

THE PREDICTIVE VALIDITY OF THE DIAL-4 WITH A DIVERSE PRESCHOOL  
POPULATION

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## **ABSTRACT**

### **THE PREDICTIVE VALIDITY OF THE DIAL-4 WITH A DIVERSE PRESCHOOL POPULATION**

Lauren M. Pucci

School readiness refers to continuous, multi-faceted, abilities that develop during early childhood and encapsulate how prepared children are to learn as they enter their first formal school experience (Howard, 2011; Romano et. al., 2010; Stormont et. al., 2015). Children who exhibit greater school readiness skills, such as cognitive, language, and fine and gross motor abilities, prior to the start of kindergarten are more likely to succeed academically throughout their later school years (Ricciardi et. al., 2021; Schachter et. al., 2019; Williams & Lerner, 2019), while children who lack school readiness skills are more likely to demonstrate difficulties throughout elementary school (Linder et. al., 2013; Russo et. al., 2019, Welsh et. al., 2010). Research has also shown that socio-economic status and familial background play a significant role in a child's school readiness skills (Borre et. al., 2019; Cameron et. al., 2012; Linder et. al., 2013; Williams & Lerner, 2019).

Kindergarten screening has been an increasing practice in school districts throughout the United States to assess for school readiness abilities (Howard, 2011; Romano et. al., 2010; Stormont et. al., 2015; Williams & Lerner, 2019). Children who score lower on screening measures in kindergarten are more likely to exhibit later reading and mathematics difficulties throughout elementary school (Jordan et. al., 2010; McNamara et. al., 2011). In the current study, the relationship between results from the kindergarten screening, using the Developmental Indicator for the Assessment of Learning, Fourth Edition (DIAL-4), and later academic achievement, as measured by

Fountas & Pinnell (F & P) Benchmark Assessment System, Second Edition Reading Levels and New York State test scores, was examined. The aim of this study is to add to the existing literature regarding the predictive ability of kindergarten screening measures on subsequent academic achievement, while also examining the role that socio-economic status and ethnicity play on kindergarten readiness skills and later academic success. The findings of the study supported the DIAL-4 as a valid and accurate kindergarten screening measure of later academic achievement, while also providing new findings regarding school readiness skills for children of ethnically diverse backgrounds and from economically disadvantaged families. Limitations and directions for further research are discussed as well as practical implications for the practice of school psychology.

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## **CHAPTER I: Introduction**

### **Overview**

The purpose of this chapter is to present the primary problem investigated by this research. The researcher designed this study to answer essential questions regarding the predictive validity of kindergarten screening measure on later academic achievement, while also examining the role of ethnicity and socio-economic status. Important background information and the significance of the study are provided for better understanding of the study and are offered below.

Children's school readiness, especially in the early school years, is a significant indicator for school success as it establishes a positive school trajectory (An et. al., 2018). School readiness is a multi-dimensional measure of learning opportunities in a child's home, school, and community environments (Daily et. al., 2012; Ma et. al., 2015; Williams & Lerner, 2019). Previously, school readiness was viewed as a developmental stage that was biologically determined; however, recent research has altered that viewpoint to school readiness being a modifiable attribute that is influenced by an individuals' environment (Ma et. al., 2015; Williams & Lerner, 2019). In past years, children were screened to determine if they were developmentally ready for school and if they scored lower, they would be held out of school until they were developmentally ready (Ma et. al., 2015). The current view of school readiness is based on brain research that has shown how children's brain development is influenced by the learning experiences beginning at birth and can be significantly shaped by their community, culture, socio-economic status, and accessibility to appropriate services and resources (Blair & Raver, 2015; Jeon et. al., 2011; Ma et. al., 2015). Therefore, there are many

factors that should be considered when assessing a child's school readiness prior to the start of kindergarten.

### **Background of the Study**

The objective of this study was to investigate the relationships among kindergarten screening measures and later academic achievement. Studies have shown that children who enter school ready for kindergarten, are more likely to succeed (Pan et. al., 2019; Peterson et. al., 2018; Ricciardi et. al., 2021). This is considered "school readiness" and is often assessed through a screening process prior to the child starting kindergarten (Wilson & Lonigan, 2010). These screening measures are intended to assess children's academic skills, as well as identify children who are at very high-risk or who are most in need of targeted instructional activities (Wilson & Lonigan, 2010). The differences seen within children's readiness skills demonstrate the wide variation in knowledge, skills, and behaviors that may exist between children prior to the start of kindergarten (Schachter et. al., 2020). School readiness can be viewed as multidimensional, as recent research emphasizes the importance of personal and social skills and the roles of families and communities (Diamond, 2010; Pan et. al., 2019). These measurable gaps at kindergarten entry set the foundation for documented achievement gaps, such that students from low-income, high-risk backgrounds have lower levels of educational attainment, on average, in schools within the United States, and often score lower on school readiness outcomes, as well as math, reading, and behavioral measures (Abenavoli et. al., 2017; Holliday et. al., 2014; Herbers et. al., 2012; Lipscomb et. al., 2019; Schachter et. al., 2020).

The information gathered through screening assessments prior to the start of kindergarten is useful to identify early gaps in a child's school readiness and it provides information that can be used both at the classroom level, as well as state systems level (Ohle & Harvey, 2017; Schachter et. al., 2020; Regenstein et. al., 2017). First, at the classroom or school level, kindergarten screening gives initial insight on the child's current levels of functioning, informs instructional needs at the start of kindergarten, and assists with determining the most beneficial educational placement for each individual student (Ohle & Harvey, 2017; Schachter et. al., 2020; Stormont, et al., 2015; Regenstein et. al., 2017). At the state systems level, kindergarten screening measures help identify where resources are most needed are most, evaluate the progress of early education and intervention efforts in closing readiness gaps before kindergarten entry, and describe and compare knowledge, skills, and behaviors of each kindergarten (Ohle & Harvey, 2017; Regenstein et al., 2017). Kindergarten screening measures are extremely beneficial to assess school readiness, assess the need for early interventions, and gain insight on later academic achievement, especially in diverse communities.

### **Significance of the Study**

This study is significant to students, parents, and school personnel, both in the New York State Department of Education, and across all school districts. This study will support a unified kindergarten screening process and assessment for all children prior to the start of kindergarten. It will also provide evidence of the use of kindergarten screening tools on a diverse population, specifically for those who are economically disadvantaged and of a minority ethnicity. Through the results of this study, educational professionals can better equip themselves to make data-based decisions regarding

students' educational environment, through better identifying students in need of interventions or additional academic support.

## **CHAPTER II: Literature Review**

### **School Readiness and Influential Factors**

As children enter kindergarten, their range of readiness skills varies (Gaynor, 2015; Linder et. al., 2013). Although most states have definitions of school readiness, these definitions are not consistent in content (Regenstein et. al., 2017). In order to assess school readiness, various areas of functioning including, cognitive abilities, maturational, school, social, and emotional domains of development, need to be examined (Linder et. al., 2013; Regenstein et. al., 2017; Russo et. al., 2019; Schachter et. al., 2019). These school readiness abilities provide evidence of how prepared a child is for academic domains and processes of learning, as kindergarten is often a child's first formal classroom setting (Linder et. al., 2013; Stormont et. al., 2015). School readiness also has been linked to the child's later academic outcomes (Schachter et. al., 2019).

School readiness should be viewed through a broad lens, as early childhood environmental experiences can have a strong influence on these skills (Cameron et. al., 2016b; Linder et. al., 2013). As children begin their formal schooling experience, they have unique knowledge based on their family, neighborhood, and community (Brown & Lan, 2018; Browne et. al., 2018; Linder et. al., 2013). At this developmental age, as children adapt from the home to school settings, familial and social networks have a significant impact on a child's learning and development (Cameron et. al., 2016b). These social networks can include culture, economic climate, and resources or accessibility to appropriate services (Cameron et. al., 2016b). School readiness must be assessed in a diverse population, as research has shown that ethnically diverse students are less likely to possess the skills necessary for the start of kindergarten (Ansari & Winsler, 2016;

Reardon & Portilla, 2016; Winsler et. al., 2012). Borre et. al. (2019) discussed the difficulties that Black children encounter with reading achievement, as they are challenged with variables such as poverty, quality of the home literacy environment, teacher's expectations, assessment practices, and barriers built on cultural differences. These ethnic differences in emergent literacy are still identified after controlling for socio-economic status (Borre et. al., 2019). Therefore, it is important to take into consideration these individual differences between children when assessing school readiness.

In addition to familial background, socio-economic status is also widely researched as it pertains to school readiness. Children from low-income families are twice as likely to perform lower on scales of school readiness compared to children of middle- to high-income families (Linder et. al., 2013). Research suggests that low socio-economic status is consistently negatively correlated to school readiness (Ansari et. al., 2020; Linder et. al., 2013, Mistry et. al., 2010; Peterson et. al., 2018). Gaynor (2015) examined the role of socio-economic status on school readiness and found that 59% of children from families with a household income just above the poverty line are ready for school at age five; however, 86% of children from families with household incomes above \$100,000 demonstrate school readiness abilities (Gaynor, 2015). Findings from Gaynor (2015) suggest that students from poorer families are also more likely to score lower on both cognitive and behavioral readiness measures, than students from moderate- or high-income families.

In a child's first formal school experience, there is often a skill gap between children from socio-demographically advantaged and disadvantaged backgrounds, as



well as economically advantaged and disadvantaged backgrounds (Cameron et. al., 2012; Linder et. al., 2013). This gap often leads many kindergarteners to struggle to master the foundational skills that enable them to engage successfully in classroom learning. These early deficits are predictive of a child's later academic success (Cameron et. al., 2012; Linder et. al., 2013; Russo et. al., 2019). Many children are entering school underprepared, and research suggests that students who enter kindergarten at a disadvantage, most specifically due to poverty, have early gaps that are sustained or widened over time in understandings of literacy or mathematics (Borre et. al., 2019; Cameron et. al., 2012). Children who do not possess school readiness abilities continue to have difficulties in number skills, problem solving, memory and develop fewer skills over the course of elementary school (Linder et. al., 2013; Russo et. al., 2019, Welsh et. al., 2010). Therefore, it is important to know a students' socio-economic and familial background when examining their school readiness abilities.

### **Legislation and School Readiness**

The No Child Left Behind Act (NCLB) of 2001 was designed to improve student achievement by requiring states to create annual assessments to evaluate math and reading in grades three through eight (Kreig, 2011). These tests intend to allow parents, educators, administrators, policymakers, and the general public to track performance of schools nationwide. The data collected takes poverty levels, race, ethnicities, disabilities, and limited English proficiencies into consideration to ensure that all children, regardless of his or her background, receive the support they need to be proficient in math and reading (Kreig, 2011). The NCLB also holds districts and buildings accountable for student performance on state administered high-stakes tests, sanctions failing schools,

and provides students with expanded educational opportunities (Krieg, 2011, Welsh et. al., 2010). Therefore, school readiness skills should be assessed before the start of kindergarten and academic achievement should be tracked in subsequent years to ensure that children are receiving the support needed to obtain academic success.

Following the passing of NCLB registration there has been a significant increase in the importance of the academic success of students (Davoudzadeh et. al., 2015; Repko-Erwin, 2017), as a growing number of states require kindergarten entry assessments (Center on Enhancing Early Learning Outcomes, 2014; Stedron & Berger, 2010). Over 70% of states implement some form of readiness assessment at the beginning of kindergarten (Russo et. al., 2019). According to the New York State Education Department (NYSED) Commissioner's Regulations Section 117.3, every school district in New York State must have a plan regarding diagnostic screening of all students in their native language by qualified personnel prior to the start of school (*NYSED:SSS:Commissioner's Regulations - Sections 117.1-3.*, n.d.). Screenings that are delayed should be completed by December 1<sup>st</sup> or within 15 days of the student's transfer into the New York State public school (*NYSED:SSS:Commissioner's Regulations - Sections 117.1-3.*, n.d.).

### **Kindergarten Screeners**

In order to have an initial assessment of pre-school children before they enter kindergarten, screening is often completed to gain insight on a child's skills and school readiness. School readiness is multifaceted, so these screenings should not be limited to preliteracy and prenumeracy skills, but rather include important components such as cognitive, language, health, motor skills, behavioral, and socio-emotional well-being

(Howard, 2011; Romano et. al., 2010; Stormont et. al., 2015). Kindergarten assessments are intended to be used directly to support children's development and academic achievement to improve educational outcomes (Howard, 2011). Screening tools are designed to be low cost, time efficient assessments of many children and assist with identifying children who are at risk for academic delays (Emmons & Alfonso, 2005; Regenstein et. al., 2017) or learning disabilities (Spagnola, 2010). Additionally, screening tools are a helpful resource to determine educational placement (Stormont, et al., 2015). Another goal of screening is to identify students that may have a developmental delay, which goes beyond a child slightly or momentarily lagging in development. Rather, this delay significantly affects development, and without special intervention, will likely negatively impact academic achievement during the school years (Mardell-Czudnowski & Goldenberg, 2011; Moodie et. al., 2014). The data gathered from these screenings can be effectively applied to enhance early school success when used to inform educational adaptations to the specific needs of children (Emmons & Alfonso, 2005; Regenstein et. al., 2017). By using the results of the kindergarten screening measure to provide early intervention, it is likely to result in an increase in prosocial behaviors, lower retention rates, and decrease special education referrals (Emmons & Alfonso, 2005; Goldstein et. al., 2014).

### **Early Literacy and School Readiness**

Academic success can be assessed through a variety of different measures across domains. One way that academic success is often measured is through literacy or reading, as it is a keystone skill that is essential to build many other academic abilities (Greenwood et. al., 2015).

Early reading is important, as research has demonstrated that there is a 90% chance that students who display poor reading levels in first grade will continue to demonstrate poor reading skills later in their academic career (Greenwood et. al., 2015). However, the role of socio-economic status is an important contributing factor given the demonstrated link between lower socio-economic status and poor reading skills (Dolean et. al., 2019; Geo et. al., 2015; Greenwood et. al, 2015). Greenwood et. al. (2015) stated that 83% of children from low-income families and 85% of low-income students attending high-poverty schools fail to reach “proficient” reading levels. Children from low socio-economic status tend to exhibit delays in decoding skills and acquire language skills more slowly than children from high socio-economic status (Greenwood et. al., 2015). Therefore, this population is at an increased risk for early reading difficulties and potentially not attaining reading proficiency standards by third grade as mandated by NCLB (Geo et. al., 2015).

### **Motor Skills and Academic Achievement**

School readiness is not only solely determined on cognitive abilities (Cameron et. al., 2012). A child’s motor abilities also influence whether they can effectively function in a classroom setting (Cameron et. al., 2012; Dinehart & Manfra, 2013; Mardell-Czudnowski & Goldenberg, 2011; Schmidt et. al., 2017; Westendorp et. al., 2011). Therefore, there has been an increase in kindergarten screening tools that examine multiple skill sets that children possess beyond just basic literacy and mathematics competence (Cameron et. al., 2012).

In order to develop programs that can improve these readiness skills early in school settings, the specific skills that predict long-term achievement must be identified

(Cameron et. al., 2012). Executive functioning abilities, specifically fine and gross motor skills, consistently contribute to later learning outcomes (Cameron et. al., 2012; Carlson et. al., 2013; Grissmer et. al., 2010; Westendorp et. al., 2011). Motor skills include both the cognitive processes that lead to the movement and the underlying internal processes responsible for movement (Cameron et. al., 2012). Motor skills have a great impact on academic and behavioral skills, specifically in the areas of decoding letters and words, solving quantitative problems, writing, and interacting effectively with peers and adults (Cameron et. al., 2016a). Therefore, motor skills can be linked to achievement in various capacities. Motor skills are strongly correlated to school readiness, as demonstrated through classroom self-regulation and emergent academic skills. Strong motor skills may also compensate for weak behavioral or academic skills (Cameron et. al., 2016a).

Deficiencies in fine motor skills are the strongest predictor of special education referrals and the second strongest predictor of kindergarten retention controlling for vocabulary, auditory, and visual skills, and socio-demographic factors (Cameron et. al., 2012). Longitudinal studies have demonstrated that children with strong skills in fine and gross motor tasks in preschool attained higher levels of third grade reading achievement (Cameron et. al., 2012). Overall, this suggests that kindergarten readiness assessments should contain a motor component, as motor skills are a strong predictor of academic achievement.

**Developmental Indicator for the Assessment of Learning, Fourth Edition (DIAL-4)  
as a Kindergarten Screener**

Growing importance has been placed on implementing universal screening for kindergarten readiness skills prior to kindergarten (Houri & Miller, 2020). These

measures will help to identify at-risk students and will allow educators to provide early intervention (Hourí & Miller, 2020; Moodie et. al., 2014). These early supports can strengthen a child's skills, thereby increasing their likelihood for future academic and social, emotional, and behavioral success, as well as overall positive adult outcomes (Hourí & Miller, 2020; Moodie et. al., 2014). Ward and Rothlisberg (2011) posited that the entire utility of prevention and early intervention strategies is directly contingent on the ability to accurately screen young children.

To determine the appropriateness of a battery for universal screening procedures, a thorough review of psychometric properties is warranted (Hourí & Miller, 2020). This entails a review of the measure's reliability, validity, bias identification methods, and norming procedures. Strong reliability and validity evidence indicate that a rating scale accurately evaluates the constructs that are intended to be measured (Hourí & Miller, 2020). When taking into consideration diversity, it is important that the rating scales include both a norming sample that is representative of the general population and thorough bias evaluation procedures, which provide a measurement of any biases in the scales' administration or scoring procedures based on demographic characteristics (Hourí & Miller, 2020). While variability in format and size may exist between kindergarten screening measures, many have a clear ability to identify students in need of further support (Stormont et. al., 2015).

Three developmental screeners that are widely researched as useful tools to identify children's school readiness abilities are the BRIGANCE Screens, the Battelle Development Inventory, 2<sup>nd</sup> Edition – Screening Test (BDI-2 Screening Test), and the Developmental Indicator for the Assessment of Learning, Fourth Edition (DIAL-4). The

BRIGANCE Screens was created to identify children who may have language impairments, learning disabilities, or cognitive delays, or children who may be academically gifted (Glascoe, 2005; Moodie et. al., 2014). The BDI-2 Screening Test is made up of items from the Battelle Development Inventory – 2<sup>nd</sup> edition (BDI-2). The BDI-2 should be administered after the BDI-2 Screening Test if the child is at risk for a developmental delay (Elbaum et. al., 2010; Moodie et. al., 2014). Similarly, the DIAL-4 is designed to identify children who need intervention. The BRIGANCE Screens and the DIAL-4 have acceptable reliability and validity, whereas, the developer of the BDI-2 Screening Test did not examine interrater reliability, test-retest reliability, construct validity, or concurrent validity (Moodie et. al., 2014). The DIAL-4 was also normed on a more diverse sample than the BRIGANCE Screens and the BDI-2 Screening Test (Moodie et. al., 2014).

The DIAL-4 was developed by Carol Mardell and Dorothea S. Goldenberg and published by Pearson (Moodie et. al., 2014). The DIAL-4 is a psychometrically sound screener, as its interrater reliability, test-retest reliability, and internal consistency reliability are all acceptable (Moodie et. al., 2014). Further, the DIAL-4 demonstrates good content validity, as childhood experts were consulted during development (Moodie et. al., 2014). It also has strong concurrent validity and moderate construct validity (Moodie, et. al., 2014). The DIAL-4 was normed on a diverse sample of 1,400 children, which consisted of both English- and Spanish- speaking children and was selected to be highly representative of the U.S. population (Moodie et. al., 2014). Based on the psychometric properties and norming sample of the DIAL-4, it was chosen as the best screening measure for the school utilized in the current study.

The DIAL-4 contains three areas of assessment: motor, concepts, and language (Moodie et. al., 2014). The domain of motor assesses the skills of throwing, hopping, skipping, block building, thumb finger coordination, cutting, and writing (Coughlan, 2015; Mardell & Goldenberg, 2016; Pearson Education Inc., 2019). A child's ability to point to body parts, demonstrate color knowledge, rote count, identify concepts, execute sorting tasks, and identify shapes, are assessed in the domain of concepts (Coughlan, 2015; Mardell & Goldenberg, 2016). The domain of language assesses the knowledge of personal information, speech articulation, naming of objects, letters and sounds, and problem solving (Coughlan, 2015; Mardell & Goldenberg, 2016; Pearson Education Inc., 2019). Therefore, the DIAL-4 provides vital information regarding children's knowledge beyond just basic cognitive abilities, which is essential when assessing for school readiness before kindergarten.

### **The Present Study**

Kindergarten screening allows teachers and school personnel to identify children's level of readiness before they enter their first formal school experience (Linder et. al., 2013; Stormont et. al., 2015). A child's familial background, specifically their ethnicity and socio-economic status play a significant role on his or her readiness abilities as determined by assessments (Ansari & Winsler, 2016; Borre et. al., 2019; Cameron et. al., 2012; Gaynor, 2015; Linder et. al., 2013; Ma et. al., 2015; Winsler et. al., 2012). Growing importance has been placed on the use of kindergarten screeners to identify these readiness abilities, as they can assist in identifying at-risk children and provide information regarding the need for early intervention services (Howard, 2011; Regenstein et. al., 2017; Stormont et. al., 2015). Research has provided evidence for the use of the



DIAL-4 as an effective tool for identifying school readiness (Coughlan, 2015; Ellingsen, 2016; Moodie et. al., 2014). The current study examined the predictive validity of the DIAL-4 for students of a diverse population and those who are economically disadvantaged, as this is an area with limited research.

### **Impact of the COVID-19 Pandemic**

Education across the world has been impacted by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2/COVID-19). COVID-19 was declared a pandemic on March 12, 2020, by the World Health Organization. On March 18, 2020, the UN Educational, Scientific, and Cultural Organization estimated that 862 million students, nearly half of the global school population, were affected by school closures being implemented in 107 countries had implemented (Viner et. al., 2020). Those numbers increased in the following days, as the UN Educational, Scientific, and Cultural Organization estimated that 138 countries closed schools nationwide, affecting 80% of children's education worldwide (Viner et. al., 2020). School closures are implemented to reduce social contacts between students and, therefore, interrupt transmission of the virus (Van Lacker & Parolin, 2020).

As this research has been conducted in a Title 1 school, it is important to note that a large concentration of students come from low-income households. Researchers have begun to examine the social and health consequences of school closures, as they can be detrimental for children living in poverty. Van Lancker and Parolin (2020) report that inequalities in social, health, and academic domains based on socio-economic status are likely to be exacerbated by the school closure. School closures can worsen food insecurity since many children and adolescents rely on schools for their meals during the

day (de Miranda et. al., 2020; Van Lancker & Parolin, 2020). School lunch is positively associated with more successful academic performance; whereas food insecurity, which may include either irregular or unhealthy diets, is associated with low educational attainment and sizeable risks to children's physical and mental health (Gundersen et. al., 2012; Van Lancker & Parolin, 2020). There was a large portion of the United States COVID-19 cases reported in New York City, where this research was conducted. One in ten students in New York City were homeless or experienced severe housing instability, which creates a barrier for children to successfully complete online schooling or homework (Van Lancker & Parolin, 2020). Furthermore, an additional threat to low-income families is the impact of the pandemic on the economy. In the past, recessions have heightened levels of child poverty with long-lasting consequences for children's health, wellbeing, and learning outcomes (Van Lancker & Parolin, 2020). Due to research detailing evidence that a disruption of in-person education can be detrimental to children, specifically those from low-income households, it is important to take this into consideration for this study as academic achievement measures are obtained in the following years.

In the current study, due to the suspension of in-person schooling in March of 2020, data regarding academic achievement as measured by the school-based reading benchmark assessment and state-wide examinations was not able to be collected throughout the 2019-2020 school year. More specifically, F & P levels for the winter and spring of 2020 were not able to be collected for any students, and the New York State English Language Arts and Math tests were not administered in the spring of 2020 and the scores for the 2021 New York State English Language Arts and Math test scores were

not accessible to the researcher. This missing data regarding students' academic achievement places a limitation on examining the predictive validity of the DIAL-4.

### **CHAPTER III: Research Questions**

In the current study, the predictive validity of kindergarten screening measures on later academic achievement was examined. This research may help address the following research questions:

1. Can screening measures, specifically the DIAL-4, administered prior to the start of kindergarten significantly predict academic achievement measured by reading levels and standardized test scores six years after the screening?
2. To what degree can the DIAL-4 significantly predict subsequent academic achievement when administered to a culturally and economically diverse population dissimilar to the normative sample?

#### **Hypotheses**

Previous literature has demonstrated a positive correlation between school readiness, measured by kindergarten screeners, and later achievement in reading (Greenword et. al., 2015; Ozernov-Palchik et. al., 2017). As such, it is hypothesized that

1. There will be a significant positive correlation between performance on a kindergarten screener as measured by the DIAL-4 Total Score and subsequent academic achievement as measured by the student's average Fountas and Pinnell (F & P) Reading Levels each year.
2. There will be a significant positive correlation between performance on a kindergarten screener as measured by the DIAL-4 Concepts Score and subsequent academic achievement as measured by F & P Reading Levels.

3. There will be a significant positive correlation between performance on a kindergarten screener as measured by the DIAL-4 Language Score and subsequent academic achievement as measured by F & P Reading Levels.

Previous literature has demonstrated a positive correlation between motor skills and later academic achievement (Cameron et. al., 2012; Carlson et. al., 2013; Dinehart & Manfra, 2013; Grissmer et. al., 2010; Westendorp et. al., 2011). As such, it is hypothesized that

4. There will be a significant positive correlation between motor skills, as measured by performance on the DIAL-4 Motor Score and subsequent academic achievement as measured by F & P Reading Levels.

Previous literature has demonstrated a positive correlation between school readiness, measured by kindergarten screeners, and later achievement in English Language Arts (Reid et. al., 2019). As such, it is hypothesized that

5. There will be a significant positive correlation between the performance on a kindergarten screener as measured by DIAL-4 Total Score and subsequent academic achievement as measured by the New York State English Language Arts test score.

Previous literature has demonstrated a positive correlation between school readiness, measured by kindergarten screeners, and later achievement in mathematics (Seethaler & Fuchs, 2010). As such, it is hypothesized that

6. There will be a significant positive correlation between the performance on a kindergarten screener as measured by DIAL-4 Total Score and subsequent academic achievement as measured by the New York State Math test score.

Previous literature has shown large gaps in the academic skills of minority children as compared to white children (Ansari & Winsler, 2016; Winsler et. al., 2012). As such, it is hypothesized that

7. Children from a diverse ethnic background will demonstrate fewer readiness skills as measured by the DIAL-4 Total Score.
8. Ethnicity will be a significant predictor of academic achievement as measured by:
  - 8a. F & P Reading Levels.
  - 8b. New York State English Language Arts test scores.
  - 8c. New York State Math test scores.

Previous research has demonstrated that students who are at a disadvantage due to their socio-economic status are more likely to have difficulties with school readiness and thus, later academic achievement (Borre et. al., 2019; Cameron et. al., 2012; Gaynor, 2015; Linder et. al., 2013). As such, it is hypothesized that

9. Children from a low socio-economic status are going to demonstrate fewer readiness skills, as measured by the DIAL-4 Total Score.
10. Socio-economic status will be positively correlated with academic achievement as measured by:
  - 10a. F & P Reading Levels.
  - 10b. New York State English Language Arts test scores.
  - 10c. New York State Math test scores.

## **CHAPTER IV: Methods**

### **Overview**

This chapter provides details about the method of data collection utilized in this study. The participants and instrumentation are described. Approval from the researcher's Institutional Review Board (IRB) and the New York State Department of Education was obtained.

### **Sample and Participant Selection**

The participants are from a Title 1 public elementary school in Queens, New York. The school contains grades pre-kindergarten through fifth grade and currently has 1,025 students in attendance (New York City Department of Education, 2020). The screenings were conducted on students before they entered kindergarten and included both children that were enrolled for pre-kindergarten in the school and those new to the district. The population for this study was students who were entering kindergarten in 2015, 2016, 2017, 2018, and 2019. The demographic profile of this school can be described as being comprised of mostly Hispanic (49.66%) and Asian (30.73%), as well as, White (6.93%), Black (5.27%), American Indian or Alaskan Native (4.39%), Native Hawaiian or Other Pacific Islander (1.27%), Multiracial (1.37%), and not reported (0.39%) (New York City Department of Education, 2020).

All participants were administered the DIAL-4 as a screening measure prior to the start of kindergarten and were included in a longitudinal study to measure academic achievement across the next seven consecutive years. To be included for analyses, the participants had to meet the following two criteria; the student had to be screened by the school district using the DIAL-4 and the student had to have an academic achievement

outcome measure completed in the subsequent years. If the student had only fulfilled one of those two requirements, the student was not included in the analyses. Ways that a student may have failed to meet a requirement include: if the student was a late entry, therefore admitted to kindergarten after the screening process was concluded for that year, if there was missing data in their DIAL-4 screening measure due to a student refusing to complete or an administration or scoring error of the examiner, and/or if there were no outcome measures for the student. The child would be missing achievement date if they transferred schools, if the teacher did not complete the Fountas & Pinnell (F & P) reading levels in the following years, or failure to complete the New York State English Language Arts and Math tests during the third grade.

From 2015 to 2017, the DIAL-4 was administered in May by a team of speech-language pathologists employed by the New York State Department of Education. In 2018 and 2019 doctoral level graduate students assisted the speech-language pathologists with the administration. All domains on the DIAL-4 were administered; Motor, Language, and Concepts, and the DIAL-4 Total Score was calculated. The trained doctoral level graduate students scored the protocols by hand and utilized the online scoring software, Q-global, to generate individual reports that included a standard score and percentile across all performance areas; Motor, Concepts, Language, and DIAL-4 Total.

### **Demographic Data**

Data from kindergarten screening completed via the DIAL-4 at a Title 1 school in Queens, New York was gathered from children that entered kindergarten in 2015, 2016, 2017, 2018, and 2019. A total of 453 students were screening prior to starting



kindergarten between 2015 and 2019. Due to screening administration errors, 6.2% ( $n = 28$ ) of the screenings were not able to be used for these research purposes. Children screened were then followed and F & P Reading Levels and New York State English Language Arts test scores, and the New York State Math test scores were obtained to access later academic achievement. Due to students being discharged or relocated to a different school within the time of the study, 12% ( $n = 54$ ) of the data was excluded from the current study.

The current sample used for this study consists of 371 students, screened in 2015, 2016, 2017, 2018, and 2019, who were between the ages of four years, four months and five years, six months at the time of screening. The current research sample is comprised of 49.1% female and 50.9% male, with the ethnicities as follows: 10.5% Hispanic, 59.3% Asian, 6.5% Black, 13.8% White, 6.7% American Indian or Alaskan, 1.9% Multiracial, and 1.4% Native Hawaiian or Other Pacific Islander.

### **Predictive Measure**

#### **Developmental Indicator for the Assessment of Learning, Fourth Edition**

**(DIAL-4).** The DIAL-4 is an individually administered screening test, containing three areas of assessment: Motor, Language, and Concepts (Coughlan, 2015; Ellingsen, 2016; Moodie et. al., 2014). It is designed to indicate children between the ages of 2 years 6 months to 5 years 11 months who may benefit from further diagnostic assessment or intervention (Coughlan, 2015; Ellingsen, 2016; Moodie et. al., 2014). The DIAL-4 was designed to efficiently screen a large number of children in an efficient manner, before entering kindergarten, to best distinguish those who may be at risk for academic difficulties from those who are not at risk (Coughlan, 2015; Ellingsen, 2016).

The DIAL-4 was normed on a population of 1,400 English- and Spanish-speaking students and was selected to be highly representative of the U.S. population. The genders and ethnicities of the normative sample are as follows; 50.5% female and 49.5% male, 13.0% Black, 3.5% Asian, 25.0% Hispanic, 53.0% White, and 5.5% Other (Moodie et. al., 2014).

### **Criterion Measures**

#### **Fountas & Pinnell (F & P) Benchmark Assessment System, Second Edition.**

The F & P Benchmark Assessment System is a formative assessment designed for triennial screening (Klingbeil et. al., 2015). The F & P Benchmark Assessment System has one system for students in grades kindergarten through two and another for students grades three through eight. There is no national norming data, and the grade level expectations may be adjusted based on the school district (Klingbeil et. al., 2015). Using the F & P Benchmark Assessment System, teachers observe, code, and analyze students' reading behavior while the student reads orally. The student is then asked a series of prompts providing the teacher with information regarding their comprehension of the material. Through examination of the students' oral reading fluency and comprehension, they are rated and given an overall reading level based on an AA to Z scale (Klingbeil et. al., 2015).

**New York State English Language Arts and Math Tests.** In New York State, students in grade three through eight take the State English Language Arts (NY State English Language Arts (ELA) Tests, n.d.) and Math tests (NY State Math Tests, n.d.) in the Spring. These examinations are scored by licensed and trained New York City

teachers through a distributed scoring process, meaning no student's exam is scored by a teacher from the student's school.

**Student Data.** Demographic data was obtained for each child screened with the DIAL-4 and is included in this study. Due to the abundance of research regarding the impact of socio-economic status on academic achievement, data regarding whether a child was economically disadvantaged at this school, defined by if the student received free lunch (Domina et. al., 2018), was obtained. The child's ethnicity, date of birth, and gender were also recorded.

### **Confidentiality**

All data collected were secured with pertinent documents in a locked closet within the school psychologist's office at the school in Queens, New York where the screenings were taking place. All electronic files were saved to an USB flash drive that was stored in a locked drawer in the desk of the school psychologist at the school in Queens, New York where the screenings were taking place. Further, the files on the USB flash drive are encrypted with a password that is known only by the participating researchers. The password is changed every two months to ensure protection of the data. In December 2022, after the conclusion of the research, all identifying student data will be deleted from the USB flash drive. The paper DIAL-4 protocols were filed in the locked office closet until six years preceding the participating students' anticipated graduation from high school, as this is the legal requirement in New York for possession of student paperwork.

## CHAPTER V: Results

### Overview

This study was conducted to evaluate the predictive validity of the DIAL-4 as a screening measure for children before they enter kindergarten on later academic achievement throughout elementary school. As research has demonstrated differences in school readiness based on familial background and socio-economic status among the preschool age (Borre et. al., 2019; Cameron et. al., 2012; Linder et. al., 2013), this study utilizes an ethnically and economically diverse population at a Title 1 school in Queens, New York to assess the utility of kindergarten screening on later academic achievement.

This study utilized data from 371 students spread across five cohorts from 2015 ( $n = 45$ ), 2016 ( $n = 57$ ), 2017 ( $n = 69$ ), 2018 ( $n = 95$ ), and 2019 ( $n = 105$ ). Overall, the sample was 49.1% female ( $n = 182$ ), mostly of students who were Asian ( $n = 220$ , 59.3%), and economically disadvantaged ( $n = 287$ , 77.4%), as measured by the qualification for free lunch. Table 1 further displays the demographic information of this study's sample.

Compared to the normative sample used to develop the DIAL-4 ( $n = 1,400$ ), several differences were observed in the racial composition of the current sample. Disproportionately more students were Caucasian/White in the DIAL-4 normative sample (53.0%) compared to the current sample (13.7%),  $\chi^2(1) = 180.26, p < .0001$ . In addition, significantly more students in the current sample were Asian (59.3%) than the normative sample (3.5%),  $\chi^2(1) = 708.46, p < .0001$ . Similarly, a significantly higher percentage of students in the normative sample were African American/Black (13.0%) compared to the current sample (6.5%),  $\chi^2(1) = 12.046, p = .0005$ . Finally, fewer

students were Hispanic (10.5%) in the current sample compared to the normative sample (25%),  $\chi^2(1) = 10.34, p < .0001$ . Regarding socio-economic status, a significantly higher percentage of students was observed in the current sample who qualified as economically disadvantaged (77.4%) compared to the rate of child poverty in 1996 when the DIAL-4 was normed (13.7%),  $y^2(1) = 1273.19, p < .0001$ . Therefore, due to the differences seen from the normative sample, this study can further explore previous research's findings that children from ethnically diverse backgrounds and/or children who grew up in poverty demonstrate lower school readiness skills and less academic achievement throughout elementary school.

Compared to the normative scores for the DIAL-4 (standard score = 100.00), no significant differences were observed in the current sample for DIAL-4 total score ( $M = 102.38, t(370) = 1.66, p = .10$ ), motor score ( $M = 101.66, t(370) = 0.71, p = .47$ ), concepts score ( $M = 101.11, t(370) = 0.14, p = .89$ ), or language score ( $M = 100.91, t(370) = 0.11, p = .92$ ).

The current study utilized multiple years of data, beginning in 2015 and continuing until 2022; therefore, the availability of F & P Reading Levels varies between the five cohorts. Due to the disruption of in-person learning and the COVID-19 global pandemic, the 2015 cohort is the only cohort that has New York State English Language Arts test scores, and the New York State Math test scores. Table 2 provides an overview of the dependent measures that are available for each cohort in the current study.

Race/ethnicity was recoded from 7-levels as documented in school records to match the 5-levels used in the DIAL-4 normative sample (i.e., Asian, African American/Black, Hispanic/Latino, Caucasian/White, and Other). Specifically, students

who were identified in school records as American Indian/Alaskan, Hawaiian/Pacific Islander, or Multiple were recoded as “Other” for the current analyses. Similarly, the F & P Reading Level dependent variable was coded to be inputted as numerical scores instead of letter assigned (e.g., A=1, B=2, C=3). The fall, winter, and spring numerical scores were then averaged to create an average reading level for each year (e.g., 2015/2016, 2016/2017).

### **Statistical Methods**

Analyses were conducted using SPSS Statistics Version v.28.0. To describe continuous variables, means and standard deviations were computed, and to describe categorical variables, frequencies and percentages were used. A series of Analyses of Variance (ANOVA) tests were conducted to evaluate between-group differences in DIAL-4 scores at baseline. Next, Pearson correlations were used to evaluate the strength and direction of associations between continuous variables. Analyses of covariance (ANCOVA) were also used to examine between-group differences while controlling for pertinent covariates. Ordinary Least Squares (OLS) regression tested for moderation as outlined in Field (2018) and Hayes (2022) by using the PROCESS macro for SPSS v.28 (Model 1). To avoid multicollinearity with the interaction term, continuous variables were centered. To assess the stability and reliability of moderation models, bootstrapped samples ( $n = 10,000$ ) and 95% confidence intervals for the conditional effect were used. All statistical tests were two-tailed and performed at  $\alpha = 0.05$  for interpretation.

### **Data Availability and Variable Recording**

Table 3 provides descriptive statistics for scores on the DIAL-4, F & P Reading Levels, and New York State English Language Arts and Math test scores. A series of

ANOVAs were conducted to test for differences among these measures by cohort year. A main effect for cohort year on DIAL-4 Total Score,  $F(4,370) = 3.52, p = .008$ , Motor,  $F(4,370) = 3.13, p = .015$ , Concepts,  $F(4,370) = 8.08, p < .001$ , and Language,  $F(4,370) = 2.85, p = .024$  was found. Bonferroni post hoc analyses indicated that the average DIAL-4 Total Score was significantly higher among participants from the 2017 cohort than students from the 2016, 2018, and 2019 cohorts (Table 4). Additionally, other significant differences in DIAL-4 subscale scores for Motor, Concepts, and Language were observed (Table 4). Given the significant differences in DIAL-4 scores and unavailability of measures for certain years, subsequent analyses were stratified by cohort year.

### **Analyses of Hypotheses**

**DIAL-4 Total Score and F & P Reading Levels.** Pearson  $r$  correlations were calculated to examine the relationship between the individual DIAL-4 Total Score and subsequent academic achievement as measured by the average F & P Reading Levels for each academic year. As can be seen in Table 5, the DIAL-4 Total Scores and F & P Reading Levels were correlated ( $p$ 's  $< .001$ ) for each cohort across all subsequent years. This hypothesis was supported.

**DIAL-4 Concepts Score and F & P Reading Levels.** Pearson  $r$  correlations were calculated to examine the relationship between the individual DIAL-4 Concepts and subsequent academic achievement as measured by the F & P Reading Levels for each year (Table 6). As with Hypothesis 1, the strength of the correlations were mostly in the “strong” range ( $r$ 's  $> .50$ ) across all cohorts and from one to two years following administration of the DIAL-4 to as long as four to five years post-administration. This hypothesis was supported.

**DIAL-4 Language Score and F & P Reading Levels.** Pearson  $r$  correlations were calculated to examine the relationship between the individual DIAL-4 Language Score and subsequent academic achievement as measured by the F & P Reading Levels for each year. The hypothesis was also supported by statistically significant correlations (Table 7). For the 2015 cohort, the strength of the correlations between Language scores on the DIAL-4 and subsequent F & P Reading Levels were comparatively smaller than other cohorts.

**DIAL-4 Motor Score and F & P Reading Levels.** Pearson  $r$  correlations were calculated to examine the relationship between the individual DIAL-4 Motor Score and subsequent academic achievement as measured by the F & P Reading Levels for each year. Results were more mixed for this hypothesis (Table 8). First, non-significant correlations ( $p > .05$ ) were observed for the 2015 cohort between Motor subscale scores and average reading level in grades K, 1<sup>st</sup>, and 3<sup>rd</sup> (academic years 2015/2016, 2016/2017, and 2018/2019, respectively). Second, correlations between the DIAL-4 Motor Score and F & P Reading Levels for the 2018 cohort were relatively weaker than other DIAL scores (Tables 5, 6, and 7) as well as, smaller than the 2016 and 2019 cohorts.

**DIAL-4 Total Score and New York State English Language Arts test scores.** Pearson  $r$  correlations were calculated to examine the relationship between the individual DIAL-4 Total Score and subsequent academic achievement as measured New York State English Language Arts test scores. As previously noted, scores for the New York State English Language Arts test were only available for the 2015 cohort. Results supported the



fifth hypothesis with DIAL-4 Total scores being significantly correlated with English Language Arts scores,  $r(45) = .55, p < .001$ .

**DIAL-4 Total Score and New York State Math test scores.** Pearson  $r$  correlations were calculated to examine the relationship between the individual DIAL-4 Total Score and subsequent academic achievement as measured New York State Math test scores. As previously noted, scores for the New York State Math test were only available for the 2015 cohort. Results supported the fifth hypothesis with DIAL-4 Total scores being significantly correlated with Math scores,  $r(45) = .49, p < .001$ .

**DIAL-4 Total Score and Ethnicity.** It was hypothesized that children from a diverse ethnic background would demonstrate fewer readiness skills as measured by the DIAL-4 Total Score. ANOVA results revealed a significant effect of ethnicity on DIAL-4 total scores,  $F(4,370) = 2.79, p = .026$  (Table 9). However, no statistically significant pairwise differences existed between ethnic groups (Table 10).

**Ethnicity and F & P Reading Levels.** Additional analyses were performed to examine whether ethnicity was significantly related to subsequent reading achievement. Considering significant effect of ethnic differences on kindergarten readiness skills, analyses of covariance (ANCOVA) were used to control for DIAL-4 scores. To maximize statistical power by including as many students as possible while ensuring equal duration in later reading ability, F & P reading levels from the spring semester of 2<sup>nd</sup> grade were used as the dependent variable. ANCOVA revealed that after controlling for DIAL-4 scores, student ethnicity had a significant effect on F & P scores two years later,  $F(4,266) = 4.36, p = .002$  (Table 11). Bonferroni post hoc analyses indicated that

reading levels were significantly higher among students who were Hispanic than those who were White ( $p = .012$ ) or Other ( $p = .005$ ) ethnicity.

Supplemental analyses were conducted to test for potential moderating effects of race on the predictive relationship between DIAL-4 scores and subsequent academic achievement as measured by F & P Reading Levels for the spring semester of 2<sup>nd</sup> grade. Results of the moderating regression did not reveal moderation (Table 12).

**Ethnicity and New York State English Language Arts test scores and New York State Math test scores.** Similar ANCOVAs provided mixed support for subsequent academic achievement as measured by NYS State English Language Arts and Math test scores. As stated previously, New York State test scores were only available for the 2015 cohort ( $n = 45$ ). Results revealed significant differences in English Language Arts scores,  $F(1,45) = 3.17, p = .024$  (Table 13). Bonferroni post hoc analyses indicated that White students scored significantly higher than Black students ( $p = .011$ ). Conversely, no significant differences were observed for Math scores,  $F(1,45) = 0.33, p = .858$ . Furthermore, moderated regression results revealed no moderating effects for New York State English Language Arts test scores (Table 14) or New York State Math test scores (Table 15).

**DIAL-4 Total Score and Socio-economic status.** It was also hypothesized that children from a low socio-economic status would demonstrate fewer readiness skills, as measured by the DIAL-4 Total Score, as well as be associated with lower F & P Reading Levels and lower New York State English Language Arts and Math test scores. Results did not support the hypothesis that economically disadvantaged students would score lower on the DIAL-4,  $F(1,371) = 0.87, p = .352$ .

**Socio-economic status and F & P Reading Levels.** It was hypothesized that children from a low socio-economic status would demonstrate lower F & P Reading Levels. As described previously, to include as many students as possible to maximize statistical power while ensuring equal duration in later reading ability, F & P reading levels from the spring semester of 2<sup>nd</sup> grade were used as the dependent variable. Examination of F & P reading scores from 2<sup>nd</sup> grade did not support the hypothesis that economically disadvantaged students would score lower in reading achievement,  $F(1,264) = 1.40, p = .238$ .

**Socio-economic status and New York State English Language Arts test scores and Math test scores.** It was hypothesized that children from a low socio-economic status would demonstrate lower New York State English Language Arts test scores and New York State Math test scores. However, analyses of New York State test scores did not reveal any significant differences in New York State English Language Arts test scores,  $F(1,44) = 0.35, p = .559$ , or New York State Math test scores,  $F(1,44) = 1.25, p = .270$ .

**Socio-economic status and ethnicity.** Additional analyses were performed to examine whether socio-economic status was associated with ethnicity. Results revealed there was no ethnic differences in the proportion of students who were from a low socio-economic status,  $\chi^2(4) = 1.76, p = .780$ .

### Summary of Hypotheses

There will be a significant positive correlation between performance on a kindergarten screener as measured by the DIAL-4 Total Score and subsequent academic achievement as measured by the student's average Fountas and Pinnell (F & P) Reading Levels each year.	Supported
There will be a significant positive correlation between performance on a kindergarten screener as measured by the DIAL-4 Concepts Score and subsequent academic achievement as measured by F & P Reading Levels.	Supported
There will be a significant positive correlation between performance on a kindergarten screener as measured by the DIAL-4 Language Score and subsequent academic achievement as measured by F & P Reading Levels.	Supported
There will be a significant positive correlation between motor skills, as measured by performance on the DIAL-4 Motor Score and subsequent academic achievement as measured by F & P Reading Levels.	Supported
There will be a significant positive correlation between the performance on a kindergarten screener as measured by DIAL-4 Total Score and subsequent academic achievement as measured by the New York State English Language Arts test score.	Supported
There will be a significant positive correlation between the performance on a kindergarten screener as measured by DIAL-4 Total Score and subsequent academic achievement as measured by the New York State Math test score.	Supported
Children from a diverse ethnic background will demonstrate fewer readiness skills as measured by the DIAL-4 Total Score.	Not Supported
Ethnicity will be a significant predictor of academic achievement as measured by F & P Reading Levels.	Supported
Ethnicity will be a significant predictor of academic achievement as measured by New York State English Language Arts test scores.	Supported
Ethnicity will be a significant predictor of academic achievement as measured by New York State Math test scores.	Not Supported
Children from a low socio-economic status are going to demonstrate fewer readiness skills, as measured by the DIAL-4 Total Score.	Not Supported
Socio-economic status will be positively correlated with academic achievement as measured by F & P Reading Levels.	Not Supported

Socio-economic status will be positively correlated with academic achievement as measured by New York State English Language Arts test scores.	Not Supported
Socio-economic status will be positively correlated with academic achievement as measured by New York State Math test scores.	Not Supported

## **CHAPTER VI: Discussion**

### **Overview**

The importance of screening measures for determining school readiness is of growing importance, as more states are requiring the administration of such before the start of kindergarten (Howard, 2011; Romano et. al., 2010; Stormont et. al., 2015). To ensure that children reach their academic potential, a universal standard for measuring children's levels of readiness is essential (Emmons & Alfonso, 2005; Howard, 2011; Regenstein et. al., 2017). While analyzing children's performance on these measures, it is also important to note that there are many familial and community influences that play a role on the student's level of school readiness (Borre et. al., 2019; Cameron et. al., 2012; Linder et. al., 2013). The implications of the study's findings are discussed considering their importance to school psychologists. Limitations and future directions for research are then discussed in this section.

### **Evaluation of the Hypotheses**

Out of 14 the hypotheses proposed by the researcher, eight were supported. The DIAL-4's effectiveness was confirmed, and it was found to be a predictive and accurate screening measure. This study demonstrates that the DIAL-4 Total, Concepts, Language, and Motor scores are all predictive of later academic achievement as measured by F & P Reading Levels, while the DIAL-4 Total Score is also predictive of later academic achievement as measured by the New York State English Language Arts test taken by the 2015 cohort when they were in third grade (2018/2019 school year). These findings are supported by existing literature that school readiness skills prior to the start of kindergarten are correlated with academic performance throughout elementary school

(Pagani et. al., 2010; Ricciardi et. al., 2021). Therefore, there is further emphasis on the importance of kindergarten screening assessments, as they inform the appropriate stakeholders within the school about a child's school readiness, and provide information that allow teachers, administration, and school specialists to be proactive in identifying interventions for at-risk students (Montroy et. al., 2020; Quirk et. al., 2013; Simonsen et. al., 2010).

Conversely, the current study's results did not reflect much of the current research stating that in the United States children's economic background predicts academic success (Calzada et. al., 2015). Research has shown that prior to kindergarten entry, children from economically disadvantaged families fall behind their peers from higher socio-economic status in the cognitive, emotional, and social skills that have proven to be essential to academic success (Olszewski-Kubilius & Corwith, 2018; Waters et. al., 2021) and these differences persist across primary and secondary schooling (Waters et. al., 2021), as children who live in poverty are almost twice as likely to drop out of high school (Calzada et. al., 2015; Hernandez, 2011). Children learn from their environments and due to children from economically disadvantaged families having less opportunities and experiences available to them than those who are more economically advantaged, there are often viewed as having lower school readiness skills or being developmentally delayed (Bowman et. al., 2018). Research has theorized that socio-economic status determines the time and money that is invested in children, further stating that children from economically disadvantaged homes have less access to language stimulation from parents, books, and toys, as well as more limited opportunities for early childhood education, lower quality schools, and fewer extracurricular activities, which in turn

hinders their school readiness skills and development (Votruba-Drzal et. al., 2015). Although much of the research today supports this viewpoint, the results of this study found that there was no difference in the DIAL-4 scores for children who were from economically disadvantaged families and those who were not. The lack of support for the hypothesis that economically disadvantaged students would score lower on the DIAL-4, or have less school readiness skills, is favorable in terms of equality when entering kindergarten (Bischoff & Reardon, 2014; Kornrich & Furstenberg, 2013; Reardon & Portilla, 2016); however, the impact of preschool enrollment and other factors should be investigated to further understand the closing gap. One explanation for this may be that this sample is from one community in which the same resources are available to all families and children; however, there is no evidence stating that this is the cause of the results found and should be explored.

Research has demonstrated that the Black-White gap in mathematics and reading is present at the start of school and expands by over .10 standard deviations by the end of first grade (Curran & Kellogg, 2016). This achievement gap between Black and White children that begins in early childhood, extends into elementary school, and continues throughout higher education (Bono et. al., 2016). Additionally, research has shown that Black students, regardless of poverty status, are significantly more likely to drop out than White students (Borre et. al., 2019; Calzada et. al., 2015; Hernandez, 2011). Conversely, the current study found that the Black children scored significantly higher than the White students on the DIAL-4. Therefore, although ethnicity is a significant predictor of later academic achievement, measured by F & P Reading Levels, it does not parallel the



current research that children from an ethnically diverse background are less likely to exhibit school readiness prior to the start of kindergarten.

As the students from this sample all reside in the same community, it is important to consider the possible impact that may have on the results. School readiness skills in young children have been linked to both family and neighborhood resources (Kingston et. al., 2013). Research has shown that neighborhood cohesion and characteristics positively affects children's development (McRae et. al., 2020). Thus, having neighborhood homogeneity would suggest that all children have similar resources available to them, despite their ethnicity. Therefore, although previous literature has found that children from a diverse ethnic background score lower on school readiness abilities; it is important to look at the resources available to the children, not just race.

### **Future Directions**

There has been an increase of research regarding the significance of kindergarten screening prior to the start of kindergarten. However, the current research further examined the role of ethnicity and socio-economic status in the predictive measure of the DIAL-4, as diversity is of growing importance in today's society. By the researcher using a sample from a school that is ethnically different from the normative sample, it expands on the knowledge regarding kindergarten screening on a diverse population.

Studies have stated that kindergarten screening measures are especially useful in identifying children who are at-risk to provide early intervention services. This study further supported previous research that the DIAL-4 is a valid and accurate screening measure of school readiness abilities (Coughlan, 2015; Ellingsen, 2016; Moodie et. al., 2014). However, if academic intervention services were provided following the

administration and scoring of the kindergarten screening measure, which hopefully it should, it may impact the predictive ability of the DIAL-4. Therefore, future research should examine and attempt to control for any resources or intervention services that were provided to the child as a moderating variable when assessing later academic achievement.

As the findings suggest that the income gap in school readiness skills has decreased and may be influenced by higher preschool enrollment, future researchers may want to consider examining the role of preschool attendance on later academic achievement. Extensive research demonstrates that high-quality preschool experiences are related to children's improved academic, social, and behavioral outcomes and may be significant to the income school readiness gap (Buckrop et. al., 2016; Reardon & Portilla, 2016). Specifically, some studies suggest preschool is an effective early intervention for children at-risk for later school difficulties because high-quality preschool experiences relate to reduced special education referral rates (Buckrop et. al., 201; Quirk et. al., 2013; Rebell, 2016). While there is growing research regarding the positive impacts of preschool on children's school trajectories, it may not be available to all children and there may also be differential quality across the preschool settings. Children from low socio-economic families are more likely to be exposed to an environment that can impair or delay cognitive development and slow social and emotional functioning, such as, environmental toxins; inadequate diet, parental depression and/or substance abuse, trauma and abuse, divorce, low-quality childcare, violent crime, and inadequate language and cognitive stimulation (Ratcliffe & McKiernan, 2012; Rebell, 2016). Therefore, future

research should examine the role of access to preschool education and future academic success, specifically for children who may be economically disadvantaged.

### **Limitations**

Any generalizations made from this research should consider the following limited factors. The participants are all from one Title 1 public school setting in Queens, New York; therefore, the results will not be applicable to students in all settings. This is a district with predominately low-income families and students; therefore, the results only pertain to that demographic and cannot be generalized to other districts or other socio-economic scenarios. Overall, the sample used for the present study is not representative of the United States population (*U.S. Census Bureau QuickFacts: United States, 2022*).

One measure of academic achievement was the Fountas and Pinnell (F & P) Reading Levels, in which teachers assign the student a level based on the characteristics of the text that the child is reading, as well as characteristics of early emergent readers, emergent readers, developing readers, early independent readers, developing independent readers, and independent readers. Although there is a F & P Text Level Gradient that is intended to provide general guidelines, teacher judgement is required when deciding the individual student's level.

Lastly, due to the COVID-19 pandemic, there was a pause in in-person learning, which will impact trajectory of students' academic achievement. The COVID-19 pandemic also limited the achievement data used in this study, as the state tests were not administered during the 2020 school year, and the state test scores for the 2021 school year were not able to be accessed by the researcher.

## **CHAPTER VII: Practical Implications for the Discipline of School Psychology**

Although conclusions based on the current findings should be made with caution, the results suggest that kindergarten screening measures can be accurate and valid measures of later academic achievement throughout elementary school. The implications of the current study for the realm of school psychology include some support for the predictive validity of kindergarten screening for future academic achievement in standardized testing and reading levels. Overall, the researcher concluded that the DIAL-4 is a valid and reliable measure that predicts both short and long-term achievement. In general, the results indicate that children who perform well on the DIAL-4 perform well on subsequent measures of academic achievement. As school psychologists are often involved in preschool screening either directly through assessment administration or indirectly by reviewing results, making recommendations, and collaborating with teachers (McIntyre et. al., 2014), it is important that they are aware of the predictive nature of the measures used.

As the kindergarten screening process takes places prior to the child starting kindergarten, it will allow collaboration of teachers, school psychologists, and school administration to determine the best educational placement for the child. It will also help determine any weaknesses that the child presents and will allow for early intervention services to immediately target these areas. Having the school psychologist as part of this process is beneficial as they can offer recommendations and consult with both school personnel and family.

The results from the present study are that an important predictor of academic achievement throughout elementary school is school readiness as measured by the DIAL-

4. Additionally, as there was a significant effect of ethnicity on the DIAL-4 Total Scores, ethnicity should be taken into consideration when analyzing the scores on these readiness assessments. The role and function of school psychologists is to collaborate with school personnel, teachers, and parents to assure that the child is entering kindergarten in a classroom setting that best fits their individualized needs. This study further emphasizes the role of the school psychologist in the screening process to provide recommendations of early intervention services or classroom accommodations to address the gap in readiness skills in order to assure each student is set up for success and will demonstrate later academic achievement throughout elementary school.

**Table 1***Demographic Characteristics of Elementary Sample (N=371)*

Characteristic	<i>n</i>	%
<b>Gender</b>		
Female	182	49.1%
Male	189	50.9%
<b>Race</b>		
Asian	220	59.3%
African American/Black	24	6.5%
Hispanic/Latino	39	10.5%
Caucasian/White	51	13.7%
Other	37	10.0%
Age in months (M, SD)	58.05	(3.68)
Age in years (Y, SD)	4.84	(.3)
<b>Economic Disadvantage</b>		
Yes	287	77.4%
No	84	22.6%

**TABLE 2***Availability of Dependent and Moderating Variables by Cohort*

Variables	Cohort (year of DIAL-4 administration)				
	2015 (n=45)	2016 (n=57)	2017 (n=69)	2018 (n=95)	2019 (n=105)
<b>F&amp;P Reading</b>					
2015/2016 Fall, Winter, Spring	×				
2016/2017 Fall, Winter, Spring	×	×			
2017/2018 Fall, Winter, Spring	×	×	×		
2018/2019 Fall, Winter, Spring	×	×	×	×	
2020/2021 Fall, Winter, Spring	×	×	×	×	×
2021/2022 Fall, Winter, Spring		×	×	×	×
<b>NYS English and Math</b>					
2018/2019	×				

*Note.* F&P = Fountas & Pinnell Benchmark Assessment System); NYS = New York State.

**Table 3***Descriptive Statistics for Measures*

	Mean (Std. Dev.)	Score Range
<b>DIAL-4</b>		
Total Score	102.38 (16.00)	65.00 135.00
Motor	101.66 (17.78)	65.00 135.00
Concepts	101.11 (14.54)	65.00 131.00
Language	100.91 (16.63)	65.00 135.00
<b>F&amp;P Reading</b>		
2015/2016	2.17 (1.14)	0.33 6.00
2016/2017	5.16 (3.43)	0.33 13.00
2017/2018	7.05 (4.48)	0.33 18.67
2018/2019	8.98 (5.05)	0.33 22.50
2020/2021	12.28 (5.97)	0.33 25.00
2021/2022	15.62 (5.02)	1.33 25.33
<b>NYS State Exam Score (raw)</b>		
English	612.56 (18.98)	560.00 650.00
Math	607.07 (15.18)	568.00 640.00

*Note.* F&P = Fountas & Pinnell Benchmark Assessment System); NYS = New York State.



**Table 4***Between-Group Differences in DIAL-4 Scores Based on Year of DIAL-4 Administration*

	2015	2016	2017	2018	2019	Post Hoc
	(A)	(B)	(C)	(D)	(E)	
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	Comparisons
<b>DIAL-4</b>						
Total Score	101.16 (11.74)	100.65 (14.91)	108.75 (17.65)	101.47 (15.94)	100.47 (16.29)	C>B,D,E
Motor	94.96 (14.72)	99.23 (18.21)	103.88 (21.14)	105.14 (17.24)	101.25 (16.00)	D>A
Concepts	100.69 (11.43)	99.72 (13.53)	109.58 (13.39)	99.37 (14.91)	98.04 (14.76)	C>A,B,D,E
Language	104.00 (13.72)	99.79 (15.22)	105.77 (17.44)	98.04 (16.33)	99.59 (17.60)	C>D

**Table 5***Correlations Between DIAL-4 Total Scores and Reading Level, Stratified by Year*

		<u>F&amp;P Reading Score (by year)</u>					
		2015/2016	2016/2017	2017/2018	2018/2019	2020/2021	2021/2022
DIAL-4 Total Score	2015	.46**	.52***	.52***	.53***	.54***	†
	(n = 45)						
	2016		.63***	.67***	.67***	.62***	.60***
	(n = 57)						
	2017			.53***	.63***	.57***	.53***
	(n = 69)						
2018					.53***	.58***	.55***
(n = 95)							
2019						.60***	.67***
(n = 105)							

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

† Missing

**Table 6***Correlations Between DIAL-4 Concept Scores and Reading Level, Stratified by Year*

	<u>F&amp;P Reading Score (by year)</u>					
	2015/2016	2016/2017	2017/2018	2018/2019	2020/2021	2021/2022
2015 (n = 45)	.51***	.56***	.55***	.52***	.50***	†
2016 (n = 57)		.45***	.60***	.65***	.66***	.63***
2017 (n = 69)			.54**	.63***	.59***	.54***
2018 (n = 95)				.57***	.61***	.58***
2019 (n = 105)					.52***	.61***

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ 

† Missing

**Table 7***Correlations Between DIAL-4 Language Scores and Reading Level, Stratified by Year*

		<u>F&amp;P Reading Score (by year)</u>					
		2015/2016	2016/2017	2017/2018	2018/2019	2020/2021	2021/2022
<u>DIAL-4 Language Score</u>	2015 (n = 45)	.45**	.42**	.35*	.41**	.34*	†
	2016 (n = 57)		.53***	.52***	.56***	.50***	.50***
	2017 (n = 69)			.50***	.62***	.52***	.44***
	2018 (n = 95)				.50***	.53***	.50***
	2019 (n = 105)					.48***	.56***

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ 

† Missing

**Table 8***Correlations Between DIAL-4 Motor Scores and Reading Level, Stratified by Year*

		<u>F&amp;P Reading Score (by year)</u>					
		2015/2016	2016/2017	2017/2018	2018/2019	2020/2021	2021/2022
DIAL-4 Motor Score	2015 (n = 45)	.10	.22	.31*	.26	.39**	†
	2016 (n = 57)		.62***	.62***	.58***	.50***	.45***
	2017 (n = 69)			.33**	.35**	.35**	.37**
	2018 (n = 95)				.23*	.29**	.29**
	2019 (n = 105)					.51***	.51***

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

† Missing

**Table 9***Between-Group Differences in DIAL-4 Total Score Based on Ethnicity*

	Asian		Black		Hispanic		White		Other	
	(A)		(B)		(C)		(D)		(E)	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)
DIAL-4 Score	103.56	(16.22)	109.08	(13.53)	99.28	(12.00)	98.73	(16.57)	99.27	(17.36)

**Table 10***Bonferroni Post Hoc Analyses for Between-Group Differences in DIAL-4 Total Scores*

		Mean Difference	Std. Error	Sig.
Asian	Black	-5.52	3.41	0.671
	Hispanic	4.28	2.75	0.721
	White	4.84	2.46	0.400
	Other	4.29	2.82	0.743
Black	Black	5.52	3.41	0.671
	Hispanic	9.80	4.11	0.162
	White	10.36	3.92	0.083
	Other	9.81	4.15	0.171
Hispanic	Black	-4.28	2.75	0.721
	Hispanic	-9.80	4.11	0.162
	White	0.56	3.37	1.000
	Other	0.01	3.64	1.000
White	Black	-4.84	2.46	0.400
	Hispanic	-10.36	3.92	0.083
	White	-0.56	3.37	1.000
	Other	-0.55	3.42	1.000
Other	Black	-4.29	2.82	0.743
	Hispanic	-9.81	4.15	0.171
	White	-0.01	3.64	1.000
	Other	0.55	3.42	1.000

**Table 11**

*Estimated Marginal Means for Between-Group Differences in F & P Reading Level in 2<sup>nd</sup> Grade  
Based on Ethnicity After Controlling for DIAL-4 Score*

	Asian (A)	Black (B)	Hispanic (C)	White (D)	Other (E)
	<i>M</i> ( <i>SE</i> )	<i>M</i> ( <i>SE</i> )	<i>M</i> ( <i>SE</i> )	<i>M</i> ( <i>SE</i> )	<i>M</i> ( <i>SE</i> )
F & P Reading Score	9.47 (0.25)	8.73 (.74)	10.82 (.51)	8.42 (.53)	7.80 (.70)



**Table 12**

*Moderated Regression Results for DIAL-4 Total Score and 2<sup>nd</sup> Grade Spring F & P Reading Score as Moderated by Ethnicity (N = 266)*

Variables	<i>B (95% CI)</i>	<i>SE B</i>	<i>t</i>	<i>p</i>
Constant	9.48 (8.99, 9.97)	.25	38.052	.000
DIAL-4 Total Score	.11 (.08, .14)	.02	7.02	.000
Ethnicity	-.22 (-.50,.07)	.14	-1.51	.133
Ethnicity x DIAL-4	.01 (-.01,.02)	.01	0.87	.384

$R = .517, F(3,262) = 31.92, p < .001, R^2 = .002, F(1,262) = 0.90, p = .384$

**Table 13**

*Estimated Marginal Means for Between-Group Differences in New York State Exam Scores  
Based on Ethnicity After Controlling for DIAL-4 Score*

	Asian (A)	Black (B)	Hispanic (C)	White (D)	Other (E)
	<i>M</i> ( <i>SE</i> )	<i>M</i> ( <i>SE</i> )	<i>M</i> ( <i>SE</i> )	<i>M</i> ( <i>SE</i> )	<i>M</i> ( <i>SE</i> )
English Language	612.26 (3.27)	591.96 (8.51)	611.75 (3.71)	632.76 (7.66)	612.54 (14.85)
Arts score					
Math score	606.53 (3.08)	602.55 (8.03)	608.50 (3.51)	610.42 (7.23)	595.44 (14.02)

**Table 14**

*Moderated Regression Results for DIAL-4 Total Score and New York State English Language Arts Test Score as Moderated by Ethnicity (N = 45)*

Variables	<i>B</i> (95% <i>CI</i> )	<i>SE B</i>	<i>t</i>	<i>p</i>
Constant	612.37 (607.30, 617.43)	2.51	244.33	.000
DIAL-4 Total Score	.94 (.50, 1.38)	.22	4.35	.000
Ethnicity	2.22 (-2.14, 6.57)	2.16	1.03	.310
Ethnicity x DIAL-4	-.05 (-.41, .31)	.18	-.30	.769

$R = .562$ ,  $F(3,41) = 6.32$ ,  $p < .001$ ,  $R^2 = .002$ ,  $F(1,44) = 0.09$ ,  $p = .769$

**Table 15**

*Moderated Regression Results for DIAL-4 Total Score and New York State Math Test Score as Moderated by Ethnicity (N = 45)*

Variables	<i>B</i> (95% <i>CI</i> )	SE <i>B</i>	<i>t</i>	<i>p</i>
Constant	606.76 (602.50, 611.03)	2.11	287.43	.000
DIAL-4 Total Score	.64 (.26, 1.01)	.18	3.49	.001
Ethnicity	.25 (-3.41,3.92)	1.82	0.14	.889
Ethnicity x DIAL-4	-.08 (-.38, .22)	.15	-.56	.578

$R = .492, F(3,41) = 4.37, p < .001, R^2 = .006, F(1,44) = 0.31, p = .578$

## References

- Abenavoli, R. M., Greenberg, M. T., & Bierman, K. L. (2017). Identification and validation of school readiness profiles among high-risk kindergartners. *Early Childhood Research Quarterly, 38*, 33-43.
- An, X., Curby, T. W., & Xie, Q. (2018). Chinese teachers' perceptions of early childhood school readiness. *School Psychology International, 39*(5), 454-469.
- Ansari, A., Pianta, R. C., Whittaker, J. E., Vitiello, V., & Ruzek, E. (2020). Enrollment in public-prekindergarten and school readiness skills at kindergarten entry: Differential associations by home language, income, and program characteristics. *Early Childhood Research Quarterly, 54*, 60-71.
- Ansari, A., & Winsler, A. (2016). Kindergarten readiness for low-income and ethnically diverse children attending publicly funded preschool programs in Miami. *Early Childhood Research Quarterly, 37*, 69-80.
- Bischoff, K., & Reardon, S. F. (2014). Residential segregation by income, 1970–2009. In J. Logan (Ed.), *Diversity and disparities: America enters a new century* (pp. 208–233). New York, NY: Russell Sage Foundation
- Blair, C., & Raver, C. C. (2015). School readiness and self-regulation: A developmental psychobiological approach. *Annual review of psychology, 66*, 711.
- Bono, K. E., Sy, S. R., & Kopp, C. B. (2016). School readiness among low-income black children: Family characteristics, parenting, and social support. *Early Child Development and Care, 186*(3), 419-435.
- Borre, A. J., Bernhard, J., Bleiker, C., & Winsler, A. (2019). Preschool literacy intervention for low-income, ethnically diverse children: Effects of the early

- authors program through kindergarten. *Journal of Education for Students Placed at Risk (JESPAR)*, 24(2), 132-153.
- Bowman, B. T., Comer, J. P., & Johns, D. J. (2018). Addressing the African American achievement gap: Three leading educators issue a call to action. *YC Young Children*, 73(2), 14-23.
- Brown, C. P., & Lan, Y.-C. (2018). Understanding families' conceptions of school readiness in the United States: a qualitative metasynthesis. *International Journal of Early Years Education*, 26(4), 403–421. <https://doi-org.jerome.stjohns.edu/10.1080/09669760.2018.1454302>
- Browne, D. T., Wade, M., Prime, H., & Jenkins, J. M. (2018). School readiness amongst urban Canadian families: Risk profiles and family mediation. *Journal of Educational Psychology*, 110(1), 133-146.  
<http://dx.doi.org.jerome.stjohns.edu:81/10.1037/edu0000202>
- Buckrop, J., Roberts, A., & LoCasale-Crouch, J. (2016). Children's preschool classroom experiences and associations with early elementary special education referral. *Early Childhood Research Quarterly*, 36, 452-461.
- Calzada, E., Barajas-Gonzalez, R. G., Dawson-McClure, S., Huang, K. Y., Palamar, J., Kamboukos, D., & Brotman, L. M. (2015). Early academic achievement among American low-income Black students from immigrant and non-immigrant families. *Prevention Science*, 16(8), 1159-1168.
- Cameron, C. E., Brock, L. L., Murrah, W. M., Bell, L. H., Worzalla, S. L., Grissmer, D., & Morrison, F. J. (2012). Fine motor skills and executive function both contribute

to kindergarten achievement. *Child development*, 83(4), 1229–1244.

<https://doi.org/10.1111/j.1467-8624.2012.01768.x>

Cameron, C. E., Cottone, E. A., Murrah, W. M., & Grissmer, D. W. (2016a). How are motor skills linked to children's school performance and academic achievement? *Child Development Perspectives*, 10(2), 93–

98. <https://doi.org/10.1111/cdep.12168>

Cameron, C. A., Pinto, G., Hunt, A. K., and Léger, P. (2016b) Emerging literacy during ‘Day in the Life’ in the transition to school, *Early Child Development and Care*, 186:9, 1476-1490, DOI: 10.1080/03004430.2015.1105800

Carlson, A. G., Rowe, E., & Curby, T. W. (2013). Disentangling fine motor skills’ relations to academic achievement: the relative contributions of visual-spatial integration and visual-motor coordination. *The Journal of genetic psychology*, 174(5), 514-533.

Center on Enhancing Early Learning Outcomes. (2014). Fast fact: Information and resources on developing state policy on kindergarten entry assessment (KEA). New Brunswick, NJ: Author. <http://eric.ed.gov/?id=ED555719>

Coughlan, K. A. (2015). Test review: Developmental Indicators for the Assessment of Learning, Fourth Edition (DIAL-4), by C Mardell-Czudnowski & D S Goldenberg. *Journal of Psychoeducational Assessment*, 33(3), 291–295.

<https://doi-org.jerome.stjohns.edu/10.1177/0734282914548848>

Curran, F. C., & Kellogg, A. T. (2016). Understanding science achievement gaps by race/ethnicity and gender in kindergarten and first grade. *Educational Researcher*, 45(5), 273-282.

- Daily, S., Burkhauser, M., & Halle, T. (2011). School readiness practices in the United States. *National Civic Review*, *100*(4), 21-25.
- Davoudzadeh, P., McTernan, M. L., & Grimm, K. (2015). Early school readiness predictors of grade retention from kindergarten through eighth grade: A multilevel discrete-time survival analysis approach. *Early Childhood Research Quarterly*, *32*, 183-192. <https://doi.org/10.1016/j.ecresq.2015.04.005>
- de Miranda, D. M., da Silva Athanasio, B., Oliveira, A. C. S., & Simoes-e-Silva, A. C. (2020). How is COVID-19 pandemic impacting mental health of children and adolescents?. *International journal of disaster risk reduction*, *51*, 101845.
- Diamond, A. (2010). The evidence base for improving school outcomes by addressing the whole child and by addressing skills and attitudes, not just content. *Early Educ. Dev.* *21*, 780–793. doi: 10.1080/10409289.2010.514522
- Dinehart, L., & Manfra, L. (2013). Associations between low-income children's fine motor skills in preschool and academic performance in second grade. *Early Education & Development*, *24*(2), 138-161.
- Dolean, D., Melby-Lervåg, M., Tincas, I., Damsa, C., & Lervåg, A. (2019). Achievement gap: Socioeconomic status affects reading development beyond language and cognition in children facing poverty. *Learning and Instruction*, *63*, 101218. <https://doi.org/10.1016/j.learninstruc.2019.101218>.
- Domina, T., Pharris-Ciurej, N., Penner, A. M., Penner, E. K., Brummet, Q., Porter, S. R., & Sanabria, T. (2018). Is free and reduced-price lunch a valid measure of educational disadvantage?. *Educational Researcher*, *47*(9), 539-555.



- Elbaum, B., Gattamorta, K. A., & Penfield, R. D. (2010). Evaluation of the Battelle developmental inventory, screening test for use in states' child outcomes measurement systems under the Individuals with Disabilities Education Act. *Journal of Early Intervention, 32*(4), 255-273.
- Emmons, M. & Alfonso, V. (2005). A Critical Review of the Technical Characteristics of Current Preschool Screening Batteries. *Journal of Psychoeducational Assessment, 23*, 111-127.
- Field, A. P. (2018). *Discovering statistics using IBM SPSS statistics* (5th edition, North American edition). Sage Publications Inc.
- Gaynor, A. K. (2015). Development Toward School Readiness: A Holistic Model. *The Journal of Education, 195*(2), 27-40.  
<https://doi.org/10.1177/002205741519500304>
- Ghandour, R. M., Kristin, A. M., Murphy, K., Bethell, C., Jones, J. R., Harwood, R., Buerlein, J., Kogan, M., & Lu, M. (2019). School Readiness among U.S. Children: Development of a Pilot Measure. *Child Indicators Research, 12*(4), 1389-1411. <https://doi.org/10.1007/s12187-018-9586-8>
- Glascoe, F.P. (2005). Technical report for the Brigance Screens. North Billerica, MA: Curriculum Associates.
- Goldstein, J., Eastwood, M., & Behuniak, P. (2014). Can teacher ratings of students' skills at kindergarten entry predict kindergarten retention?. *The Journal of Educational Research, 107*(3), 217-229.
- Goldstein, J., McCoach, D. B., & Yu, H. (2017). The predictive validity of kindergarten readiness judgments: Lessons from one state. *Journal of Educational*

*Research*, 110(1), 50–60. <https://doi-org.jerome.stjohns.edu/10.1080/00220671.2015.1039111>

- Greenwood, C. R., Carta, J. J., Goldstein, H., Kaminski, R. A., McConnell, S. R., & Atwater, J. (2014). The Center for Response to Intervention in Early Childhood: Developing Evidence-Based Tools for a Multi-Tier Approach to Preschool Language and Early Literacy Instruction. *Journal of Early Intervention*, 36(4), 246–262. <https://doi.org/10.1177/1053815115581209>
- Grissmer, D., Grimm, K. J., Aiyer, S. M., Murrah, W. M., & Steele, J. S. (2010). Fine motor skills and early comprehension of the world: two new school readiness indicators. *Developmental psychology*, 46(5), 1008.
- Gundersen, C., Kreider, B., & Pepper, J. (2012). The impact of the National School Lunch Program on child health: A nonparametric bounds analysis. *Journal of Econometrics*, 166(1), 79-91.
- Guo, Y., Sun, S., Breit-Smith, A., Morrison, F. J., & Connor, C. M. (2015). Behavioral engagement and reading achievement in elementary-school-age children: A longitudinal cross-lagged analysis. *Journal of Educational Psychology*, 107(2), 332-347. <http://dx.doi.org.jerome.stjohns.edu:81/10.1037/a0037638>
- Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (Third edition). The Guilford Press.
- Houri, A. K., & Miller, F. G. (2020). A systematic review of universal screeners used to evaluate social-emotional and behavioral aspects of kindergarten readiness. *Early Education and Development*, 31(5), 653-675.

- Herbers, J. E., Cutuli, J. J., Supkoff, L. M., Heistad, D., Chan, C. K., Hinz, E., & Masten, A. S. (2012). Early reading skills and academic achievement trajectories of students facing poverty, homelessness, and high residential mobility. *Educational Researcher, 41*(9), 366-374.
- Hernandez, D. J. (2011). Double jeopardy: How third grade reading skills and poverty influence school graduation (special report). Retrieved from *Annie E Casey Foundation* website: <http://fcd-us.org/sites/default/files/DoubleJeopardyReport.pdf>.
- Holliday, M. R., Cimetta, A., Cutshaw, C. A., Yaden, D., & Marx, R. W. (2014). Protective factors for school readiness among children in poverty. *Journal of Education for Students Placed at Risk (JESPAR), 19*(3-4), 125-147.
- Howard, E. C. (2011). Moving Forward with Kindergarten Readiness Assessment Efforts: A Position Paper of the Early Childhood Education State Collaborative on Assessment and Student Standards. *Council of Chief State School Officers*.
- Jeon, L., Buettner, C. K., & Hur, E. (2014). Family and neighborhood disadvantage, home environment, and children's school readiness. *Journal of Family Psychology, 28*, 718–727. <https://doi.org/10.1037/fam0000022>.
- Jordan, N. C., Glutting, J., Ramineni, C., & Watkins, M. W. (2010). Validating a number sense screening tool for use in kindergarten and first grade: Prediction of mathematics proficiency in third grade. *School Psychology Review, 39*(2), 181-195
- Kena, G., Aud, S., Johnson, F., Wang, X., Zhang, J., Rathbun, A., ... Kristapovich, P. (2014). *The condition of education 2014* (NCES 2014-083). Washington, DC:

Department of Education, National Center for Education Statistics. Retrieved from <http://nces.ed.gov/pubsearch>.

- Kingston, S., Huang, K. Y., Calzada, E., Dawson-McClure, S., & Brotman, L. (2013). Parent involvement in education as a moderator of family and neighborhood socioeconomic context on school readiness among young children. *Journal of Community Psychology, 41*(3), 265-276.
- Klingbeil, D. A., McComas, J. J., Burns, M. K., & Helman, L. (2015). Comparison of Predictive Validity and Diagnostic Accuracy of Screening Measures of Reading Skills. *Psychology in the Schools, 52*(5), 500–514. [https://doi-org/erome.stjohns.edu/10.1002/pits.21839](https://doi.org/erome.stjohns.edu/10.1002/pits.21839)
- Kornrich, S., & Furstenberg, F. (2013). Investing in children: Changes in parental spending on children, 1972–2007. *Demography, 50*(1), 1–23.
- Krieg, J. M. (2011). Which students are left behind? The racial impacts of the No Child Left Behind Act. *Economics of Education Review, 30*(4), 654-664.
- Linder, S. M., Ramey, M. D., & Zambak, S. (2013). Predictors of school readiness in literacy and mathematics: a selective review of the literature. *Early childhood research & practice, 15*(1), n1.
- Lipscomb, S. T., Miao, A. J., Finders, J. K., Hatfield, B., Kothari, B. H., & Pears, K. (2019). Community-Level Social Determinants and Children's School Readiness. *Prevention Science, 20*(4), 468-477. <https://doi.org/10.1007/s11121-019-01002-8>

- Liu, X., Zhou, X., & Lackaff, J. (2013). Incremental Validity in the Clinical Assessment of Early Childhood Development. *Journal of Psychoeducational Assessment*, 31(5), 506–515. <https://doi.org/10.1177/0734282912473457>
- Ma, X., Nelson, R. F., Shen, J., & Krenn, H. Y. (2015). Effects of preschool intervention strategies on school readiness in kindergarten. *Educational Research for Policy and Practice*, 14(1), 1-17. doi:<http://dx.doi.org/10.1007/s10671-014-9163-y>
- Mardell-Czudnowski, C., & Goldenberg, D.S. (2011). *Developmental Indicators for the Assessment of Learning, Fourth Edition (DIAL-4)*. Bloomington, MN:NCS Pearson.
- Mardell, C., & Goldenberg, D. S. (2016). *DIAL-4 manual*. Bloomington, MN: NCS Pearson, Inc.
- McIntyre, L.L., Eckert, T.L., Arbolino, L.A. *et al.* The Transition to Kindergarten for Typically Developing Children: A Survey of School Psychologists' Involvement. *Early Childhood Education Journal*, 42(3), 203–210 (2014). <https://doi.org/10.1007/s10643-013-0593-6>
- McNamara, J. K., Scissons, M., & Gutknecht, N. (2011). A longitudinal study of kindergarten children at risk for reading disabilities: The poor really are getting poorer. *Journal of learning disabilities*, 44(5), 421-430
- McRae, D. N., Muhajarine, N., Janus, M., Duku, E., Brownell, M., Forer, B., & Guhn, M. (2020). Immigrant and ethnic neighbourhood concentration and reduced child developmental vulnerability: A Canadian cohort study. *International Journal of Population Data Science*, 5(1).

- Mistry, R. S., Benner, A. D., Biesanz, J. C., Clark, S. L., & Howes, C. (2010). Family and social risk, and parental investments during the early childhood years as predictors of low-income children's school readiness outcomes. *Early Childhood Research Quarterly, 25*(4), 432-449.
- Montroy, J. J., Zucker, T. A., Assel, M. M., Landry, S. H., Anthony, J. L., Williams, J. M., ... & Taylor, H. B. (2020). The Texas kindergarten entry assessment: Development, psychometrics, and scale-up of a comprehensive screener. *Early Education and Development, 31*(5), 701-738.
- Moodie, S., Daneri, P., Goldhagen, S., Halle, T., Green, K., & LaMonte, L. (2014). *Early childhood developmental screening: A compendium of measures for children ages birth to five* (OPRE Report 2014-11). Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.
- New York City Department of Education. (2020). *School Register P.S 108 Captain Vincent G. Fowler (Q108)*. Retrieved from <https://www.nycenet.edu/PublicApps/register.aspx?s=Q108>
- NY State English Language Arts (ELA) Tests. (n.d.). Retrieved from <https://www.schools.nyc.gov/learning/student-journey/grade-by-grade/testing/ny-state-english-language-arts>
- NY State Math Tests. (n.d.). Retrieved from <https://www.schools.nyc.gov/learning/student-journey/grade-by-grade/testing/ny-state-math>

*NYSED:SSS:Commissioner's Regulations - Sections 117.1-3.* (n.d.). NYSED.

[http://www.p12.nysed.gov/sss/lawsregs/117-1-](http://www.p12.nysed.gov/sss/lawsregs/117-1-3.html#:~:text=Section%20117.3.,in%20accordance%20with%20the%20plan.)

[3.html#:~:text=Section%20117.3.,in%20accordance%20with%20the%20plan.](http://www.p12.nysed.gov/sss/lawsregs/117-1-3.html#:~:text=Section%20117.3.,in%20accordance%20with%20the%20plan.)

Ohle, K. A., & Harvey, H. A. (2017). Educators' perceptions of school readiness within the context of a kindergarten entry assessment in Alaska. *Early Child Development and Care*, 1–15. doi:10.1080/03004430.2017.1417855

Olszewski-Kubilius, P., & Corwith, S. (2018). Poverty, academic achievement, and giftedness: A literature review. *Gifted Child Quarterly*, 62(1), 37-55.

Ozernov-Palchik, O., Norton, E. S., Sideridis, G., Beach, S. D., Wolf, M., Gabrieli, J., & Gaab, N. (2017). Longitudinal stability of pre-reading skill profiles of kindergarten children: implications for early screening and theories of reading. *Developmental science*, 20(5), 10.1111/desc.12471.

<https://doi.org/10.1111/desc.12471>

Pagani, L. S., Fitzpatrick, C., Archambault, I., & Janosz, M. (2010). School readiness and later achievement: a French Canadian replication and extension. *Developmental psychology*, 46(5), 984.

Pearson Education, Inc. (2019). Developmental Indicators for the Assessment of

Learning, Fourth Edition (DIAL-4). Retrieved from

<https://www.pearsonassessments.com/content/dam/school/global/clinical/us/assets/dial-4/DIAL-4-Overview-Brochure.pdf>

Peterson, J., Bruce, J., Patel, N., & Chamberlain, L. J. (2018). Parental attitudes, behaviors, and barriers to school readiness among parents of low-income Latino

- children. *International Journal of Environmental Research and Public Health*, 15(2), 188.
- Quirk, M., Nylund-Gibson, K., & Furlong, M. (2013). Exploring patterns of Latino/a children's school readiness at kindergarten entry and their relations with Grade 2 achievement. *Early Childhood Research Quarterly*, 28(2), 437-449.
- Ratcliffe, C., & McKernan, S. (2012). Child poverty and its lasting consequence: summary. *Low Income Working Families Fact Sheet*. Urban Institute. Retrieved from <https://www.urban.org/>.
- Reardon, S. F., & Portilla, X. A. (2016). Recent trends in income, racial, and ethnic school readiness gaps at kindergarten entry. *Aera Open*, 2(3), 2332858416657343.
- Rebell, M. (2016). Connecticut not the first to create school inequity by relying on property-tax funding. *Teachers College*. Columbia University.
- Regenstein, E., Connors, M., Romero-Jurado, R., & Weiner, J. (2017). Uses and misuses of kindergarten readiness assessment results. *Ounce Policy Conversations*, 6(11).
- Reid, E. K., Keller-Margulis, M. A, Schanding, G. T., & Tolar, T. D. (2019) Predicting kindergarten writing achievement using early written expression and behavior screening, *Journal of Applied School Psychology*, 35(3), 215-233, <https://doi.org/10.1080/15377903.2019.1568333>
- Repko-Erwin, Melia E. (2017). Was kindergarten left behind? Examining US kindergarten as the new first grade in the wake of No Child Left Behind. *Global Education Review*, 4(2), 58-74.



- Ricciardi, C., Manfra, L., Hartman, S., Bleiker, C., Dineheart, L., & Winsler, A. (2021). School readiness skills at age four predict academic achievement through 5th grade. *Early Childhood Research Quarterly, 57*, 110-120.
- Russo, J. M., Williford, A. P., Markowitz, A. J., Vitiello, V. E., & Bassok, D. (2019). Examining the validity of a widely-used school readiness assessment: Implications for teachers and early childhood programs. *Early Childhood Research Quarterly, 48*, 14-25.
- Schachter, R. E., Strang, T. M., & Piasta, S. B. (2019). Teachers' experiences with a state-mandated kindergarten readiness assessment. *Early Years, 39*(1), 80-96.
- Schmidt, M., Egger, F., Benzing, V., Jäger, K., Conzelmann, A., Roebers, C. M., & Pesce, C. (2017). Disentangling the relationship between children's motor ability, executive function and academic achievement. *PLoSOne, 12*(8), <http://dx.doi.org.jerome.stjohns.edu:81/10.1371/journal.pone.0182845>
- Seethaler, P. M., & Fuchs, L. S. (2010). The predictive utility of kindergarten screening for math difficulty. *Exceptional Children, 77*(1), 37-59.
- Simonsen, B., Shaw, S. F., Faggella-Luby, M., Sugai, G., Coyne, M. D., Rhein, B., ... & Alfano, M. (2010). A schoolwide model for service delivery: Redefining special educators as interventionists. *Remedial and Special Education, 31*(1), 17-23.
- Spagnola, K. T. Q. (2010). Assessing the stability of the predictive validity of age of entry and the developmental indicators for the assessment of learning-third edition (dial-3) on school achievement. (2010-99030-493).
- Stedron, J., & Berger, A. (2010). NCSL technical report: State approaches to school readiness assessment. Denver, CO: National Conference of State Legislators.

Retrieved October 24, 2020, from

<http://www.ncsl.org/documents/Educ/KindergartenAssessment.pdf>.

Stormont, M., Herman, K. C., Reinke, W. M., King, K. R., & Owens, S. (2015). The Kindergarten Academic and Behavior Readiness Screener: The utility of single-item teacher ratings of kindergarten readiness. *School Psychology, 30*(2), 212-228. <http://dx.doi.org.jerome.stjohns.edu:81/10.1037/spq0000089>

*U.S. Census Bureau QuickFacts: United States*. United States Census Bureau. (2021).

Retrieved August 1, 2022, from

<https://www.census.gov/quickfacts/fact/table/US/PST045221>

Van Lancker, W., & Parolin, Z. (2020). COVID-19, school closures, and child poverty: a social crisis in the making. *The Lancet Public Health, 5*(5), e243-e244.

Viner, R. M., Russell, S. J., Croker, H., Packer, J., Ward, J., Stansfield, C., ... & Booy, R. (2020). School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. *The Lancet Child & Adolescent Health*.

Votruba-Drzal, E., Miller, P., & Coley, R. L. (2016). Poverty, urbanicity, and children's development of early academic skills. *Child Development Perspectives, 10*(1), 3-9.

Ward, K. E., & Rothlisberg, B. A. (2011). Introduction to the special issue: Preschool assessment and intervention. *Psychology in the Schools, 48*(5), 427-429.

<https://doi-org.jerome.stjohns.edu/10.1002/pits.20564>

- Waters, N. E., Ahmed, S. F., Tang, S., Morrison, F. J., & Davis-Kean, P. E. (2021). Pathways from socioeconomic status to early academic achievement: The role of specific executive functions. *Early Childhood Research Quarterly, 54*, 321-331.
- Welsh, J. A., Nix, R. L., Blair, C., Bierman, K. L., & Nelson, K. E. (2010). The Development of Cognitive Skills and Gains in Academic School Readiness for Children from Low-Income Families. *Journal of educational psychology, 102*(1), 43–53. <https://doi.org/10.1037/a0016738>
- Westendorp, M., Hartman, E., Houwen, S., Smith, J., & Visscher, C. (2011). The relationship between gross motor skills and academic achievement in children with learning disabilities. *Research in developmental disabilities, 32*(6), 2773-2779.
- Williams, P. G., Lerner, M. A., Sells, J., Alderman, S. L., Hashikawa, A., Mendelsohn, A., ... & Weiss-Harrison, A. (2019). School readiness. *Pediatrics, 144*(2).
- Wilson, S. B., & Lonigan, C. J. (2010). Identifying preschool children at risk of later reading difficulties: evaluation of two emergent literacy screening tools. *Journal of learning disabilities, 43*(1), 62–76. <https://doi.org/10.1177/0022219409345007>
- Winsler, A., Hutchison, L. A., De Feyter, J. J., Manfra, L., Bleiker, C., Hartman, S. C., & Levitt, J. (2012). Child, family, and childcare predictors of delayed school entry and kindergarten retention among linguistically and ethnically diverse children. *Developmental Psychology, 48*(5), 1299.

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