning sound awareness, children were shown 10 picture items, one at a time and they were asked to say the word, then the beginning sound of the word. There were 10 possible scores and each question is rated a one.

In the print and word awareness section, children were shown a rhyming book on Hey Diddle Diddle, children are asked to point to the title, identify words in the page, point to specific words, read from left to right, move their finger on the print line, identify specific uppercase letters and identify a space within a word. The maximum score is 10 and seven to nine score falls in the area of meeting expectation. For rhyme awareness, children were shown a first picture and three other pictures, children were asked to identify the word that rhymes with the first picture out of the other three pictures. There are 10 questions for this section with a maximum of 10 scores and minimum of five to meet expectation. The nursery rhyme awareness assessment has 10 items comprising of 10 rhymes. As the teacher say the rhyme with the children, children were asked to fill in the missing word. There is a maximum of 10 scores and a minimum of six to meet expectation. Children in each class is validated on PALS online and scores are entered.

Scores are reflected numerically with color codes. Pink code means the child meet expectations, blue implies PALS was administered to the student in non-standard conditions using specific accommodations listed in a child's Individual Education Program (IEP) and black implies child is marked as exempted from taking PALS assessment. PALS allow for individual child, class, site, and organization reports to be generated for comparison

Data Analysis Plan

The Statistical Package for Social Sciences (SPSS) 24 was used for data analysis. The use of a more sophisticated SPSS 24 ensured the use of standard formula, computation and mathematical calculations or functions that are accurate (Kirkpatrick & Feeney, 2015). After receiving the data, I conducted a data cleaning process to eliminate corrupt data or data that could not be accounted for. Children that were 4-year-olds with incomplete data were eliminated from the study. This included children that had winter or midyear 2018 posttest assessments for TSG and PALS but has no pretest. This also included children that has the fall 2017 pretest but who has no winter or midyear posttest results. To ensure equal representation of data, 4-year-old children who has one or the other, but not both TSG and PALS scores were removed from the study. In PALS assessment, the performance of a child in recognizing uppercase alphabet determines their continuation to other tasks represented in the test (Invernizzi et al., 2004), therefore children that were not assessed across all the tasks were removed from the study. Likewise, 3-year-old children in a 4-year-old classroom had their names removed from the study because PALS Pre-K was designed to test 4-year-old children (Invernizzi et al.,

2004). The data was reviewed for missing data, the missing data was accounted for by checking if some children were moved to other classrooms. These may include children that may have their pretest in a prior classroom and posttest in another classroom. Every child with missing data that could not be accounted for was eliminated from the study. Research Question and Hypothesis are stated below

How do assessment scores differ among at-risk children who are taught by teachers with different levels of education and years of experience?

The null hypothesis was as follows: There is no significant difference among assessment scores when at-risk children are taught by teachers with different levels of education and years of experience.

The alternate hypothesis was the following: There is a significant difference among assessment scores when at-risk children are taught by teachers with different levels of education and years of experience.

Data entry into SPSS was completed before data analysis. To determine if a difference exists between teachers' levels of education and at-risk Pre-K 4 scores, I retrieved archived data of at-risk Pre-K 4 children for fall 2017 and winter 2018 assessment from TSG and PALS system of the local Head Start. The fall assessment scores served as the pretest, and the winter performance scores represented the posttest. Both TSG and PALS score improvement of the pretest and posttest were subject to statistical analysis and compared to the levels of education of teachers assigned to teach in the respective classrooms. Using SPSS 24, I ran descriptive statistics showing the mean and standard deviation of the standardized assessment scores in relation to the

teachers' levels of education (i.e., crosstabs). Descriptive statistics reveal the basic summaries of data in a study (Lodico et al., 2010). I used a one-way MANCOVA to test the hypothesis and answer the research question.

Prior to analyzing with one-way MANCOVA, I tested if the data meet the 10 assumptions which are critical to running a one-way MANCOVA (Huberty & Petoskey, 2000). My variables currently satisfy Assumptions 1 to 4, which do not require statistical test using SPSS. However, Assumption 5 require a linear relationship between the different pair of the dependent variables for each group of the independent variable, therefore, I plotted scatterplot matrix with LOESS lines of the dependent variables for each group of independent variable. To meet up with Assumption 6, which require a linear relationship between the covariate of each dependent variable nested within the different groups of the independent variable, a scatterplot matrix with LOESS lines was plotted for the dependent variable for each group of independent variables. Assumption 7 require there should be homogeneity of regression slopes between the covariate and each dependent variable. I used SPSS to check if the linear are the same. Assumption 8 require a homogeneity of variance and covariance matrices, therefore I tested the homogeneity of variance and covariance by using Box's M test of equality of covariance matrices. Assumption 9 require there are no univariate or multivariate outliers with the independent variable for each dependent variable. I used SPSS to detect possible univariate outliers by checking the standardized residuals and use the Mahalanobis distance on SPSS to detect possible multivariate outliers. For Assumption 10, I used Shapiro-Wilk test of normality to ensure there is no multivariate normality (Huberty & Petoskey, 2000).

Since MANCOVA is an omnibus test, the result did not identify the specific groups that were significantly different from the other among the independent variables (Creswell, 2012). I ran a Tukey's post hoc test, to identify which groups significantly differed from each other. Result was interpreted using descriptive, tabular, comparison statistics, and narrative explanation. The result of the differences from the comparison are discussed below to give a broader insight to the result findings.

Accessed data from the local Head Start computer based archived database of TSG and PALS webpage were numerical and continuous in nature and data generated from teachers' levels of education were categorical. To preserve confidentiality of all data, raw data that was coded and saved in a password protected computer and the electronic coded data will be destroyed five years after the defense and publication of my study. Data in Chapter 4 included the findings which were represented in tables and narration. Chapter 5 included discussion, comparison to literatures and implication for practice.

Threats to Validity

Describing validity from the perspective of evidence and use of instrument rather than the traditional lenses of types of validity, Creswell (2012) described "validity as the development of sound evidence to demonstrate that the test interpretation of scores or construct meant to be measured matches its intended use" (Creswell, 2012, p. 159). This definition views validity as the degree to which all the evidence focuses on the intended interpretation of test scores for the proposed purpose (Creswell, 2012). Threats to validity therefore implies precise reasons for why we can go wrong when making inference in a

study or experiment due to issues of covariance, treatment or if causal relationship holds over variation in individuals (Creswell, 2012).

External Validity

According to Lodico et al. (2010), external validity is the degree to which the result or findings of a research study is generalizable beyond the population which was studied. The data for this research study were archival implying that I did not use the instruments to test the children for the pretest or posttest. This quantitative study was not an experimental study, so I did not present an intervention to affect or improve the performance of the subjects, therefore testing reactivity which may occur because subjects perform better in a pretest rather than because of the intervention was not applicable to this study (Creswell, 2017). Due to the archival nature of the data, I did not have any interaction with the subjects, therefore the interaction effects of selection which may occur while using the pretest materials during experimental treatment such that the result may not be generalized to an untested group do not apply to this study (Creswell, 2017). The specificity of variable for this study clearly identifies teachers' levels of education as the independent variable and the dependent variable are represented by standardized assessment scores of at-risk pre-kindergarten four children. The setting is specified as a local Head Start and the procedure for generalizing the variables are vividly stated. There was no treatment involved in the study, therefore, operational definition of treatment was not applicable to this study. This study is not an experimental design, so it did not include participants; hence reactive effects of experimental arrangement did not apply to this study. Multiple treatment interference did not apply to this study because the

data were archival, there was no prior or later treatment administered by me to limit the generalizability of findings. The whole target population of at-risk Pre-K 4 and all Pre-K 4 teachers was used to investigate this study. The result of this study may be generalized to a similar population to that which is being studied.

Internal Validity

Threats to internal validity may involve problems or other factors aside from the independent variable which may affect the dependent variable (Creswell, 2012). Possible threats to internal validity may include history, which may be unexpected occurrences between the pretest and posttest which may affect the dependent data (Lodico et al., 2010). This limits this study because I did not personally conduct the pre and posttests and so may not determine any unexpected occurrence. To ensure consistencies, I performed data cleaning process and compared the pretest and posttest of each child on both standardized tests, all inconsistent data was eliminated. Other possible threats that limits this study include maturation which may occur over time due to intellectual development, environmental, genetic, or other parental factors which may have caused a boost in the children's test scores. I cannot control this factor because the test score is archival, so this may also be a limitation to this study. Testing as a threat to internal validity involve when the result of a pretest alters the posttest (Lodico et al., 2010). I did not administer the pretest so this may limit this study. Threats of instrumentation may occur if the test instrument is changed in between the pretest and posttest (Creswell, 2014). I cannot determine or ascertain if such occurrence happened during testing, but I checked the archived data for such limitation and there was no such occurrence. Other

threats to internal validity include statistical regression due to extreme high or low scores that regresses the mean after retesting. This was a limitation because I was not involved in testing the children represented in the study. To address experimental mortality, every participant with a pretest but no posttest was removed from the study. The issue of selection-maturation interaction may also limit this study because of the archival nature of the data. Moreover, the archival data did not involve treatment groups neither is it an experimental study. Due to the archival nature of this study, these factors are beyond my control. The use of MANCOVA synchronizes the scores to remove possible extraneous variables.

Construct Validity

Construct validity may involve searching for evidence to ascertain an instrument accurately measures a nonobservable ability from the variables (Lodico et al., 2010). Creswell (2012) described construct validity as validating the inferences about the variables in the study. Threats to construct validity implies certain reasons why a researcher may be wrong in their inferences. Possible threats to construct validity in this study may occur because the constructs measured by the instruments are abilities that are not visible, but can only be determined by the observable test scores. This may be influenced by how the test is administered and the condition surrounding the administration. Since the population sample is homogenous for the dependent variables of this study, to ascertain the construct validity of the instruments, the population was not compared to a heterogeneous population.

Ethical Procedures

I wrote an official letter to the Vice President of Programs of the local Head Start where the archived data was obtained for this research study and included the purpose of the investigation. I identified the gap in research on practice as it relates to the state requirements for teachers of Pre-K 4 children. I sought permission to access personnel database for credential information for Pre-K 4. I included that all information would be held confidential by coding any identifying teacher information accessed from the database. My letter requested permission to access the archival data of Pre-K 4 TSG and PALS assessment scores for fall 2017 and winter 2018 from the local Head Start. All classroom names, children's names, and teachers' names from TSG and PALS archival data for each classroom were alpha-numerically coded. All teacher related information obtained from Child Plus database was coded as numeric. Coded data was entered and saved in a safe electronic format in a password protected computer and I had sole access to the information. The raw data entered into a safe electronic password protected computer and the coded electronic copy would be destroyed five years after the defense and publication of my study. My letter included the significance of the study in ascertaining if a difference exists between teachers' levels of education and the subsequent scores of Pre-K 4 children. I also included the positive social changes that may result from the study. For decision and policy making processes, I would share the outcome of the study with the Head Start child care center.

I am currently an Instructional Coach for the Early Head Start (EHS) program in the local Head Start and my position had no influence on the teachers or scores as it

relates to this study. I am not in a supervisory position. EHS is a separate program constituting specifically of infants and toddlers, while Head Start is for 3-5-year-olds. Interpretation of findings was comparison based and not a cause and effect basis. As a rule of the thumb, this study considered the IRB do no harm effect to participants, and so participants were protected by assured confidentiality of all information.

Summary

This quantitative MANCOVA research study investigated if a difference exists between teachers' levels of education and at-risk Pre-K 4 children's scores on standardized readiness assessment. The study used archival pretest and posttest TSG and PALS data from a local Head Start program. The participants included all the 18 teachers of the nine Pre-K 4 classrooms across the two sites as the independent variables and 142 at-risk children's TSG and PALS scores as the dependent variable. All the data of children in the classroom was assessed but 3-year-old children in a 4-year-old classroom were excluded from the study because PALS was designed to measure 4-year-old performance (Invernizzi et al., 2004). The study was significant to Head Start and educational leaders and policy makers in determining the levels of education of teachers' who teaches at- risk Pre-K 4 children. Since the population for the dependent variable was a homogenous at-risk population, the result would not be generalized to schools or settings with heterogeneous population.

The state requirement that defines that Pre-K 4 children teachers must have a bachelor's degree and a license (DPI, 2017) and the subsequent assignment of teachers with diverse lower level of education to 4-year-old classrooms which resulted in

children's scoring below expectation in fall 2017 has necessitated the need for this study. Providing evidence may guide the local Head Start leaders and administrators on the criteria of credentials that would be appropriate for teachers of at-risk Pre-K 4 children. The Head Start leaders can infer their experience in advising policy makers in specifically defining the criteria relevant to the situation of at-risk children. A quantitative, MANCOVA research design was suitable for this study because it examined the difference between variables which has a covariate (Huberty & Petoskey, 2000). Moreover, teachers and Pre-K 4 children were already assigned into classes and so the participants cannot be manipulated because it will be unethical to practice such. Chapter 4 focused on collection of data after approval from IRB to collect data. The process of data analysis, results and findings were outlined in the next chapter, based on the use of SPSS statistical analysis.

Chapter 4: Reflections and Conclusions

The purpose of this quantitative method and MANCOVA study was to determine if a difference exists between teachers' levels of education and at-risk Pre-K 4 children's scores on standardized readiness assessments, the TSG (TSG, n.d.) and PALS (PALS, 2004), in a local Head Start located in a Midwestern state of the United States. The data were archival, with an initial population of 163 at-risk Pre-K 4 children and 18 teachers. Data cleaning and screening resulted in the elimination of missing, incomplete, or corrupt data for 21 children, including 3-year-old children in a 4-year-old classroom. The data were thereby reduced to a target population of 142 children and 18 teachers, totaling 160.

The study was guided by the following research question: How do assessment scores differ among at-risk children who are taught by teachers with different levels of education and years of experience?

Null hypothesis: There is no significant difference between assessment scores when at-risk children are taught by teachers with different levels of education and years of experience.

Alternative hypothesis: There is a significant difference between assessment scores when at-risk children are taught by teachers with different levels of education and years of experience.

This chapter includes the outcome of the 10 assumptions that determined the use of a MANCOVA design. The chapter further includes the results of the descriptive analysis of the cleaned and screened archival data and the results from a MANCOVA data analysis. Other sections address the process for data collection and the cleaning, and

screening procedure. The representation of the target population and the demographic characteristics are discussed. The results of basic univariate analysis of covariates (types of teachers' levels of education) to justify the addition of a covariate are explained. Results of the descriptive analysis and MANCOVA are reported under results. The type and result of the post hoc test are discussed. Results are presented in tables, and their relevance to the research question is explained in this chapter. A summary section includes the answer to the research question and a transition to Chapter 5.

Data Collection

After I received IRB approval (01-17-19-0408589) to advance to the final study stage of data collection, between January and February 2019, I wrote an official letter to the vice president of programs of the local Head Start seeking access and permission to examine archival pretest and posttest data of at-risk Pre-K 4 children for the TSG and PALS for the 2017-2018 academic year. My letter also requested permission to access and obtain at-risk Pre-K 4 teachers' information on their levels of education and years of experience. The title and purpose of my study and the gap in research on practice identified were included. My letter addressed the significance of the study and the positive social change that might result from the study. It included the type of research method and design that would be used to analyze the archival data. I stated the importance of obtaining the data to conduct my investigation for the study. I noted that all of the data and other means of identification would be coded and saved in an electronic format on a password-protected computer and that I would have sole access to the information. I indicated that the raw and coded data would be kept for 5 years following

the defense and publication of my study, after which they would be destroyed. I stated that for policy and decision-making processes, I would share the outcome of my study in a summary report.

I received a response of approval to my request in January 2019, with a request that I work with the site directors to obtain the data. I met with both site directors separately, and I received approval to meet with the education managers responsible for the Pre-K 4 classrooms. I received the raw data from both the pretest and posttest of TSG and PALS scores of at-risk Pre-K 4 children printed from a password-protected TSG and PALS site of the local Head Start for the 2017-2018 academic year. I received teachers' information including their levels of qualification and years of experience printed from password-protected Child Plus Software from the education managers. For clarification purposes, I asked for the identification of children who were 3-year-olds enrolled in the 4-year-old classrooms. There was no deviation from the process stated in Chapter 3.

Data Analysis

I intended to conduct a MANCOVA by adding a covariate, field of study, which would create the opportunity for robust data. Nevertheless, every statistical test has basic assumptions it must meet; the third assumption for conducting a MANCOVA requires the independent variable to be continuous data. The independent variable for this quantitative study was categorical; therefore, to avoid violation of requirements for conducting a MANCOVA, a one-way MANOVA design was used as an alternative to MANCOVA analysis. There are 10 assumptions that must be met before conducting a one-way MANOVA:

Assumption 1: Two or more dependent variables should be measured at interval or ratio level, otherwise regarded as a continuous variable.

Assumption 2: The independent variables should consist of two or more categorical independent groups.

Assumption 3: The data must have independence of observations.

Assumption 4: There should be no univariate or multivariate outliers.

Assumption 5: There needs to be multivariate normality.

Assumption 6: There must be no multicollinearity.

Assumption 7: There should be a linear relationship between the dependent variables for each group of the independent variables.

Assumption 8: There must be an adequate sample size.

Assumption 9: There should be homogeneity of variance-covariance matrices.

Assumption 10: There should be homogeneity of variance.

My data satisfied Assumptions 1 through 3, which did not require statistical analysis in SPSS. Assumptions 4 through 10 were addressed using SPSS.

Results

The total population consisted of 163 children and 18 teachers. The data cleaning and screening process eliminated 11 3-year-olds from the data because such children had TSG pretest and posttest scores but had no PALS scores because PALS was created to assess only 4-year-old children. The elimination reduced the total target population to 152 children and 18 Pre-K 4 teachers. Further cleaning and screening of the data indicated 10 children with pretest in one or both standardized tests, but without a posttest.

These children were removed from the study based on incomplete data. The total number of individuals coded whose data were used for analysis was 142 at-risk Pre-K 4 children and their 18 teachers. There was a lead and assistant teacher in each classroom; therefore, with a total of nine Pre-K 4 classrooms for both sites of the local Head Start, the target population for the teachers was 18 in number. The demographic target population at the study sites was made up of 100% at-risk children, with 96% African American, 1% mixed race, 2% unknown races, and 0% other races. The population was 52% female and 48% male (Head Start, 2017). The local Head Start site served children from birth to age 5, with 24% representing the population of 4-year-olds; and the primary language was English for 99% of program participants (Head Start, 2017). At-risk Pre-K 4 children represent 24% of the total population of the Head Start and the Head Start was 100% African American, with 49% female and 51% male (Head Start, 2017).

The levels for Independent Variable 1, teachers' levels of education, were categorized as follows:

1. MS, MA, BS, or BA in ECE, CD, or a related field, and licensed in ECE;
2. MS, MA, BS, or BA in an unrelated field;
3. Associate's degree in ECE;
4. Associate's degree in unrelated field; and
5. CDA, college credits, and/or high school diploma.

In the teacher data screening process for Independent Variable 1 (teachers' levels of education), five teachers fell under Category 1 of MS, MA, BS, or BA in ECE or CD or related field and licensed in ECE. Two teachers were in category of MS, MA, BS, or

BA in an unrelated field and were not licensed in ECE; two teachers held an associate's degree in ECE Category 3; three teachers had an associate's degree in unrelated field, corresponding with Category 4; and in Category 5; one teacher held a CDA, two teachers had some college credits, and three teachers held high school diplomas. Independent Variable 2 (teachers' years of experience) was categorized into 0-5 years, 5-10 years, and 10 years or more. Five teachers fell in the category of 0-5 years of experience, eight teachers were in the category of 5-10 years of experience, and five teachers were in the category of 10 years and above.

Assumption 1: This assumption of running a one-way MANOVA was met because the four dependent variables consisting of pretests and posttests for PALS and TSG were continuous variables.

Assumption 2: The assumption was met because the independent variable; teachers' levels of education, had five categories, while the second independent variable, teachers' years of experience, was in three categories.

Assumption 3: The assumption was met because each participant in the sample was counted once.

Assumption 4: This assumption was not met for all of the outcomes of the univariate outliers but was met for the multivariate outlier. Univariate outliers' assessments were identified in the data by using boxplots. The data were re-analyzed by removing extreme data that could be responsible for the outliers, yet outliers were still recorded. Research findings have shown that outliers that do not result from data entry error or measurement error but are genuine rare values and have no good cause to be

rejected or regarded as invalid may be kept in a one-way MANOVA analysis (Laerd Statistics, 2015). On this basis, the univariate outliers were kept in the analysis. There were no multivariate outliers in the data as assessed by Mahalanobis distance ($p > .001$). The Mahalanobis recorded for the data was 7.81964, and the value was less than the critical value of 18.47 for four dependent variables as presented in Table 1.

Table 1

Mahalanobis Result for Multivariate Outliers and the Critical Values

MAH 1	Predictor variable	Critical value
7.81954	4	18.47
7.14196	5	20.52
4.65188	6	22.46
4.54893	7	24.32
4.49520	8	26.13

Note. $p >.001$. MAH 1 = 7.81954 for four dependent variables.

Assumption 5: This assumption was met for results that indicated $p > .05$, while some of the assumptions were not met because $p < .05$. Using Shapiro-Wilk test for normality with a sample of 160 participants, the test was considered significant at $p > .05$. The significant levels for lead teachers' levels of education as related to the dependent variables were recorded as (.001, .073, .000, .008, .243, .005, .000, .018, .137, .000, .064, .016); lead teachers' years of experience in relation to the dependent variables were listed as (.159, .000, .128, .275, .001, .103, .077, .000, .003, .038, .002, .002). Assistant teachers' levels of education in relation to the dependent variables were (.010, .008, .008, .009, .128, .013, .008, .002, .141, .000, .120, .654, .001, .000, .007, .590). Assistant teachers' years of experience in relation to the dependent variables were (.003, .073, .000,

.029, .243, .000, .034, .018, .000, .007, .064, .000). The Shapiro-Wilk test for normality is presented in Table 2.

Table 2

Shapiro-Wilk for Normality

		Kolmogorov-Smirnov			Shapiro-Wilk		
	Lead edu	Statistic	*df*	Sig	Statistic	*df*	Sig
PALS pre	1	.147	47	.012	.899	47	.001
	3	.202	16	.079	.897	16	.073
	5	.135	79	.001	.926	79	.000
PALS post	1	.172	47	.001	.930	47	.008
	3	.146	16	200*	.930	16	.243
	5	.113	79	.014	.952	79	.005
TSG pre	1	.184	47	.000	.827	47	.000
	3	.217	16	.043	.859	16	.018
	5	.112	79	.016	.976	79	.137
TSG post	1	.118	47	.098	.847	47	.000
	3	.180	16	.176	.894	16	.064
	5	.149	79	.000	.961	79	.016

* This is a lower bound of the true significance.
[a]Lilliefors significance correction.

Assumption 6: This assumption was not met as a result of the presence of multicollinearity as assessed by Pearson correlation (r = .649, p = .000, r = .751, p = .000, r = .804, p = .000, r = 1, p = blank). This assumption is presented in Table 3.

Table 3

Pearson Correlation

		PALS pre	PALS post	TSG pre	TSG post
PALS pre	Pearson correlation	1	.839**	.723**	.649**
	Sig (2-tailed)		.000	.000	.000
	N	142	142	142	142
PALS post	Pearson correlation	.839**	1	.655**	.751
	Sig (2-tailed)	.000		.000	.000
	N	142	142	142	142
TSG pre	Pearson correlation	.723**	.655**	1	.804**
	Sig (2-tailed)	.000	.000		.000
	N	142	142	142	142
TSG post	Pearson correlation	.649**	.751**	.804**	1
	Sig (2-tailed)	.000	.000	.000	
	N	142	142	142	142

**Correlation is significant at the 0.01 level (2-tailed).

Assumption 7: This assumption was met because there was a more linear relationship between PALS and TSG pretest and posttest for lead teachers' years of experience, assistant teachers' level of education, and assistant teachers' years of experience than for lead teachers' level of education as assessed by scatterplot.

Assumption 8: This assumption was met because there was an adequate number (*N*) in each case group (47, 16, 79, 17,109, 16, 46, 45, 16, 35, 63, 16, 63) as presented in Table 4.

Table 4

Between-Subject Factors for Teacher Variables and PALS and TSG

		N
Lead Edu	1	47
	3	16
	5	79
Lead Exp	1	17
	2	109
	3	16
Asst Edu	1	46
	2	45
	3	16
	4	35
Asst Exp	1	63
	2	16
	3	63

Assumption 9: This assumption was not met because the test was statistically significant at (p = .000). The assessment was conducted using a Box's test of equality of covariance matrices, and a test was considered significant at $p < .001$ as indicated in Table 5.

Table 5

Homogenuity of Variance Covariance

Box's M	147.245
F	1.881
df1	70
df2	18821.094
Sig	.000

Note. Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

Assumption 10: This assumption was met as assessed by Levene's Test of Homogeneity of Variance ($p > .05$) with a (.88, .684, .642, .644) for PALS pretest, PALS posttest, TSG pretest and TSG posttest respective. The results were presented in Table 6.

Table 6

Levene's Test of Equality of Error Variances

	F	df1	df2	Sig
PALS pre	1.823	7	134	.088
PALS post	.685	7	134	.684
TSG pre	.736	7	134	.642
TSG post	.733	7	134	.644

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

[a]Design Intercept + Lead Edu + Lead Exp + Asst Edu + Asst Exp + Lead Edu* Lead Exp + Lead Edu* Asst Edu + Lead Edu* Ass Exp + Lead Exp* Asst Edu + Lead Exp *Asst Exp + Asst Edu* Asst Exp + Lead Edu *Lead Exp * Asst Edu + Lead Edu * Lead Exp. *Asst Exp + Lead Edu * Asst Edu *Asst Exp + Lead Exp * Asst Edu * Asst Exp+ lead Edu * Lead Exp * Asst Edu * Asst Exp.

Descriptive Statistics

The descriptive statistics represent the mean value and standard deviation of the groups of teachers' levels of education and years of experience in relation to at-risk children's scores in PALS pretest and posttest and TSG pretest and posttest standardized assessment. The descriptive statistics of at-risk children's result in PALS pretest and posttest and TSG pretest and posttest in relation to the independent variables; teachers' levels of education and teachers' years of experience were presented in Table 7. The result of PALS pretest indicated that at-risk children scored higher based on lead teachers' years of experience. At-risk children taught by lead teachers of the highest level of education with specialization and license in ECE or CD and assistant teachers with

highest level of education in unrelated field and 5-10 years of experience scored higher in PALS pretest (*M* = 45.1, *SD* = 30.2; *M* = 48.7, *SD* = 35.9) than their counterparts taught by teachers of the lowest levels of education and experience (*M* = 30.4, *SD* = 17.7; *M* = 32.5, *SD* = 25.5). Irrespective of teachers' level of education and years of experience, at-risk children scored higher in PALS posttest (*M* = 65.4, *SD* = 26.3; *M* = 64.8, *SD* = 36.0; *M* = 63.6, *SD* = 32.0) than PALS pretest *(M* = 45.1, *SD* = 30.2; *M* = 48.7, *SD* = 35.9; *M* = 32.5, *SD* = 25.5; *M* = 30.4, *SD* = 25.5). The PALS posttest reveal at-risk children taught by lead teachers who have associate degree in ECE and 5-10 years of experience have the highest score (*M* = 65.4, *SD* = 26.3) followed by teachers with the highest level of education in ECE or a related field who are licensed in ECE and have 5-10 years of experience (*M* = 64.77, *SD* = 36.0), then teachers with the highest level of education in ECE or CD or related field and licensed in ECE but with 0-5 years of experience (*M* = 63.59, *SD* = 32.0) when compared to lead teachers with the lowest qualifications and 5-10 years of experience working with teachers who have associate degrees in an unrelated field but have more than 10 years working experience (*M* = 48.9, *SD* = 29.5).

At-risk children taught by lead teachers and assistant teachers with the lowest levels of education and or associate degree in an unrelated field with 5-10 years of experience or more have the lowest scores in TSG pretest (*M* = 37.5, *SD* = 12.3). At-risk children taught by lead teachers who hold associate degrees in ECE and have 10 or more years of experience have the highest score in TSG pretest (*M* = 51.8, *SD* = 7.4) followed by at-risk children taught by licensed teachers with the highest level of education in ECE or CD or a related field with 0-5 years of experience, who are paired with assistant

teachers who fall in the category of highest level of education in an unrelated field (M = 46.4, SD = 7.4). At-risk children have a higher score in TSG posttest (M = 51.8, SD = 7.4) than TSG pretest (M = 37.46, SD = 12.2). Other trends recorded reveal at-risk children taught by assistant teachers who hold associate degrees in ECE with 10 or more years of experience have the highest scores in TSG posttest (M = 55.5, SD = 8.5; M = 51.8, SD = 7.4) followed by at-risk children taught by teachers who are associate degree holders in ECE with 5-10 years of experience (M = 51.2, SD = 6.6). At-risk Pre-K 4 children taught by licensed teachers with the highest level of education in ECE or CD or a related field with 0-5 years of experience recorded a lower score in TSG posttest (M = 49.6, SD = 6.6).

Table 7

Descriptive Statistics of Teachers' Levels of Education, Experience on PALS/TSG Results

Levels of edu	Years of exp	Test	*M*	*SD*
MS/MA/BS/BA in ECE or related field and licensed in ECE	5-10	PALS pretest	45.1 48.7	30.2 35.9
CDA, college credits, and high school diploma	0-5	PALS pretest	30.4 32.5	17.7 25.5
		PALS pretest	45.1 48.7 32.5 30.44	30.2 35.9 25.5 25.5
		PALS posttest	65.4 64.77 63.6	26.3 36.0 32.0
AS in ECE	5-10	PALS posttest	65.4	26.3
MS/MA/BS/BA in ECE or related field and licensed in ECE	5-10	PALS posttest	64.77	36.0
MS/MA/BS/BA in ECE or related field and licensed in ECE	0-5	PALS posttest	63.59	32.0
CDA, college credits, and high school diploma	5-10	PALS posttest	48.9	29.5
CDA, college credits, and high school diploma	5-10	TSG pretest	37.5	12.2
AS in ECE	10 years+	TSG posttest	51.8	7.4
MS/MA/BS/BA in ECE or related field and licensed in ECE	0-5	TSG posttest	46.4	7.4
		TSG pretest TSG posttest	37.46 51.8	12.2 7.4
AS in ECE	10 years+	TSG posttest	55.5 51.8	8.5 7.4
AS in ECE	5-10	TSG posttest	51.2	6.6
MS/MA/BS/BA in ECE or related field and licensed in ECE	0-5	TSG posttest	49.6	6.6

One-Way MANOVA

One-way MANOVA was run to determine which groups of the independent variable were statistically significant in relation to the dependent variable and this was illustrated in Appendix A. The results generated from SPSS for a one-way MANOVA are represented in Appendix A. One-way MANOVA Multivariate Result for Teacher and Test Score Variable. When assumptions of MANOVA is violated, Pillai's Trace is highly recommended because it offers the most powerful and robust statistics, especially if the homogeneity of variance-covariance was violated, and or when the test is statistically significant at $p < .001$. It was also recommended when there are uneven cell sizes or small sample size (Finch, 2005; Pillai, 1955; Seba, 1984). Since this quantitative study violated Assumption 9; the homogeneity of variance-covariance, Pillai's Trace was considered over other options that can be used to report a one-way MANOVA. Pillai's Trace showed no value in the output of other groups of the Independent Variables 1 except the assistant teachers' level of education which was statistically significant on the combined dependent variables, $F(8,264) = 2.511$, $p = .012$; Pillai's Trace $\Lambda_t = .141$; partial $\square^2 = .071$.

Univariate One-Way ANOVA

With an indication of a statistical significance of the assistant teachers' level of education among the groups of Independent Variables 1 ($p = .012$) indicating that $p < .05$, a univariate one-way ANOVA was run to determine which of the dependent variables is contributing to the statistical significance of the one-way MANOVA report. Test will be significant if $p < .0001$ and the result was presented in Table 9. Table 9; Test of Between

Subject Result from Univariate One-way ANOVA was included in the Appendix section as Appendix B. Running a univariate one-way ANOVA on each dependent variable was a suitable follow up to a statistically significant result of a one-way MANOVA, which if the result was not statistically significant, a post hoc test will not be necessary (Laerd Statistics, 2015). The test of between subject effect indicated there was no statistically significant difference in PALS pretest between at-risk children taught by assistant teachers' levels of education F (2,134) = .475, p = .623; partial $\square^2$ = .007. There was no statistically significant difference in PALS posttest F (2,134) = .640, p = .529; partial $\square^2$ = .009.There was no statistically significant difference in TSG pretest F (2,134) = 1.244, p = .291; partial $\square^2$ = .018. There was no statistically significant difference in TSG posttest F (2,134) = 1.280, p = .281; partial $\square^2$ = .019.

Answering the Research Question

The primary research question that guided this study was "How do assessment scores differ among at-risk children who are taught by teachers with different levels of education and years of experience?" and the related null hypothesis was: There was no significant difference between assessment scores when at-risk children were taught by teachers' with different levels of education. To test the hypothesis, the result of the multivariate test and one-way univariate ANOVA in Tables 8 and 9 respectively was used. The multivariate result of Pillai's Trace for assistant teachers' level of education indicated a statistical difference at p = .012. The hypothesis was tested further to determine which of the dependent variables contributed to the statistically significant difference showed by assistant teachers' level of education by using a univariate one-

way ANOVA. The test of between subject results of the univariate one-way ANOVA (Table 9) indicated no significant difference was found among the groups of dependent variables in relation to assistant teachers' levels of education. The null hypothesis for the research question which states that there is no significant difference in assessment scores if at-risk children were taught by teachers of varying levels of education was accepted in light of this findings.

In conclusion, the only statistical difference indicated by one-way multivariate test result was assistant teacher level of education F (8,264) = 2.511, p = .012; Pillai's Trace Λ_t = .141; partial $\square^2$ = .071 and was represented in Appendix A. The test of between subject result of the univariate one-way ANOVA conducted to identify the dependent variables that contributed to this statistical difference, revealed that assistant teachers' level of education was not statistically significant for PALS pretest F (2,134) = .475, p = .623; partial $\square^2$ = .007; PALS posttest F (2,134) = .640, p = .529; partial $\square^2$ = .009; TSG pretest F (2,134) = 1.244, p = .291; partial $\square^2$ = .018; TSG posttest F (2,134) = 1.280, p = .281; partial $\square^2$ = .019 and was presented as Table 9 in Appendix B. Based on this findings, the null hypothesis for the research question which states there are no statistical difference in assessment scores of at-risk children when taught by teachers of different levels of education and years of experience was supported. Lack of statistically significant difference does not require further post hoc test to be conducted.

Summary

The study utilized a TSG and PALS pretest and posttest archival data of 142 at-risk Pre-K 4 children and 18 Pre-K 4 lead and assistant teachers to examine the

differences in at-risk children's assessment by teachers' level of education and years of experience in a Head Start located in a Midwestern city of United States. Differences in performance between the pretest and posttest of PALS and TSG was investigated. The differences between teachers' levels of education and years of experience on the combined PALS and TSG result was also examined and supported by Tables 1 to 9. No statistically significant difference was found among the scores. In the final chapter, I compared the findings to literature, present the implication of the findings from the conclusion, and suggest recommendations for further study.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this quantitative study was to determine if a difference exists between teachers' levels of education and at-risk Pre-K 4 children's scores on standardized readiness assessments, the TSG (TSG, n.d.) and PALS (PALS, 2004). I used a one-way MANOVA design to compare the scores of 142 at-risk Pre-K 4 children in a local Head Start located in a Midwestern city of the United States to the levels of education and experience of the 18 Pre-K 4 teachers assigned to the children's classrooms. The study was necessitated by the differences that exist in levels of education of teachers assigned to teach at-risk Pre-K 4 children, which are inconsistent with state requirements and led to children falling below expectations in PALS and TSG performance in fall 2017.

One-way MANOVA multivariate test results showed that assistant teachers' levels of education were statistically significant at $p = .012$. To identify which of the dependent variables that were contributing to the statistically significant difference, a one-way univariate ANOVA was conducted. The test of between-subject results revealed that no statistically significant difference was found among the groups of the dependent variables. The findings from the univariate one-way ANOVA led to the acceptance of the null hypothesis that there is no significant difference when at-risk children are taught by teachers with different levels of education. In this chapter, I discuss the interpretation of my findings, limitations of the study, implications for practice and social change, and recommendations for practice. The chapter ends with a conclusion.

Interpretation of the Findings

Teachers' level of education is considered an integral part of structural quality in providing qualitative experience for preschool children (Falenchuk et al., 2017; Pelatti, Dynia, Logan, & Kaderavek, 2016). Variations in the quality of service offered to preschool children have been a concern for researchers and policy makers (Burchinal et al., 2016), and raising teachers' levels of education has been identified as a core factor in promoting children's learning and experience for later schooling (AAP & APHA, 2015; Barnett et al., 2016, 2017; Buettner et al., 2015; NAEYC, 2015). Lin and Magnuson (2018) identified lack of degreed teachers as potentially lowering the quality of service in EC programs, having negative effect on school readiness, and creating a deficiency for at-risk children who had been described as having cognitive and behavior development delay (Bellows et al., 2017; Laundry et al., 2017; Peeters & Sharmahd, 2015). To promote high-quality prekindergarten experience and a strong foundation for later schooling, the study state required all Pre-K 4 teachers in all programs across the state to have a state license and a minimum of a bachelor's degree in ECE or CD (DPI, 2017).

Previous findings have shown conflicting views on the importance of teachers' levels of education. Exploring multiple channels of teachers' levels of education to include teaching certification, degrees, teaching experience, coaching, and in-service trainings, Claire-Son et al. (2013) found that teacher specialization in EC played a more significant role in promoting a higher quality foundation for learning and meeting the social-emotional needs of at-risk children. Similar findings have indicated that teachers' disciplines or specializations play a more important role in children's learning process

than the qualification of the degree earned (Melhuish et al., 2015; Totenhagen et al., 2016). Falenchuk et al. (2017) concluded that teachers' level of education is not a key driver of children's outcomes because they found a very weak association between teachers' level of education and children's vocabulary and letter word identification and no significant association with mathematics outcome. Other previous research findings have indicated that teachers who were highly qualified with a minimum of a bachelor's degree and teachers with a state license contributed significantly to better outcomes for preschoolers (Barnett, 2003; Kelley & Camilli, 2007; Manning et al., 2017 & Setiawan, 2017).

Pianta et al. (2008) reported that teacher-child interaction contributed more significantly to children's experience and preparation for school readiness than teachers' degrees. Accordingly, other authors showed that irrespective of teachers' levels of education or experience, teacher-child interaction seems to contribute positively to children's learning and development (Early, Maxwell, Ponder, & Pan, 2017; Nasiopoulou et al., 2017). Similarly, other researchers found that effective teaching and subsequent learning outcome resulted from teacher-child sensitive interaction to promote language and literacy outcomes rather than teachers' levels of education, materials, or activities (Hatfield, Burchinal, Pianta, & Sideris, 2016; Nasiopoulou et al., 2017).

Ackermann (2004) also showed that though teacher licenses or certification contribute positively to children's outcome, the standards for such credentials vary from state to state. Based on this variation, it cannot be ascertained whether teachers who completed the courses for certification are better than those who did not, therefore

indicating lack of association and connection between teacher certification and instructional practices (Claire-Son et al., 2013). I found that there was no significant difference in at-risk Pre-K 4 children's assessment test scores when children were taught by teachers with different levels of education and experiences. Specifically, my findings indicated that assistant teachers' levels of education were related to significant differences in at-risk Pre-K 4 children's assessment scores and that lead teachers who had higher degrees and a state license had no significant difference as reported by some findings. However, Shin, Hestenes, and Cassidy (2004) reported that prior research findings on teacher structure focused mainly on lead teachers, with less emphasis on assistant teachers; hence, little literature exists concerning the relevance of assistant teachers in children's learning. Findings further suggest that though children interact with different caregivers, researchers have seldom considered the roles and outcomes of lead and assistant teachers in early childhood literature (Shin et al., 2004), and the interactions of the two teachers may differ based on expected responsibilities and possible support from the assistant teacher.

The possible significant difference indicated by the assistant teachers in this study may have occurred in the process of teacher-child interaction as suggested by Early et al. (2017), Hatfield et al. (2016), Pianta et al. (2008), and Nasiopoulou (2017). The findings from this study suggest that teacher certification has no causal effect as described by Claire-Son et al. (2013) because the teachers who were licensed in early childhood had no significant effect on at-risk children's scores. Other possible options for the findings in this study may have occurred due to how assistant teachers were trained, as suggested by

Buettner et al. (2016), who found that 4-year college curricula in the United States focused on knowledge and theoretical aspects of CD, while the 2-year college curriculum was geared toward classroom practice and management. The theoretical foundation for this study, Bronfenbrenner's (1979) theory of ecological systems, also indicated that developing children are influenced by the type of interactions and relationships they have with various systems. Interaction between a teacher and a child occurs in the mesosystem. Accordingly, the findings of this study indicated that assistant teachers' level of education was statistically significant over other higher levels of teachers' education. This statistical difference may have occurred in the process of interaction.

Limitations of the Study

Even though there were many different local Head Starts, the target population for this study is specific to a Midwestern state in United States, and to a local Head Start that serves at-risk Pre-K children. The findings from this study may be limited in generalizability to other states, and /or Head Start programs in United States or in other countries. Consequently, the level of education of teachers in different Head Starts vary according to geographical location and the agency policies, therefore the generalizability of this study may be limited to programs that are similar to those identified in this study. The analysis and results of this study was based on archival data and may not be generalized to other experimental or nonexperimental studies. Consequently, the result would not be compared to any data generated by other means other than archival. Archival data are collected by someone else, so a researcher does not have the expected quality control over the collection, consequently the data may be inaccurate or distorted

(Creswell, 2014; Lodico, Spaulding & Voegtle, 2010). The data is archival and so I had no control over the data and the conditions under which it was collected. To avoid inaccuracies and distortion of data, data cleaning was done by excluding 3-year-old children that were enrolled in 4-year-old classrooms because such children had a TSG score but no PALS scores as PALS was exclusively designed to assess 4-year-old children (Invernizzi, Sullivan, Meier, & Swank, 2004). Children that were 4-year-old but without complete scores in both PALS and TSG were also eliminated from the data.

Quantitative data require large samples to achieve desired results, but lack of resources may affect data and may hinder the explanation of complex issues especially if data is not robust enough (Creswell, 2012). Large sample size and randomization in quantitative study allow the generalization of the study to a more heterogeneous population (Creswell, 2014; Lodico et al., 2010). The minimal sample size of the variables in this study may limit the generalization of the result to homogenous population similar to that which is being studied. To accommodate this limitation, the result was not generalized to any sort of heterogeneous population. The use of a quantitative MANCOVA design allowed for comparing the difference between the independent and dependent variables while controlling for covariates (Creswell, 2012; Huberty & Petoskey, 2000; Lodico et al., 2010). I intended to analyze the data using a MANCOVA design which allow for comparing the differences between teachers' levels of education and years of experience and at-risk children's assessment test scores, while controlling for a covariate; field of study. The covariate may identify the possible role of teachers' field of study, but my independent variable did not meet Assumption 3 of

running a MANCOVA because my data were categorical rather than continuous, so I opted for a one-way MANOVA. This may also limit the generalizability of this study. To ensure a robust data while using one-way MANOVA, I considered teachers' levels of education and years of experience of both the lead and assistant teachers in each classroom. Randomization of subjects are impossible in this study because children were already assigned to specific classrooms and teachers. Therefore, the results of this study were reported based on comparing differences in variables and no cause and effect may be determined for these results.

Recommendations

The result of the archival data used to investigate this study indicated that among other teachers' levels of education and experiences, assistant teachers' levels of education influenced at-risk children's outcome better. Findings also showed that none of the test scores contributed to the statistical significance of the assistant teachers' levels of education. I recommend that further research use other forms of data that are not archival. Such data may be more accurate and reliable such that it meets with all the assumptions of multivariate analysis of data. To ascertain whether teacher-child interaction was the factor responsible for the findings in this study, future research might include a pre and post CLASS assessment to find a possible correlation between teachers' CLASS scores and children's performance, as suggested by Cannon et al. (2016) and Early et al. (2016). Future study may also be conducted in other local Head Starts within and/or outside of the state, with a possibility of comparing the results. I also recommend the use of other forms of statistical tests different from one-way MANOVA, to gain more understanding

of the outcome. Further research could consider a mixed method approach with an aim of comparing the quantitative and qualitative findings for possible explanation of the trends or patterns as stated by Creswell (2012). Research could focus on a more generalizable outcome by identifying a larger sample population.

To ascertain how much influence teachers' education has on at-risk children's assessment scores, I suggest that licensed teachers with high levels of education in early childhood or child development in the district schools within the state be compared to teachers with the same levels of education in Head Start settings. Other forms of standardized instruments relevant to Pre-K 4 children's assessment may be used in place of PALS and TSG for future research. Future researchers might also consider studying the significance of teachers' levels of education in at-risk and non-at-risk settings for Pre-K 4 children. Finally, this quantitative study was initially intended to use a one-way MANCOVA to capture the role of a covariate, field of study, but had to opt for a one-way MANOVA because the independent variables were categorical rather than continuous as required to satisfy the assumptions of conducting a MANCOVA. Future researchers might consider the use of a one-way MANCOVA if the independent variables are continuous.

Recommendations for Practice

Extant research has indicated that professional development is imperative to promote higher standards and hone the skills of teachers with minimal levels of education (Bleach, 2014; Epstein, 2014; Lino, 2014). Findings from the Perry Preschool Program, Tulsa Head Start Study, and most recently, the New Jersey Abbot programs indicated that

they all served at-risk children and recorded successful outcomes by using licensed and highly qualified staff who had knowledge of child development and teacher practice (Heckman et al., 2010; High Scope Research Foundation, 2016; Farrie & Weber, 2014; Frede, Jung, Barnett, Lamy, & Figueras, 2007; Office of Head Start, 2017) and were furnished with adequate professional development. Exploring different forms of professional development may play a significant role in enhancing and honing the skills of teachers rather than relying on teachers' levels of education and years of experience. I recommend that at-risk programs hire intentional teachers. Intentional teachers do have a purpose, and they are able to explain their purpose to others (Bredekamp, 2011). Intentional teachers are resourceful, identify goals and work toward achieving them, make data-informed decisions, are accountable, and use their knowledge to inform practice based on developmentally appropriate practices (Bredekamp, 2011). To enhance at-risk children's assessment scores, I recommend that at-risk children's programs practice student-centered coaching, which would involve coaching teachers to interact and relate with children based on developmental goals and activities that are developmentally appropriate and that are practiced daily. I recommend that future studies focus on the role of assistant teachers in the classroom. This allows teachers to identify and individualize practice-related activities for each child. To promote positive social change, it is recommended that at-risk children's programs complement the suggested practices with a curriculum that is easy for teachers to understand, implement, use, and interpret.

Implications

At-risk children have been described as children who experience challenges in relation to cognitive and behavioral developmental delays (Bellows et al., 2017). Research findings have also shown that the quality of most preschool child care centers is not high enough to meet the needs of children from high-risk backgrounds; neither is it sufficient to prepare these children for school readiness (Landry et al., 2017). Further research reported that in Head Start programs, a few small positive results have been recorded in cognitive and social skills across pre-kindergarten, and the children's abilities with these skills were not persistent in first grade (Landry, 2017). Findings do indicate that intervention programs offered in Head Start for at-risk preschoolers yielded mixed outcomes and recorded few improvements for cognitive, literacy, and socioemotional skills necessary for school readiness (Burchinal et al., 2016). Recent findings have indicated that the most effective way to create positive changes in a learning process is through teacher-child interaction (Early et al., 2016; Pianta et al., 2008). In the investigation and analysis of college instructional contents for 4- and 2-year colleges, Buettner et al. (2016) found that while the content of 4-year colleges focused on knowledge and theories, while 2-year colleges prepared students for practice. This may be responsible for why assistant teachers' levels of education were significantly different in the multivariate test result of at-risk children's scores in comparison with higher levels of education in this study. It is critical that at-risk children have committed teachers who have a better understanding of the art of teaching and practice which is essential to unlock student's potentials.

The result of this study may be useful in promoting and focusing on teachers that understand data informed practice rather than teachers' levels of education and years of experience. The findings from this study also suggest that EC programs serving at-risk children may need to adequately provide data informed PD or training that are practice oriented and tailored after the needs of at-risk children. Rather than focus entirely on teachers' levels of education and years of experience, hiring process and interviews may focus on prospective candidate's actual demonstration of practice in the class before a selection is made. Teachers may perform excellently during oral interviews but their ability to put knowledge into practice should be considered with utmost importance. The combination of these practices may bring a positive social change. I intend sharing my findings with the local Head Start where the data for my study was collected. I will also contact the DPI who regulates requirements for hiring PRE-K 4 teachers in the study state. I intend reaching out to the NAEYC, policy makers and stakeholders in the study state. I will share my findings among EC professionals in conferences and by writing in NAEYC's quarterly magazines; Young Children and The Young Child's magazine.

Conclusion

To ensure high quality experience and successful later school outcome for Pre-K 4 children, I provided insight into the requirements for at-risk Pre-K 4 teachers' levels of education by the study state. Findings revealed there was no significant difference in at-risk Pre-K 4 children's assessment scores when they were taught by teachers with varying levels of education. However, assistant teachers' level of education showed a significant difference when compared to licensed lead teachers who have a bachelors and

higher degrees and other categories of teachers. The results further confirm that teachers' levels of education are not the catalyst required to unlock the potentials of at-risk children; neither does it appear to influence learning outcomes. It is paramount for ECE professionals and stakeholders to look beyond qualifications and licensure, but be cognizant of how teachers understand the art of teaching and effective practice and use diverse types of PD to hone the skill of teachers.

We may have to pay attention to the types of interaction that children experience with the teacher and how the experience broaden the scope of the children for learning to occur. Effective and consistent PD where teachers are trained to use data to inform their practice represent an integral process of improving teacher practices. Incorporating children centered coaching practice is a key to building quality teachers and effective practices that will lead to better outcome for at-risk Pre-K 4 children. To actualize an innovative change in the 21st century ECE, unlocking the potentials embedded in our youngest children must shift from teachers' level of education or licensure to how the children are being taught. It is also imperative for EC college faculties to reconstruct, align and tailor four-and-two-years college curriculum to suit teaching and practice for birth to preschool rather than the lay emphasis on pedagogy required by K-12 education.

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Appendix A: One-Way MANOVA Multivariate Results for Teacher and Test Score

Effect		Value	*F*	Hypothesis *df*	Error *df*	Sig.	Partial eta squared
Intercept	Pillai's Trace	.985	2177.056[b]	4.000	131.000	.000	.985
	Wilks' Lambda	.015	2177.056[b]	4.000	131.000	.000	.985
	Hotelling's Trace	66.475	2177.056[b]	4.000	131.000	.000	.985
	Roy's Largest Root	66.475	2177.056[b]	4.000	131.000	.000	.985
Lead_Edu	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Exp	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Asst_Edu	Pillai's Trace	.141	2.511	8.000	264.000	.012	.071
	Wilks' Lambda	.862	2.526[b]	8.000	262.000	.012	.072
	Hotelling's Trace	.156	2.540	8.000	260.000	.011	.072
	Roy's Largest Root	.125	4.138[c]	4.000	132.000	.003	.111
Asst_Exp	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Edu * Lead_Exp	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Edu * Asst_Edu	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.

	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Edu * Asst_Exp	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Exp * Asst_Edu	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Exp * Asst_Exp	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Asst_Edu * Asst_Exp	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Edu * Lead_Exp * Asst_Edu	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Edu * Lead_Exp * Asst_Exp	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Edu * Asst_Edu * Asst_Exp	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Exp * Asst_Edu * Asst_Exp	Pillai's Trace	.000	.[b]	.000	.000	.	.

Asst_Edu *	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
Asst_Exp	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000
Lead_Edu *	Pillai's Trace	.000	.[b]	.000	.000	.	.
Lead_Exp *	Wilks' Lambda	1.000	.[b]	.000	132.500	.	.
Asst_Edu *	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
Asst_Exp	Roy's Largest Root	.000	.000[b]	4.000	130.000	1.000	.000

[a]Design: Intercept + Lead_Edu + Lead_Exp + Asst_Edu + Asst_Exp + Lead_Edu * Lead_Exp + Lead_Edu * Asst_Edu + Lead_Edu * Asst_Exp + Lead_Exp * Asst_Edu + Lead_Exp * Asst_Exp + Asst_Edu * Asst_Exp + Lead_Edu * Lead_Exp * Asst_Edu + Lead_Edu * Lead_Exp * Asst_Exp + Lead_Edu * Asst_Edu * Asst_Exp + Lead_Exp * Asst_Edu * Asst_Exp + Lead_Edu * Lead_Exp * Asst_Edu * Asst_Exp. [b]Exact statistic. [c]The statistic is an upper bound on F that yields a lower bound on the significance level.

Appendix B: Test of Between-Subject Results From Univariate One-Way ANOVA

Source	Dependent Variable	Type III Sum of Squares	*df*	Mean Squares	*F*	Sig	Partial Eta Squared
Correlated Model	PALS Pre	5733.653[a]	7	819.093	.982	.447	.049
	PALS Post	5211.596[b]	7	744.514	.724	.652	.036
	TSG Pre	2229.194[c]	7	318.456	4.237	.000	.181
	TSG Post	1478.844[d]	7	211.263	3.414	.002	.151
Intercept	PALS Pre	183683.824	1	183683.824	220.159	.000	.622
	PALS Post	411505.814	1	411505.814	399.958	.000	.749
	TSG Pre	227297.150	1	227297.150	3024.052	.000	.958
	TSG Post	289028.105	1	289028.105	4671.226	.000	.972
Asst. Edu	PALS Pre	793.431	2	396.716	.475	.623	.007
	PALS Post	1315.986	2	657.993	.640	.529	.009
	TSG Pre	187.075	2	93.537	1.244	.291	.018
	TSG Post	158.452	2	79.226	1.280	.281	.019
Error	PALS Pre	111799.425	134				
	PALS Post	137869.052	134				
	TSG Pre	10071.855	134				
	TSG Post	8291.135	134				
Total	PALS Pre	347059.000	142				
	PALS Post	627754.000	142				
	TSG Pre	281697.000	142				
	TSG Post	346511.000	142				
Correlated Total	PALS Pre	117533.078	141				
	PALS Post	143080.648	141				
	TSG Pre	12301.049	141				
	TSG Post	9769.979	141				

[a]R Squared = .049 (Adjusted R Squared = -.001). [b]R Squared = .036 (Adjusted R Squared = -.014). [c]R Squared = .181 (Adjusted R Squared = .138). [d]R Squared = .151 (Adjusted R Squared = .107).