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PREDICTIVE ABILITY OF THE DIAL-4 ON ACADEMIC
ACHIEVEMENT**

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SOCIOEMOTIONAL FUNCTIONING AS A MODERATOR OF THE PREDICTIVE
ABILITY OF THE DIAL-4 ON ACADEMIC ACHIEVEMENT

A dissertation submitted in partial fulfillment
of the requirements for the degree of

DOCTOR OF PSYCHOLOGY

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ST. JOHN'S UNIVERSITY

New York

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ABSTRACT

SOCIOEMOTIONAL FUNCTIONING AS A MODERATOR OF THE PREDICTIVE ABILITY OF THE DIAL-4 ON ACADEMIC ACHIEVEMENT

Margaret C. Kammerer

Student performance on kindergarten screening measures and level of kindergarten-entry skills have been shown to be predictive of subsequent academic achievement, thus making kindergarten screening measures a useful tool that guides the monitoring of student progress over time. Though a commonly used tool to assist in kindergarten placement considerations by educators nationwide, the literature is lacking in studies that demonstrate the predictive ability of the Developmental Indicators for the Assessment of Learning – Fourth Edition (DIAL-4) on later academic achievement. Related, behavioral and emotional functioning has been demonstrated to significantly impact student achievement. While the literature supports the predictive ability of kindergarten screening measures on academic performance, research is limited on how behavioral functioning moderates this predictive relationship. The present study aimed to examine the predictive ability of the DIAL-4 on later academic achievement and identify whether behavioral and emotional functioning impacts upon, and to what degree, the relationship between academic achievement and the DIAL-4. Additionally, this study examined the impact of the pause of in-person learning, as caused by the COVID-19 pandemic on student achievement and behavioral and emotional functioning through within-samples comparisons of student functioning in 2019 and 2021 to identify change amongst individual students. The results support the predictive ability of the DIAL-4 on

subsequent academic achievement with significant correlations between DIAL-4 scores obtained before kindergarten with subsequent measures of academic achievement. There was no evidence found for a moderation effect of behavioral and emotional functioning on the prediction of academic achievement. Lastly, when controlling for scores on the DIAL-4, the data suggest a decrease in rate of student academic achievement and an increase in emotional and behavioral dysregulation following the onset of the COVID-19 pandemic demonstrated by statistically significant differences in BERI scores as well as significant decreases in rates of growth in reading ability within some cohorts. These findings provide educators with empirical evidence for the utility of the DIAL-4 in predicting academic achievement as well as insight into how the COVID-19 pandemic impacted students' functioning.

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TABLE OF CONTENTS

Acknowledgements.....	ii
List of Tables	vi
List of Figures.....	vii
Chapter 1: Introduction.....	1
Chapter 2: Literature Review.....	3
Legislation and Student Identification	3
Kindergarten Readiness	4
Kindergarten Screening	6
Utility of Screeners	7
Predictive Ability of Screeners	9
Impact of the COVID-19 Pandemic	13
Present Study	14
Chapter 3: Research Questions and Hypotheses.....	15
Research Questions.....	15
Hypotheses.....	15
Chapter 4: Method	18
Participants.....	18
Administration Procedures and Data Collection.....	19

Predictive Measures	22
Outcome Measures.....	24
Data Entry and Preparation.....	29
Statistical Methods.....	30
Chapter 5: Results	32
Hypothesis 1.....	34
Hypothesis 2.....	35
Hypothesis 3.....	38
Chapter 6: Discussion	42
Results and Previous Literature	42
Limitations	47
Future Research	51
Implications for Elementary Education	53
Chapter 7: Implications for the Practice of School Psychology	55
References.....	57

LIST OF TABLES

Table 1. Availability of Dependent and Moderating Variables by Cohort	30
Table 2. Demographic Characteristics of Elementary Sample ($N = 371$)	32
Table 3. Descriptive Statistics of DIAL-4 Total Scores, NYS Exam Scores, F&P Reading Levels, and BERI Scores.....	33
Table 4. Correlations Between DIAL-4 Total Scores and F&P Reading Level, Stratified by Year.....	35
Table 5. Moderated Regression Results for DIAL-4 Total Score and First Grade Spring F&P Reading Levels as Moderated by First Grade BERI Score ($N = 167$)	36
Table 6. Moderated Regression Results for DIAL-4 Total Score and Second Grade Spring F&P Reading Levels as Moderated by Second Grade BERI Score ($N = 95$).....	37
Table 7. Moderated Regression Results for DIAL-4 Total Score and NYS ELA score as Moderated by BERI Score ($N = 45$)	38
Table 8. Moderated Regression Results for DIAL-4 Total Score and NYS Math Score as moderated by BERI Score ($N = 45$)	38

LIST OF FIGURES

Figure 1. Mean and Standard Error for DIAL-4 Scores by Cohort Year	34
Figure 2. Within-Subject Changes in BERI Scores Pre- and Post- COVID-19 Controlling for DIAL-4 Total Score by Cohort Year	39
Figure 3. Within-Subject Changes in F&P Reading Levels Pre- and Post- COVID- 19 Controlling for DIAL-4 Total Score by Cohort Year.....	41

Chapter 1

Introduction

The transition to kindergarten is an important milestone representing the beginning of formal education for most students (Diffey, 2018; Quirk et al., 2018). Although an increasing number of students are exposed to outside-the-home learning experiences prior to kindergarten via preschool or childcare centers (Repko-Erwin, 2017), kindergarten continues to serve as a steppingstone from early childhood educational experiences to the more academically focused environment of elementary school (Weisenfeld et al., 2020). Kindergarten readiness, also referred to as school readiness, is a complex, multi-faceted construct used to describe a student's level of readiness for and likelihood of successfully adjusting to the demands of kindergarten (Connors-Tadros, 2013; Regenstein et al., 2017). This construct is often measured through administration of screening tests prior to a student's entry into kindergarten (Alfonso, 2017; Regenstein et al., 2017; Slutzky & DeBruin-Parecki, 2019). Many children enter kindergarten with below average levels of readiness because of limitations in their social, emotional, cognitive, and physical development (Williams et al., 2019). Both the identification of students in need of academic support earlier on in their educational career as well as the continual monitoring of their academic progress and socioemotional development are imperative for improving a child's trajectory of academic achievement (Eklund & Dowdy, 2014; Oslund et al., 2017; Quirk et al., 2018).

Over the years, legislation has heavily influenced the efforts put forth by schools to engage in identification of students with suspected disabilities and the annual monitoring of academic achievement following kindergarten or school entry (Deville &

Chalhoub-Deville, 2011; Ennis et al., 2017; Repko-Erwin, 2017; Wright & Wright, 2007). Furthermore, despite there being an increased level of awareness of the impact of socioemotional functioning on academic achievement (Arnold, 2012; Eklund & Dowdy, 2014; Wenz-Gross et al., 2018), the monitoring of socioemotional functioning is not as frequently mandated (Dowdy & Kamphaus, 2010; Kremer et al., 2016; Substance Abuse and Mental Health Services Administration [SAMSHA], 2019). Taken together, the purpose of this study seeks to examine the predictive ability of the Developmental Indicators for the Assessment of Learning – Fourth Edition (DIAL-4) kindergarten screening measure on academic achievement and aims to identify the impact of socioemotional functioning on the relationship between academic achievement and the DIAL-4.

The onset of the COVID-19 pandemic took place amidst the data collection period of this study. While the pandemic and resulting pause of in-person learning disrupted some of the predetermined plans for data collection, it gave rise to an additional aim of this study, which was to determine the impact of the mandated pause of in-person learning in March 2020 on student achievement and behavioral functioning. The impact of COVID-19 on student functioning was examined through within-samples comparisons of students' behavioral and emotional functioning, as measured by BERI scores, and comparisons of rates of change in academic improvement, as depicted by F&P reading levels, in 2019 (before the disruption in learning) to their functioning in 2021 (following the pause of in-person learning).

Chapter 2

Literature Review

Legislation and Student Identification

Identification of a student's strengths and weaknesses is essential, as early learning and development have been demonstrated to be foundational components of future academic achievement (Duncan et al., 2007; Rhoades et al., 2011). There exist laws in the United States which are reflective of the importance of early interventions and promote successful and accessible academic experiences of all children (Jensen et al., 2021, Wright & Wright, 2007). The Individuals with Disabilities Education Act (IDEA) of 2005, a federal law which has evolved significantly in recent decades, outlines statutes for providing a free and appropriate public education for all students, regardless of disability (Individuals with Disabilities Act [IDEA], 2005; Wright & Wright, 2007). Part B of IDEA outlines the Child Find obligation which requires public schools to identify, locate and evaluate all children suspected of having a disability, including infants and toddlers (Ennis et al., 2017; United States Department of Education, 2021). Given the legal responsibility to identify students suspected of disabilities, each state has developed their own guidelines for the identification and referral of students for evaluation (Ennis et al., 2017; Wright & Wright, 2007). In addition to the identification of student abilities, continual monitoring of student progress over time is important as it helps to inform the need for intervention (Landry et al., 2013; Wehby & Kern, 2014). Early identification of gaps in student readiness or ability combined with consistent monitoring can help spearhead the implementation of interventions to support students who are performing at below average levels (Eklund & Dowdy, 2014; Oslund et al., 2017; Quirk et al., 2018).

With the intention of closing the achievement gap between high and low performing students, the No Child Left Behind Act (NCLB) of 2001 was enacted by the United States (No Child Left Behind [NCLB], 2002; Wright & Wright, 2007). NCLB was pivotal, as it was the first law to require consequences for United States schools with inadequate academic performance of students (Whitney & Candelaria, 2017), leading to many shifts in educational policies and practices throughout the nation in the years following it. One shift included placing an emphasis on assessing student academic progress, with mandated reporting of yearly progress, in addition to statewide standardized assessments in third-eighth grade and once in high school (Klein 2015; NCLB, 2002). Currently, the Every Student Succeeds Act (ESSA), which replaced NCLB in 2015, continues to mandate state reporting of student academic progress (Every Student Succeeds Act [ESSA], 2015). However, though this new legislation recognizes the relationship between socioemotional functioning and academic achievement, it does not mandate specific procedures for the assessment of socioemotional functioning (National Association of School Psychologists [NASP], 2020). Lastly, the initial enactment of NCLB shed light on the importance of early childhood experiences in relation to academic achievement, as exhibited by a notable increase in state definitions of kindergarten readiness and early learning standards in the years to follow (Slutzky & DeBruin-Parecki, 2019).

Kindergarten Readiness

Currently, there is no federal definition of what constitutes kindergarten readiness and there are inconsistencies in how kindergarten readiness is defined and assessed throughout the United States (Auck & Atchison, 2017; Regenstein et al., 2017; Slutzky &

DeBruin-Parecky, 2019). According to a report conducted in 2018 by the National Center for Education Statistics (NCES), only 14 states in the U.S. have adopted a statutory definition of school readiness. Further, only 33 states have developed language regarding the assessment of readiness prior to entering kindergarten (NCES, 2018). In New York, the state in which the current study took place, there is no exclusive definition of kindergarten readiness (Education Commission of the States, 2018; Slutzky & DeBruin-Parecky, 2019). The variations in definitions of kindergarten readiness across states are reflective of the complexity of this construct (Slutzky & DeBruin-Parecki, 2019). Despite the lack of a unified definition of kindergarten readiness nationwide, most states agree that this construct is multifaceted in nature and thus difficult to define (Hanover Research, 2013; Regenstein et al., 2017).

While there is no nationally recognized definition of kindergarten readiness, each of the 50 states and the District of Columbia have developed learning standards that outline the skills, knowledge, and behaviors believed to be critical at kindergarten entry (DeBruin-Parecki & Slutzky, 2016). These learning standards reflect principles that were outlined in the National Educational Goals Panel (1995) that was created over twenty-five years ago (Stedron & Berger, 2014). The panel outlined five domains of early learning and development: physical wellbeing and motor development, social and emotional development, approaches toward learning, language development, and cognition and general knowledge. Although much time has passed, many definitions of kindergarten readiness continue to reflect these dimensions of development (Goodlett & D'Amico, 2014; Regenstein, et al., 2017). Given the multi-faceted definition of kindergarten readiness and various domains of development coupled with the often-

uneven patterns of progress made across each of these identified domains, continual monitoring of these abilities over time, which includes socioemotional functioning, is necessary (Regenstein et al., 2017; Williams et al., 2019).

Kindergarten Screening

Kindergarten screenings, also referred to as kindergarten readiness assessments, are believed to “offer a cumulative glimpse into children’s early experiences” (Goldstein, et al., 2017, pp. 50). Schools often utilize screenings to identify students who need special education services or additional supports to enhance their academic capability (Emmons & Alfonso, 2005; Hanover Research, 2013; Snow, 2011). Although there is no existing federal legislature that outlines a requirement for kindergarten screening, in recent years, following the institution of the aforementioned Child Find mandate, the utility of these assessments has become more apparent. States have been adopting their own laws regarding screening students prior to entering kindergarten, with the number of states who require some form of kindergarten screening increasing by one third from 2000-2014 (Stedron & Berger, 2014; Weisenfeld, 2020). In New York, although there are no guidelines that outline the specific process, it is mandated that “diagnostic screening of all new students” is conducted, including those entering kindergarten (Education Commission of the States, 2018). In the fall of 2018, 35 states were reported to have assessed children’s learning and development at kindergarten entry (Weisenfeld et al., 2020). This increasing number of legally mandated screening procedures highlights the importance and value of these assessments.

There exists a multitude of psychometrically sound standardized assessments intended for the purpose of kindergarten screening including the Early Screening Profiles

(Harrison et al., 1990), the Batelle Developmental Inventory- Second Edition (Newborg, 2005), and the Differential Ability Scales (Elliott, 2007). The Developmental Indicators for the Assessment of Learning-Fourth Edition (DIAL-4) was selected for use in the present study due to the evidence of criterion validity (Liu et al., 2013) and reliability (Mardell-Czudnowski & Goldenberg, 2011) as well as the robust normative sample utilized in creating the measure. In addition to its psychometric properties, the DIAL-4 is both efficient to administer and comprehensively assesses aspects of kindergarten readiness across three different performance areas: Motor, Language, and Concepts (Mardell-Czudnowski & Goldenberg, 2011).

Utility of Screeners

Though not diagnostic nor intended to be used as a sole informant, kindergarten screening measures provide useful information to educators by predicting students' academic outcomes (Goldstein et al., 2017; Katz, 2016; Seethaler & Fuchs, 2010) and thus represent a way to identify students who are at-risk of academic failure. Through screening measures, educators can identify gaps in children's knowledge and obtain estimates about their strengths and weaknesses (Alfonso, 2017; Snow, 2011), which makes them better equipped to make necessary changes to the student's learning environment (Blessing, 2019). Consistent findings across studies demonstrate that the most common purpose for administering kindergarten assessments is in effort to "individualize instruction," yet there is a lack of agreement of the definition of this term amongst educators (Golan et al., 2016; Shields et al., 2016). In addition to individualizing instruction, educators commonly use these assessments to assist with classroom placements (Shields et al., 2016). Though sometimes used for unintended, maladaptive

purposes such as preventing a student's access to kindergarten (Regenstein et al., 2017; Shields et al., 2016), screening measures, when used appropriately, provide educational professionals with pertinent information about student ability (National Center on Quality Teaching and Learning, 2014).

A student's level of kindergarten readiness serves as a precursor to future academic success (Williams et al., 2019). Students who enter kindergarten with abilities that fall below those of their peers are likely to remain behind academically without proper interventions (McClelland et al., 2013; Stedron & Berger, 2010; Williams et al., 2019). There is evidence to suggest that more than half of the achievement gap found in later school years is already present at kindergarten entry (Flynn et al., 2012; Stedron & Berger, 2010). The literature supports that early identification of delays in ability can help to close this gap between higher and lower performing students (Fricke et al., 2013; Heckman 2011; Zhang et al., 2014).

Through identification of students who are at-risk for behavioral, developmental, and academic difficulties, educational personnel can take preventative measures to ensure the success of these students (Alfonso, 2017; Racz et al., 2017). Therefore, screening measures provide important information to educators to help them intervene in a timely manner and prevent students from faltering in the educational environment. When examining the role of early educational intervention services, researchers found that interventions positively impact children's social and cognitive development in preschool programs prior to kindergarten (Camilli et al., 2010). Lovett et al. (2017) provide further support for the benefits of early intervention as students who received reading interventions significantly outperformed those who did not on standardized measures of

reading. In addition to reading, early interventions have been demonstrated to improve the trajectory of student academic achievement in mathematics (Shanley et al., 2017; Whittaker et al., 2020). Taken together, identifying students at-risk of low academic achievement can lead to beneficial outcomes both academically and socially through the initiation of intervention services.

Predictive Ability of Screeners

Kindergarten screening measures can be a useful tool that guides the monitoring of student progress over time (Alfonso, 2017; Greenwood et al., 2011). Performance on kindergarten screening measures and level of kindergarten-entry skills have been shown to be predictive of subsequent academic achievement (Duncan et al., 2007; Halle et al., 2012; Jeon et al., 2018). Through an analysis of the relationship between school-entry academic, attentional and socioemotional skills with later academic achievement amongst six different longitudinal sets of data, it was demonstrated that school-entry reading, math, and attentional skills were significant predictors of later achievement throughout elementary school (Duncan et al., 2007). The National Institute of Child and Human Development Study of Early Child Care and Youth Development (NICDH – SECCYD) and the Early Childhood Longitudinal Study – Kindergarten Class 1998-1999 (ECLS-K) provide further evidence that children’s level of kindergarten readiness is predictive of subsequent school-age academic achievement (Halle et al., 2012). In addition, an analysis of longitudinal data collected as part of the Early Head Start Research and Evaluation Project (EHSREP) demonstrated that assessments of developmental ability at age five predicted subsequent academic achievement at age ten (Jeon et al., 2018).

More specifically, evidence supports the use of screening measures as predictors of achievement across reading and mathematics (Bridges & Catts, 2008; Jordan et al., 2010; Li-Grining et al., 2010; McClelland et al., 2006; Ozernov-Palchik et al., 2017; Seethaler & Fuchs, 2010). For example, a screening measure of phonological awareness administered to students prior to kindergarten entry accurately predicted end-of-year reading achievement (Bridges & Catts, 2008). The predictive ability of screeners was further supported by Ozernov-Palchik et al. (2017) who found that students' profiles of emerging literacy skills obtained at the beginning of kindergarten were predictive of reading achievement at the end of first grade. Additionally, kindergarten-related skills were demonstrated to be predictive of academic achievement trajectories in both mathematics and reading in fifth grade (Li-Grining et al., 2010; McClelland et al., 2006). Furthermore, longitudinal studies found that student performance on kindergarten screeners measuring number sense ability and later academic achievement in mathematics were significantly correlated (Jordan et al., 2010; Seethaler & Fuchs, 2010).

In addition to predicting academic achievement, there is significant evidence to support screening measures as predictors of behavioral and emotional functioning (Hernández et al., 2018; Jeon et al., 2018; Metcalfe et al., 2010; Romano et al., 2010). In a later replication of a study by Duncan et al. (2006), it was demonstrated that earlier socioemotional behaviors observed during pre-kindergarten screening were predictive of socioemotional behaviors observed at the end of elementary school (Romano et al., 2010). When analyzing students' individual levels of functioning, there was a significant association between negative emotional expressivity in kindergarten and academic achievement in first grade (Hernández et al., 2018). Furthermore, a longitudinal study

demonstrated that developmental abilities identified at age five were predictive of both academic achievement and socioemotional functioning at age ten (Jeon et al., 2018). Measures of externalizing problems of children at three years old significantly predicted academic achievement at the end of kindergarten when participants were six years old (Metcalf et al., 2018). Along with highlighting the ways in which behavioral and emotional functioning can be predicted through screening measures, these studies emphasize the relationship between early behavioral and emotional functioning and academic achievement.

Behavioral and Emotional Functioning and Academic Achievement

The literature supports the relationship between academic achievement and behavioral and emotional functioning (Eklund et al., 2017; Halle et al., 2016; Reid et al., 2016; Sabol & Pianta, 2012). More specifically, there is significant evidence to support socioemotional functioning in preschool and within the critical period of development from kindergarten through second grade, as predictors of academic achievement at the end of elementary school (Eklund et al., 2017; Hymel & Ford, 2014; Jeon et al., 2018; Metcalf et al., 2018; Sabol & Pianta, 2012). Researchers found that behavioral screening data collected in kindergarten predicted academic achievement in both reading (Eklund et al., 2017) and writing (Reid et al., 2019). Further, overall socioemotional functioning and measures of social withdrawal in preschool significantly predicted overall academic achievement in fifth grade (Sabol & Pianta, 2012) and reading achievement in second grade (Halle et al., 2016). Results of a study conducted by Romano et al. (2010) exhibited that socioemotional traits and behaviors measured in kindergarten, including hyperactivity/ impulsivity, prosocial behavior, and anxiety and depressive symptoms

were predictive of reading and mathematics achievement in third grade. These studies illustrate the lasting impact of early emotional functioning on subsequent academic achievement.

Students who demonstrate below average academic performance frequently exhibit co-occurring instances of problem behavior which reciprocally impact achievement (Grills et al., 2014; Grills-Taquechel et al., 2012). Unfortunately, it is often the case that these socioemotional concerns of students are detected after they have emerged (SAMSHA, 2019). Screening for emotional and behavioral concerns following kindergarten entry serves as an additional preventative measure that can be taken by school personnel to lessen academic struggles of students (Eklund & Dowdy, 2014; Eklund et al., 2017; Jeon et al., 2018). Support for the utility of behavioral screeners in predicting academic achievement is demonstrated by the findings of Kilgus et al. (2017). In their study, Kilgus and colleagues examined the predictive ability of teacher ratings of student behavior using the Social, Academic and Emotional Behavior Risk Screener (SAEBERS) on academic achievement. They found that the teacher's ratings significantly correlated with later student performance in mathematics and English (Kilgus et al., 2017) which supports the relationship between behavioral functioning and academic performance in addition to the use of teacher informed measures of student behavior as a predictor of subsequent achievement.

Research examining the efficacy of both academic and socioemotional screeners together is emerging, but support for this practice is further highlighted in a study which found that behavioral screening scores accounted for an additional amount of variance in student's state test scores when compared to academic screening scores alone

(Schanding, 2014). This exhibits the utility of behavioral and emotional screening in addition to academic screening in predicting student's trajectory of academic achievement (Jeon et al., 2018; Reid et al., 2019).

Impact of the COVID-19 Pandemic

The World Health Organization (WHO) declared the SARS-CoV-2 (COVID-19) outbreak to be a global pandemic on March 12, 2020 (Viner et al., 2020). The pandemic impacted several different facets of society, including schooling (Doll et al., 2020). In March of 2020, in-person schooling in the United States was suspended as part of a two-week effort to stop the spread of the COVID-19 virus (Donohue & Miller; 2020). This pause of in-person learning forced all children in kindergarten through twelfth grade, in addition to college students, to learn through virtual methods (Kaden, 2020). This posed an issue for some as not all students have access to technological devices or internet (Dewi et al., 2022; Timmons et al., 2021). Further, research has uncovered other pitfalls of virtual learning for elementary students, such as low digital literacy skills, lack of comfort with online learning, lack of motivation for learning which foreshadows negative impacts on student achievement post-pandemic (Widikasih et al., 2021).

In conjunction with or arguably resulting from abrupt changes to day-to-day routines, the onset of the COVID-19 pandemic yielded significant increases in stress and mental health concerns amongst both children (Xie et al., 2020) and adults (Czeisler et al., 2020). Pediatricians indicate that the COVID-19 pandemic has caused major physical, psychological, educational, developmental, and social health short-term and long-term consequences in children (Irwin, et al., 2022). Preliminary studies have indicated a negative impact on student academic achievement (Dorn et al., 2020) and behavioral and

emotional functioning (Hammerstein et al., 2021; Panda et al., 2021) by the pandemic; however, given its recent occurrence and continual existence, further research is needed to examine the impact on students and their functioning.

Present Study

The present study builds upon the existing literature of kindergarten screening measures by examining the predictive ability of the Developmental Indicators for the Assessment of Learning- Fourth Edition (DIAL-4) on subsequent academic achievement. While some research has supported the DIAL-4 as a diagnostically valid measure (Liu et al., 2013), and the authors provide support for its reliability (Mardell-Czudnowski & Goldenberg, 2011), there have been no studies to date which examine the predictive ability of this assessment on academic achievement. Further, this study enhances existing support for the relationship between behavioral and emotional functioning and academic achievement. In addition, this study adds to the evidence of the efficacy of the joint use of academic and behavioral screening measures as predictors of achievement by demonstrating whether socioemotional functioning significantly moderates the predictive ability of kindergarten screeners on subsequent academic achievement. Lastly, through conducting comparative analyses of scores on measures of achievement and behavioral functioning administered prior to and after the statewide disruption of in-person schooling, this study provides insight on the impact had on academic achievement and behavioral and emotional functioning by the pause of in-person learning resulting from the COVID-19 pandemic.

Chapter 3

Research Questions and Hypotheses

Research Questions

The present study examined the following research questions:

1. Can a kindergarten screening measure, namely the Developmental Indicators for the Assessment of Learning- Fourth Edition (DIAL-4), significantly predict academic achievement as measured by Fountas & Pinnell (F&P) reading levels obtained in subsequent academic years and standardized test scores in English and mathematics taken four years after the screening?
2. To what degree does behavioral and emotional functioning, as measured by the Behavioral and Emotional Risk Index scores (BERI) of the Behavioral Assessment System for Children – Third Edition (BASC-3) Behavioral and Emotional Screening System (BESS) Teacher Report form, moderate the predictive ability of the DIAL-4 on subsequent academic achievement?
3. To what degree did the pause of in-person learning across New York State resulting from the COVID-19 pandemic impact academic achievement as measured by F&P reading levels and behavioral and emotional functioning as measured by BERI scores of students prior to and after March 2020?

Hypotheses

1. As the positive relationship between kindergarten screening measures with later reading achievement (Halle et al., 2012; Li-Grining et al., 2010; McClelland et al., 2006; Ozernov-Palchik et al., 2017), mathematics achievement (Jordan et al., 2010;

Romano et al., 2010; Seethaler & Fuchs, 2010), and writing (Reid et al., 2019) is demonstrated within the literature, it was hypothesized that:

- a. There would be a significant, positive relationship between the DIAL-4 Total Scores and subsequent reading levels as measured by the Fountas & Pinnell (F&P) Benchmark Assessment System.
- b. There would be a significant, positive relationship between the DIAL-4 Total scores and subsequent raw scores on standardized NYS Grades 3-8 English Language Arts (NYS ELA) tests.
- c. There would be a significant, positive relationship between the DIAL-4 Total Scores and subsequent raw scores on NYS Grades 3-8 Mathematics (NYS Math) tests.

2. As the relationship between behavioral and emotional functioning and subsequent academic achievement of students is supported in the literature (Eklund et al., 2017; Halle et al., 2016; Hernandez et al., 2018; Metcalfe et al., 2015; Reid et al., 2016; Romano et al., 2010; Sabol & Pianta, 2012) it was hypothesized that:

- a. The relationship between DIAL-4 scores administered before entering kindergarten and subsequent performance on reading as measured by F&P (Fountas & Pinnell Benchmark Assessment System) reading levels would be moderated by the BASC-3 BESS (Behavior Assessment System for Children-Third Edition Behavioral and Emotional Screening System) BERI (Behavioral and Emotional Risk Index) scores obtained in the spring of the same academic year.

- b. The predictive ability of the DIAL-4 scores on subsequent achievement as measured by the NYS ELA scores would be moderated by the BERI scores obtained in the same academic year.
- c. The predictive ability of the DIAL-4 scores on subsequent achievement as measured by the NYS Math scores would be moderated by the BERI scores obtained in the same academic year.

3. Given the negative emotional impact had on children by the pause of in-person learning and onset of the COVID-19 pandemic (Irwin, et al., 2022; Xie et al., 2020) as well as preliminary findings which indicate negative impacts had on student achievement following the pandemic (Hammerstein et al., 2021; Panda et al., 2021), it was hypothesized that:

- a. There would be a disruption in student behavioral and emotional functioning, as depicted by an increase in BERI scores obtained following the pause of in-person learning compared to those obtained prior, while controlling for scores on the DIAL-4.
- b. There would be a significant decrease in student achievement as measured by F&P reading levels when comparing those obtained prior to the pause of in-person learning, while controlling for scores on the DIAL-4.

Chapter 4

Method

Participants

The participants in the present study were students enrolled in a Title I public elementary school in Ozone Park, New York. There are currently 1,293 students who attend this school which educates those in pre-k through fifth grade (New York City Department of Education, 2022). The ethnic makeup of the student body is 53.63% Hispanic, 29.05% Asian, 6.93% White, 5.24% Black, 3.21% American Indian or Alaskan Native, 1.1% Multiracial, 0.76% Native Hawaiian or Other Pacific Islander, and 0.08% not reported (New York City Department of Education, 2022). Five cohorts of students who were screened prior to entering kindergarten in the fall of 2015- 2019 were included in this longitudinal study that monitored academic achievement and behavioral functioning over the course of seven consecutive years (2015-2022). There were 453 students who were screened prior to entering kindergarten from 2015-2019. Due to screening administration errors and incomplete subtests, 6.2% ($n = 28$) of the data was not usable. Further, 12% ($n = 54$) of the students who were initially screened were discharged or relocated to a different school within the timeframe of the study. The participants included within the analyses consisted of 371 students ranging in age from 4 to 5 years old ($M = 4.84$, $SD = .30$) at the time of the initial screening with 49.1 % female ($n = 182$). The ethnicities of the participants were 59.3 % Asian, 10.5% Hispanic, 6.5% Black, 13.7 % White, 6.7% American Indian or Alaskan Native, 2% Multiracial, and 1.3% Native Hawaiian or Other Pacific Islander. Informed consent was not obtained for this study. The Family Educational Rights and Privacy Act (FERPA, 1974) laws indicate

that schools can disclose information from students' educational records under certain conditions. One of these conditions is if there are organizations conducting studies for or on behalf of the school. This research fell under the jurisdiction of an organization conducting a study on behalf of the school since the results were utilized by school staff to inform educational decisions. The New York City Department of Education granted the researcher access to the student data for purposes of this study.

Administration Procedures and Data Collection

Impact of the COVID-19 Pandemic

The COVID-19 pandemic disrupted in-person learning of students nationwide, with virtual learning taking the place of traditional face-to-face methods towards the end of the 2019-2020 academic year (Lake & Dussealt, 2020). As a result of the mandated state-wide suspension of in-person schooling in March of 2020, the data collection of this study was disrupted. More specifically, there were no F&P reading levels or BERI scores obtained for the 2019-2020 academic year. In addition, as stated in a memorandum written by Chancellor Rosa (2020) of the NYS Education Department, the administration of the NYS Grades 3-8 ELA and Math tests was suspended for the 2019-2020 school year in response to the closure of schools and districts. As such, there were no standardized state test scores obtained as measures of achievement for the 2019-2020 academic year.

Developmental Indicators for the Assessment of Learning- Fourth Edition

The Developmental Indicators for the Assessment of Learning- Fourth Edition (DIAL-4) was administered to five different cohorts of students in the spring of 2015-2019 prior to their entry into kindergarten in the fall of those respective years. Screening

was conducted by a team of staff employed within the New York City Department of Education and doctoral level graduate students. Those who administered the DIAL-4 to incoming students completed a test of competency to ensure proper administration in accordance with the standardization procedures outlined within the DIAL-4 manual. This competency exam included practicing administration and scoring of sample protocols provided by the DIAL-4 publishers.

At the time of their screening, each participant was assigned a unique identification number to ensure confidentiality of student information. The data from screening procedures was archival and each of the fully administered DIAL-4 protocols were scored by doctoral level graduate students using Pearson's Q-global scoring software. The DIAL-4 Total score as well as the subsequent scores on each of the three different areas assessed: Concepts, Motor and Language were generated. The students' scores on the DIAL-4 were entered by the researcher into an encrypted data file organized in correspondence with assigned identification numbers.

Fountas & Pinnell Benchmark Assessment System

As a component of the school's universal monitoring of reading ability, students were assessed by their teachers using the Fountas & Pinnell Benchmark Assessment System – Third Edition (BAS-3) three times per academic year (fall, winter & spring) to determine their reading level along the F&P Text Level Gradient. The participating students' F&P reading levels were obtained by the researcher through access to reports of teacher assessments. As mentioned previously, there were no F&P reading levels obtained for the 2019-2020 academic school year due to the mandated closing of schools.

New York State Grades 3-8 English Language Arts and Mathematics Tests

The participating students were administered the New York State Grades 3-8 English Language Arts and Mathematics Tests upon reaching third grade, as part of the federal requirement of Every Student Succeeds Act of 2015 (New York State Education Department). The students' scores on the New York State Grades 3-8 English Language Arts and Mathematics tests (NYS ELA and Math tests) were obtained in the spring of 2019 by the researcher as an additional measure of achievement when the students in the 2015 cohort reached third grade. It should be noted that the intended plan of this study included continual collection of NYS ELA and Math test scores for participating students in the school years to follow; however as previously mentioned, the onset of the COVID-19 pandemic resulted in cancellation of the administration of state tests during the 2019-2020 school year. Further, the administrative staff of the elementary school were unable to provide student assessment scores for the 2020-2021 school year. Thus, this specific outcome measure was only collected once in 2019 for one of the five cohorts of participating students.

Behavioral Assessment Scales for Children – Third Edition Behavioral and Emotional Screening System (BASC-3 BESS) Teacher Report Form

As a measure of behavioral and emotional functioning, beginning in June of 2017, teachers of the participating students completed ratings on the Behavioral Assessment Scales for Children – Third Edition Behavioral and Emotional Screening System (BASC-3 BESS) Teacher Report form twice annually (fall & spring) for each student. The teachers' responses on the BASC-3 BESS were scored by doctoral level students, including the researcher, using the Q-global software. It should be noted that there was no

BASC-3 BESS administration in spring of 2020- spring 2021. Additionally, there was no administration of the BASC-3 BESS during the 2021-2022 academic school year.

Student Demographic Data

In addition to screening data and outcome measures data, demographic information for participating students was obtained through reviewing students' records. The collected information included student date of birth, gender, and socioeconomic status.

Predictive Measures

The Developmental Indicators for the Assessment of Learning-Fourth Edition. The Developmental Indicators for the Assessment of Learning-Fourth Edition is an individually administered screening tool intended to identify the need for intervention or diagnostic assessment in children ages 2:6 through 5:11 (Ellingsen, 2016; Mardell-Czudonowski & Goldenberg, 2011). The measure is comprised of assessments in three different performance areas including Motor, Language, and Concepts. The DIAL-4 additionally includes measures of Self-Help and Social-Emotional Behaviors through administration of both the DIAL-4 Parent and Teacher Questionnaires. In this study, these additional measures were not administered and therefore the only scores obtained were the DIAL-4 Total score as well as the scores on the three performance areas.

The DIAL-4 was standardized on a national sample of 1,400 children including both English- and Spanish- speaking children. The ethnicities of the normative sample were 13.6% African American, 2.9% Asian, 25.1% Hispanic, 53.6% White and 4% Other, which were strongly representative of the statistics reported by the 2008 U.S. Census Bureau. The DIAL-4 is psychometrically sound with evidence supporting its

validity and reliability (Liu et al., 2013; Wright, 2014). The authors cite evidence of extensive literature and expert reviews performed to determine the validity of the constructs assessed by the test items. Additionally, evidence of convergent validity is reported by the authors through studies that compared the scores of the DIAL-4 to the predecessor assessment, the DIAL-3, as well as other established measures of early childhood learning such as the Differential Ability Scales- Second Edition, the Early Screening Profiles, and the Battelle Developmental Inventory- Second Edition.

Further, the authors report that the mean internal consistency reliability coefficients of scores of the English version of the DIAL-4 were .84 for the Motor area, .92 for Concepts, .93 for Language and .95 for the DIAL-4 Total Score. The average corrected stability coefficient for all areas of the assessment combined is approximately .80 for both the English and Spanish samples, which is indicative of good stability of the scores across time, providing further support for the test's reliability (Shannon et al., 2014). There have not been many studies conducted which explore the psychometrics of the DIAL-4 as cited by the authors; however, there exists a multitude of evidence supporting the predictive validity of the previous version of the measure, the DIAL-3, in which the current version is based (Gelling, 2006; Katz, 2016; Quinn-Spagnola, 2009; Rosiak, 2007; Walk, 2005).

The tasks embedded within the DIAL-4 closely mimic early learning skills, making this assessment a useful tool for educators (Coughlan, 2015; Moodie et al., 2014). The Motor performance area includes tasks that assess both gross motor coordination and fine motor skills. The Concepts performance area was developed to assess some of the main concepts of early learning such as one-to-one correspondence, classifying, counting,

and measuring. The tasks of this performance area include identification of body parts, rote counting, identification of concepts, naming colors, counting blocks, identifying, and sorting shapes. Additionally, there is an assessment of Rapid Automatic Naming (RAN), a skill in which there is growing evidence within the literature to support its role in predicting reading fluency (Mardell-Czudonowski & Goldenberg, 2011; Mather & Wendling, 2012, p.89; Savage et al., 2018). Lastly, the Language performance area assesses lingual aspects such as articulation, rhyming, identification of words beginning with a particular sound, and problem-solving.

Outcome Measures

Fountas & Pinnell Benchmark Assessment System. The Fountas & Pinnell Benchmark Assessment System (BAS) was developed as a method to determine a student's instructional and independent reading levels along the F&P Text Level Gradient (Fountas & Pinnell, 2016). The F&P Text Level Gradient, first published in 1996 and described by the authors as “the most recognized and trusted tool for selecting books for small-group reading instruction” is a continuum consisting of reading levels A-Z+ that was created to measure students' progress in reading (Fountas & Pinnell, 1996; 2016). The BAS was designed to measure decoding, fluency, vocabulary, and comprehension skills of students in kindergarten – eighth grade and determine their respective reading level based on levels A-Z of the complete F&P Text Level Gradient. In this study, the third edition of the BAS was utilized to assess the students' reading levels.

Administration of the BAS is conducted on a one-on-one basis between teachers and students. In the first part of the assessment, the student is presented with and asked to read aloud a systematically leveled nonfiction or fiction book while the teacher observes

the reading behaviors of that student (Heinemann Publishing, n.d.). During the second part of the assessment, the teacher conducts a comprehension-based conversation with the student and records their responses (Heinemann Publishing, n.d.). Based on the student's performance on both parts of the assessment, the teacher can use the provided materials and guidelines to determine the student's level of reading proficiency along the aforementioned gradient.

Within a field study conducted on 497 students, the BAS system has demonstrated strong reliability, with test-retest reliability coefficients ranging from .93 to .97 between assessments of the nonfiction and fiction books of the same levels (Heinemann Publishing, 2012). There is also evidence of convergent validity as demonstrated through significant correlations between reading accuracy rates of the BAS and the established Reading Recovery program (Heinemann Publishing, 2012) as well as Renaissance Learning's STAR Reading program (Bangle, 2018). Further, in a study conducted in 2015, test-retest reliability coefficient of BAS testing scores from fall to spring in was recorded to be .86 signifying a strong level of reliability across a given time (Klingbeil et al., 2015).

New York State Grades 3-8 English Language Arts and Mathematics Tests.

The New York State Grades 3-8 English Language Arts and Mathematics tests are criterion-referenced tests administered to all students in the state of New York in third through eighth grade in the spring of each academic year. These tests are untimed and consist of both multiple-choice and short response questions split up into two different sessions of testing (New York State Education Department [NYSED], 2021). The English Language Arts tests are designed to assess various aspects of reading, writing and

language standards outlined by New York State (NYSED, n.d.). The mathematics tests require students to demonstrate a conceptual understanding of mathematical concepts, use pre-requisite skills, decide which formulas and tools to use, and solve mathematics problems rooted in the real world (NYSED, n.d.). The tests are offered both through traditional Paper-Based Testing (PBT) and as of 2016, digitally through Computer-Based Testing (CBT). A study of comparability of the two test modalities was conducted by Questar Assessment Inc. in 2019 on data obtained from students in grades four through 8 (Office of State Assessment [OSA], 2019). The OSA (2019) reported slight differences in mean scores between paper-administered tests and those administered through CBT methods for each grade. As a result of this, the scores of those who were assessed via PBT were adjusted by adding either 1 or 2 points to account for the difference brought about by different testing mediums and to best represent the student's level of knowledge and skills (OSA, 2019). The students in the present study were administered the tests through PBT methods only.

Two types of scores obtained from this testing are raw scores and proficiency level (1, 2, 3, or 4). The current study used the raw scores only for analyses. Within the most recent technical report published in 2020 by the New York State Department of Education which reports on the assessments administered in 2019, evidence for content validity through expert analysis of items is explained. Further, construct validity is evident in the strong internal consistency of the tests with reliability coefficients ranging from .87 to .90 reported for ELA total scores and .92 to .94 for Math total scores (NYSED, 2020).

Behavioral Assessment Scales for Children – Third Edition, Behavioral and Emotional Screener System- Teacher Report Form. The Behavioral Assessment Scales for Children- Third Edition (BASC-3) Behavioral and Emotional Screening System (BESS) is a collection of screening measures designed to “assess behavioral and emotional strengths and weaknesses of children and adolescents” (Kamphaus & Reynolds, 2015). Commonly used as a universal Tier 1 screening measure in schools, the BASC-3 BESS provides a quick and efficient way to assess behavioral and emotional risks as well as a student’s overall mental health status (Kamphaus & Reynolds, 2015). The Teacher Report form is one component of the overarching screening system. The BASC-3 BESS Teacher Report form: Child/Adolescent version, which was used in this study, was created to be completed by teachers of students in kindergarten-12th grade (Kamphaus & Reynolds, 2015). The measure includes 20 items that have been selected from the more comprehensive BASC-3 Teacher Rating scales. Raters are asked to read each statement and rate the student’s level of engagement in that behavior according to the options provided by the 4-point scale of: Never, Sometimes, Often or Almost Always.

The ratings of the BASC-3 BESS Teacher Report form yield a total score labeled as the Behavioral and Emotional Risk Index (BERI), and three sub scores: Externalizing Risk Index, Internalizing Risk Index and Adaptive Skills Risk Index. The BERI scores are converted to T-scores and percentile ranks while sub scores use a three-category classification based on their respective raw scores: normal risk, elevated risk, and extremely elevated risk. The same classification system applies to the total BERI score but is based on T-scores rather than raw scores, with scores below 61, 61-70, and 71+ corresponding to the outlined classification labels (Hogan, 2017). In this study, analyses

were done using the BERI T-scores. To ensure the validity of the ratings, the measure has a built-in validity index, the F Index, which indicates the rater's tendency to respond in an overly negative manner towards the child's behavior.

Ratings were scored using the Q-global scoring software. When scored using Q-global, two additional validity indices were provided upon generating the report: the Consistency Index and the Response Pattern Index. The Consistency Index provided information as to whether the rater was inconsistent in their responses and the Response Pattern Index indicated whether there was a pattern noted within responses.

The normative sample used for the Teacher Report form included 1,618 cases which were stratified by age, gender, parent education, race/ethnicity, and geographic region (Kamphaus & Reynolds, 2015). In the test manual, Kamphaus and Reynolds (2015) reported evidence of internal consistency, test-retest reliability, and interrater reliability of the measure. For all forms included within the BASC-3 BESS, the adjusted total BERI score test-retest reliability coefficients ranged from .87 to .93. Further, the test-retest adjusted coefficients for sub scores ranged from .76 to .92 (Hogan, 2017). Evidence of validity of this measure provided by the authors includes correlations between measures of the BASC-3 BESS and other behavioral-emotional rating scales including the BASC-3, the Conner's- Third Edition, the Autism Spectrum Rating Scales, the Achenbach System of Empirically Based Assessment, the Children's Depression Inventory- Second Edition, and the Revised Children's Manifest Anxiety Scale- Second Edition (Hogan, 2017). The BASC-3 BESS Teacher Report form has also previously demonstrated correlation with academic achievement through significant, moderate correlations found between BERI T-scores, and scores obtained on Measures of

Academic Performance (MAP) assessments in both mathematics ($r = -.49$) and reading ($r = -.41$) (Naser & Dever, 2020). Further, concurrent validity of the measure has been demonstrated through moderate and large correlations obtained between T-Scores on the BASC-3 BESS Teacher Report forms and T-Scores of the BASC-3 BESS Self-Report forms recorded in the fall ($r = .47$) and spring ($r = .55$) of a particular academic year (Naser & Dever, 2020).

Data Entry and Preparation

Given the longitudinal nature of the current study and the pause of in-person learning prompted by the COVID-19 pandemic, the availability of dependent measures (i.e., F&P reading levels, NYS ELA, and Math scores) and the proposed moderating variable (i.e., BERI scores) varied by year. For example, students who were administered the DIAL-4 in 2015 were the only cohort for whom NYS ELA and Math scores were available. Table 1 provides a visual overview of data availability for each cohort in the current study.

For the dependent variable of reading achievement, F&P reading levels from the fall, winter, and spring were converted from letter grades to numerical scores (e.g., A=1, B=2, C=3) and then averaged by academic year (e.g., 2015-2016, 2016-2017). To estimate trajectories in annual reading achievement (Hypothesis 3), percent changes in average F&P reading levels were calculated for the pre-COVID-19 period (change from the 2017-2018 academic year to 2018-2019) and for the post-COVID-19 period (from 2018-2019 to 2020-2021).

Table 1*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)
F&P Reading Levels					
2015/2016 Fall, Winter, Spring	×				
2016/2017 Fall, Winter, Spring	×	×			
2017/2018 Fall, Winter, Spring	×	×	×		
2018/2019 Fall, Winter, Spring	×	×	×	×	
2019/2020 Fall, Winter, Spring*					
2020/2021 Fall, Winter, Spring	×	×	×	×	×
2021/2022 Fall, Winter, Spring		×	×	×	×
NYS ELA and Math					
2018/2019	×				
BASC-3 BESS BERI					
2017 June	×	×			
2017 November	×	×	×		
2018 June	×	×	×		
2018 November	×	×	×	×	
2019 June	×	×	×	×	
2019 November	×	×	×	×	×
2020 June*					
2021 November*					
2021 June	×	×	×	×	×

F&P (Fountas & Pinnell Benchmark Assessment System); NYS (New York State);
 BASC-3 BESS (Behavior Assessment System for Children Behavioral and Emotional
 Screening System)

*No data available due to COVID-19 disruption

Statistical Methods

Means and standard deviations were computed to describe continuous variables, while frequencies and percentages were used for categorical variables. One-way analysis of variance (ANOVA) tests was used to evaluate between-group differences in DIAL-4 scores at baseline. Pearson correlations were used to evaluate the strength and direction of associations between continuous variables. Moderation analysis, as outlined in Field (2018) and Hayes (2013) using the PROCESS macro for SPSS v.28, was conducted to

determine whether main effects of the independent variable (DIAL-4 Total scores) on outcome variables (F&P reading levels, NYS ELA, and Math Test scores) were influenced by the hypothesized moderating variable (BERI scores). Ordinary Least Squares (OLS) regression was conducted through Model 1 in the PROCESS macro for the moderation analyses to calculate the conditional effects of behavioral and emotional functioning on academic achievement. Variables were centered to avoid multicollinearity with the interaction term; therefore DIAL-4 and BERI scores were centered, and an interaction term was used. Bootstrap samples ($n = 10,000$) and 95% confidence intervals for the conditional effect were used to assess the stability and reliability of moderation models. All statistical tests were two-tailed and performed at $\alpha = 0.05$ for interpretation.

As the BASC-3 BESS was not administered until June of 2017, after the initial cohort of students had received two years of instruction, it was decided that the BERI scores from June of each year were examined as to what degree they moderate the relationship between DIAL-4 scores administered prior to kindergarten entry and academic performance, as measured by F&P reading levels, at the end of first grade for the 2015, 2016, and 2017 cohorts. Given the differing availability of data across cohorts, an additional moderation analysis was conducted using students in the 2018 cohort. For this cohort, BERI scores from June were examined as to what degree they moderated the relationship between DIAL-4 scores and F&P reading levels obtained at the end of second grade. Therefore, each moderation analysis was conducted with the June BERI scores that coincide with the spring F&P reading levels of that respective academic year.

Chapter 5

Results

Data were obtained for a total of 371 student participants within five cohorts from 2015 ($n = 45$), 2016 ($n = 57$), 2017 ($n = 69$), 2018 ($n = 95$), and 2019 ($n = 105$). The sample was 49.1% female ($n = 182$) and predominately Asian ($n = 220$, 59.3%). The average age of participants upon administration of the DIAL-4 was 58.05 months ($SD = 3.68$), or 4.84 years ($SD = .3$). The majority of the students ($n = 287$, 77.4%) were economically disadvantaged. Table 2 provides additional demographic information.

Table 2

Demographic Characteristics of Elementary Sample (N=371)

Characteristic	<i>N</i>	%
Gender		
Female	182	49.1%
Male	189	50.9%
Race		
American Indian/Alaskan	25	6.7%
Asian	220	59.3%
African American/Black	24	6.5%
Hawaiian/Pacific Islander	5	1.3%
Hispanic/Latino	39	10.5%
White/Caucasian	51	13.7%
Multiple	7	1.9%
Age in months (M, SD)	58.05	(3.68)
Economic Disadvantage		
Yes	287	77.4%
No	84	22.6%

Table 3 provides descriptive statistics for scores on the DIAL-4, NYS ELA and Math Tests, F&P reading levels, and BERI scores. Compared to the normative scores for the DIAL-4 (standard score = 100.00), no significant differences were observed in the current sample for the DIAL-4 Total Score ($M = 102.38$, $t(370) = 1.66$, $p = .10$). As a

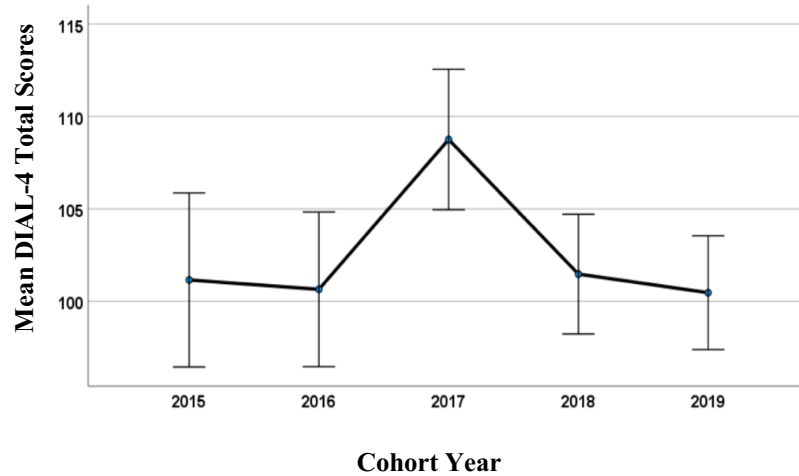
preliminary step to identify potential covariates of DIAL-4 scores, a series of ANOVAs revealed no statistically significant differences based on gender, $F(1,370) = 0.48, p = .491$, race/ethnicity, $F(6,370) = 1.94, p = .073$, or economic disadvantage, $F(1,370) = 0.87, p = .352$. Also, DIAL-4 scores were not correlated with age, $r(370) = -.076, p = .144$. Therefore, no demographic characteristics were controlled for in the primary analyses. However, there was a main effect for cohort year on DIAL-4 Total score, $F(4,370) = 3.52, p = .008$, with the average DIAL-4 score for the 2017 cohort being significantly higher than all other cohorts (see Figure 1). To account for this difference, the primary analyses were stratified by cohort year. That is, the variable of cohort year was controlled for when conducting the primary analyses.

Table 3
Descriptive Statistics of DIAL-4 Total Scores, NYS Exam Scores, F&P Reading Levels, and BERI Scores

	Mean (Std. Dev.)	Score Range
DIAL-4 Total Score	102.38 (16.00)	65.00 135.00
NYS State Exam Score (raw)		
ELA	612.56 (18.98)	560.00 650.00
Math	607.07 (15.18)	568.00 640.00
F&P Reading Levels		
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
BASC-3 BESS Score		
2017 June	47.78 (9.32)	34.00 72.00
2017/2018	47.13 (9.10)	27.50 75.00
2018/2019	50.00 (10.76)	31.00 75.50
2019 November	52.70 (10.76)	6.00 80.00
2021 June	54.11 (11.25)	34 89.00

Figure 1

Mean and Standard Error for DIAL-4 Scores by Cohort Year



Note. Error bars are used to represent standard error of the mean DIAL-4 Total Scores for each cohort year.

Hypothesis 1

A significant, positive relationship between the DIAL-4 Total Scores and subsequent F&P reading levels were found which supported hypothesis 1 (see Table 4). Overall, large statistically significant correlations were observed (i.e., r 's $\geq .50$, p 's $< .001$) for each cohort and across all years in F&P reading levels. Generally, correlations between DIAL-4 scores and subsequent reading levels tended to be slightly stronger for the 2016 cohort.

It was also hypothesized that DIAL-4 Total Scores would be positively correlated with raw scores on the standardized NYS Grades 3-8 ELA and Math tests for participants. Although analyses for this hypothesis were limited to students from the 2015

cohort, significant correlations were observed for 2018-2019 NYS ELA scores, $r(45) = .545, p < .001$, as well as NYS Math scores, $r(45) = .486, p < .001$.

Table 4

Correlations Between DIAL-4 Total Scores and F&P Reading Level, Stratified by Year

	F&P Reading Level (by year)					
	2015/2016	2016/2017	2017/2018	2018/2019	2020/2021	2021/2022
2015 DIAL Score ($n=45$)	$r = .458$ $p = .002$	$r = .524$ $p < .001$	$r = .525$ $p < .001$	$r = .525$ $p < .001$	$r = .538$ $p < .001$	n/a
2016 DIAL Score ($n=57$)		$r = .630$ $p < .001$	$r = .668$ $p < .001$	$r = .672$ $p < .001$	$r = .621$ $p < .001$	$r = .598$ $p < .001$
2017 DIAL Score ($n=69$)			$r = .528$ $p < .001$	$r = .632$ $p < .001$	$r = .569$ $p < .001$	$r = .529$ $p < .001$
2018 DIAL Score ($n=95$)				$r = .526$ $p < .001$	$r = .578$ $p < .001$	$r = .547$ $p < .001$
2019 DIAL Score ($n=105$)					$r = .597$ $p < .001$	$r = .668$ $p < .001$

Hypothesis 2

As previously mentioned, due to the school disruption associated with the pandemic, F&P reading levels and BERI scores for the 2019-2020 school year were unavailable. To maximize statistical power by including as many students as possible while ensuring equal duration in later reading ability, two separate moderation analyses were performed. The first moderation analysis focused on outcomes at the end of first grade with F&P reading levels from the spring as the dependent variable and BERI scores from the same time (spring) as the moderator. Thus, the first moderation analysis

examined the equivalent of a 2-year timespan between administration of the DIAL-4 and later reading assessment using data for the 2015, 2016, and 2017 cohorts. For the second moderation analysis, a 3-year prediction window was examined using DIAL-4 scores for the 2018 cohort and 2021 F&P reading levels and BERI scores from the spring of second grade.

Results of the first analyses that focused on outcomes at the end of first grade revealed no support for the hypothesis that the predictive ability of the DIAL-4 scores on subsequent reading levels would be moderated by the BERI scores obtained in the same academic year (see Table 5). Although BERI score was inversely associated with F&P level ($B = -.18, p = .004$), no significant interaction was observed.

Results of the second moderation analyses examining outcomes in second grade also did not provide support for the hypothesis of BERI scores moderating the association between DIAL-4 scores and later reading ability (see Table 6).

Table 5

Moderated Regression Results for DIAL-4 Total Score and First Grade Spring F&P Reading Levels as Moderated by First Grade BERI Score (N=167)

Variables	<i>B (95% CI)</i>	<i>SE B</i>	<i>T</i>	<i>p</i>
Constant	9.54 (-2.05, 21.13)	5.87	1.62	.162
DIAL-4 Total Score	.04 (-.07, .15)	.06	0.73	.464
BERI Score	-.18 (-.40, .03)	.27	-3.07	.004
DIAL-4 x BERI	.00 (-.00, .00)	.00	1.09	.279

$R = .624, F(3,163) = 34.63, p < .001, R^2 = .000, F(1,163) = 1.18, p = .279$

Table 6

Moderated Regression Results for DIAL-4 Total Score and Second Grade Spring F&P Reading Levels as Moderated by Second Grade BERI Score (N =95)

Variables	<i>B (95% CI)</i>	SE <i>B</i>	<i>t</i>	<i>p</i>
Constant	-7.96 (-33.38, 17.47)	12.80	-0.62	.536
DIAL-4 Total Score	.24 (-.00, .49)	.12	1.95	.054
BERI Score	.23 (-.23, .69)	.23	1.00	.320
DIAL-4 x BERI	-.00 (-.01, .00)	.00	-0.95	.346

R = .517, F(3,91) = 11.09, p <.001, R² = .007, F(1,91) = 0.90, p = .346

Similarly, support was not found for the hypothesis that the predictive ability of the DIAL-4 scores on subsequent achievement as measured by the NYS ELA and Math scores would be moderated by the BERI scores obtained in the same academic year. As noted previously, 2018-2019 NYS state exams scores were only available for the 2015 cohort ($n = 45$). Using the averaged BERI scores from November 2018 and June 2019 as the moderating variable, results did not reveal moderation for neither NYS ELA (see Table 7) nor Math scores (see Table 8) on the NYS Grades 3-8 exam. Although BERI scores were inversely associated with NYS Math Scores, with greater emotional and behavioral problems associated with reduced math achievement ($B = -.82, p = .004$), no significant association was observed between severity of maladaptive behaviors (as measured by the BERI) and English Language Arts achievement.

Table 7

Moderated Regression Results for DIAL-4 Total Score and NYS ELA Score as Moderated by BERI Score (N=45)

Variables	<i>B (95% CI)</i>	<i>SE B</i>	<i>t</i>	<i>p</i>
Constant	612.23 (606.93, 617.54)	2.63	233.01	<.001
DIAL-4 Total Score	.80 (.34, 1.25)	.22	3.55	.001
BERI Score	-.33 (-1.04, .38)	.35	-0.94	.350
DIAL-4 x BERI	-.00 (-.05, .05)	.02	-.09	.929
<i>R = .561, F(3, 41) = 6.28, p <.001, R² = .002, F(1, 44) = 0.10, p = .751</i>				

Table 8

Moderated Regression Results for DIAL-4 Total Score and NYS Math Score as Moderated by BERI Score (N=45)

Variables	<i>B (95% CI)</i>	<i>SE B</i>	<i>t</i>	<i>P</i>
Constant	607.00 (602.96, 611.03)	2.00	303.76	<.001
DIAL-4 Total Score	.44 (.10, .79)	.17	2.60	.013
BERI Score	-.82 (-1.36, -.28)	.27	-3.07	.004
DIAL-4 x BERI	-.00 (-.05, .05)	.02	-.09	.929
<i>R = .617, F(3, 41) = 8.40, p <.001, R² = .000, F(1, 44) = 5.89, p = .929</i>				

Hypothesis 3

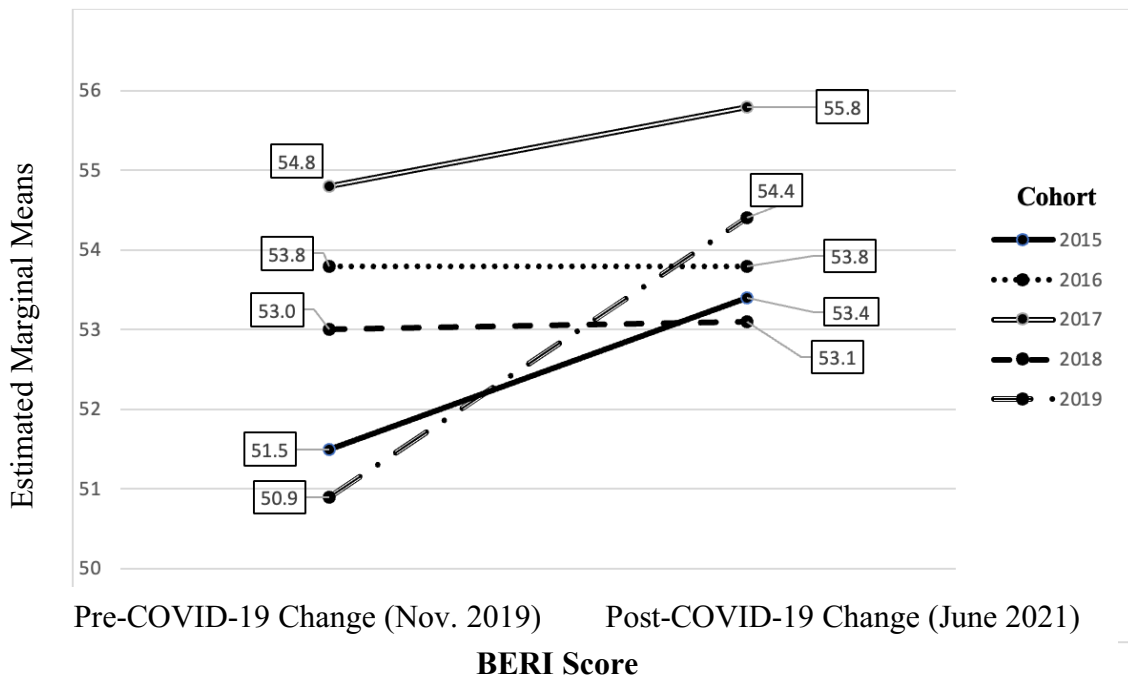
Partial support was found for the hypothesis that there would be a disruption in student behavioral and emotional functioning following the return to in-person learning in 2021, as indicated by an increase in BERI scores from the previous year. Results of a repeated-measures ANOVA comparing BERI scores from November 2019 (pre-COVID-19) to June 2021 (post-COVID-19) while controlling for DIAL-4 scores, found statistically significant increases, $F(4, 365) = 2.23, p = .051$, but only for two of the five cohorts (see Figure 2, dashed lines). Tests of within-subjects differences indicated that

the BERI increased significantly for students in the 2017 cohort, $F(1, 67) = 4.09, p = .047$, and in the 2019 cohort, $F(1, 103) = 9.52, p = .003$. Changes in BERI were not significant for students in the 2015 cohort, $F(1,43) = 1.35, p = .251$ 2016 cohort, $F(1,55) = 0.05, p = .821$, or 2018 cohort $F(1,93) = 0.90, p = .346$.

It is important to note that despite the statistically increase in BERI scores for the 2017 cohort (i.e., students finishing second grade when COVID-19-related school closures began) and 2019 cohort (i.e., students finishing kindergarten when in-person classes were suspended), BERI scores for both cohorts remained within the “normal,” non-clinical range (i.e., T-score <60).

Figure 2

Within-Subject Changes in BERI Scores Pre- and Post-COVID-19 Controlling for DIAL-4 Total Score, by Cohort Year

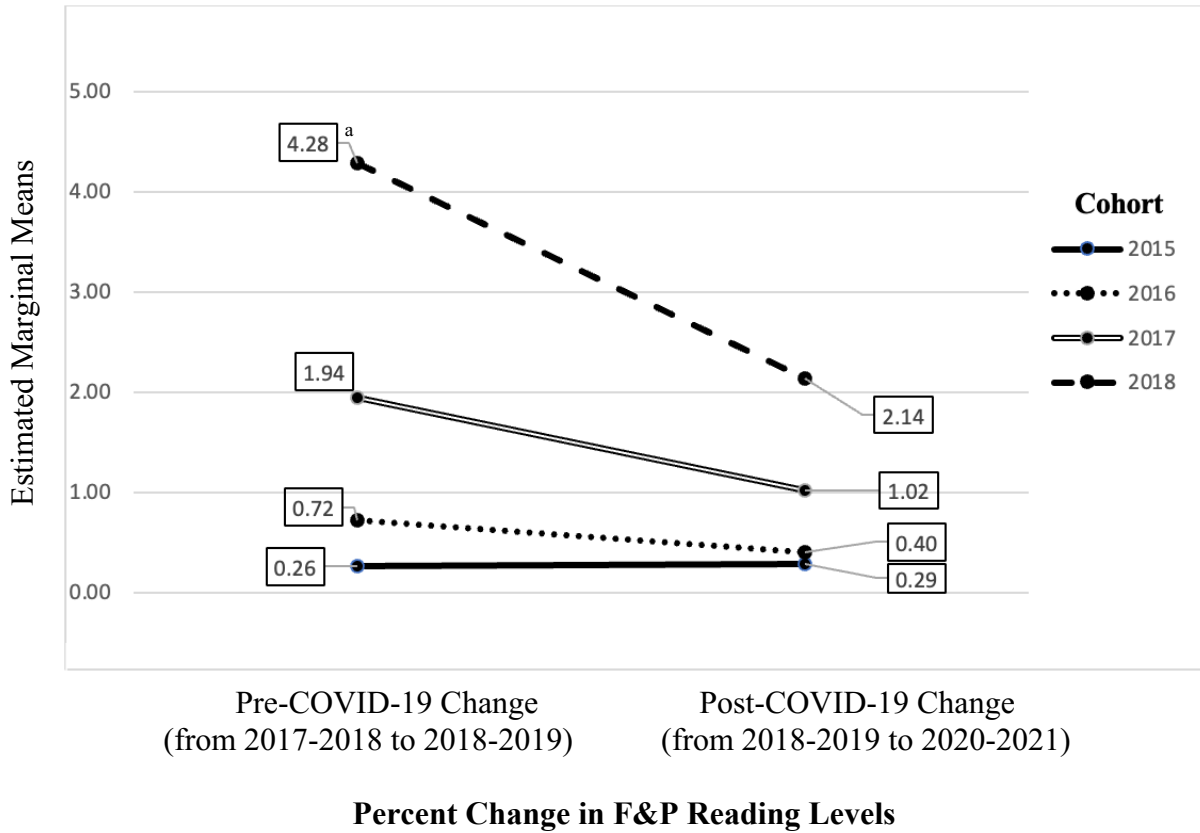


Note. Dashed lines indicate statistically significant ($p < .05$) within-subject changes in BERI scores while controlling for DIAL-4 total score.

Results from a repeated-measures ANOVA also provided support for the hypothesis that there would be a significant decrease in achievement as measured by F&P reading levels when comparing those obtained prior to the pause of in-person learning. Using data from cohorts 2015-2018 (F&P levels were not available for the 2019 cohort), results revealed that when controlling for the DIAL-4 Total Score through a repeated-measures ANCOVA (analysis of covariance), the percent change in annual F&P reading levels decreased in the post-COVID-19 period when compared to the rate of change of the pre-COVID-19 period, $F(1, 261) = 18.02, p < .001$. As can be seen in Figure 3, a significant drop in the rate of change in reading achievement was observed for students in the 2018 cohort, $F(1, 93) = 26.27, p < .001$, the 2017 cohort, $F(1, 68) = 23.45, p < .001$, and 2016 cohort, $F(1, 57) = 14.95, p < .001$. That is, the annual change or increase seen yearly was not maintained after COVID-19 and in fact the amount of annual change decreased in comparison to the annual yearly change before COVID-19. It should be noted that given the limitations in data availability, the average percent change in F&P reading level score for those in the 2018 cohort was calculated using three points of data (fall, winter, and spring) from the 2018-2019 school year whereas the percent change for the remaining cohorts in these analyses (2015, 2016 and 2017) was calculated using six data points from both the 2017-2018 and 2018-2019 academic years. On the other hand, reading levels did not change for students in the 2015 cohort (those in fourth grade at the time of school disruption due to COVID-19), $F(1, 43) = 0.13, p = .721$.

Figure 3

Within-Subject Changes in F&P Reading Levels Pre- and Post-COVID-19 Controlling for DIAL-4 Total Score by Cohort Year



Note. Dashed lines indicate statistically significant ($p < .05$) within-subject changes in F&P Reading levels while controlling for DIAL-4 Total Scores.

^aCalculated using data collected in the 2018-2019 school year only.

Chapter 6

Discussion

The following section provides a scaffolded discussion reflecting upon the current study. First, the statistical results are summarized, including what they suggest with respect to the independent, dependent, and proposed moderating variables. The results are then connected with the extant literature and how they enhance previous findings. Next, the limitations of this study are described followed by proposed directions for future research. Finally, the implications of the results and significance to elementary education and the practice of school psychology are highlighted.

Results and Previous Literature

The results of this study build upon previous findings as they support the utility of the DIAL-4 as a predictor of subsequent academic achievement. Numerous studies have supported the use of kindergarten screening measures as effective predictors of future achievement (Goldstein et al., 2017; Jordan et al., 2010; Katz, 2016; Seethaler & Fuchs, 2010). Previous research has examined the predictive ability of the DIAL-3 as well as the Speed Version of the DIAL (Gelling, 2006; Katz, 2016; Quinn-Spagnola, 2009; Rosiak, 2007; Walk, 2005); however, up until the present study, there were no studies known to the researcher which examined the predictive ability of the complete, latest version of this assessment, the DIAL-4, on subsequent student academic achievement. Though there was preexisting evidence of criterion validity (Liu et al., 2013) and convergent validity of the DIAL-4 with previous assessment versions as well as other established early developmental screening measures in the literature (Mardell-Czudnowski & Goldenberg,

2011), the results of the current study represent a direct demonstration of empirical evidence of the ability of scores on the assessment to predict later student achievement.

More specifically, the results demonstrated significant, positive correlations between scores on the DIAL-4 with subsequent F&P reading levels for all cohorts throughout all years of the study, which emphasizes the relationship between kindergarten screening performance and later reading achievement that has been demonstrated in previous studies (Duncan et al., 2007; Li-Grining et al., 2010; Oakhill & Cain, 2012; Ozernov-Palchik, et al., 2017). Furthermore, there were positive correlations noted between the DIAL-4 scores of the 2015 cohort and their respective scores on the NYS ELA and Math tests. This is consistent the work of Quinn-Spagnola (2009) and Walk (2005) who found significant correlations between scores on the DIAL-3 and performance on later standardized assessments. The results of the current study demonstrate the long-term predictive ability of the assessment on student academic achievement, with four years being the largest span between initial DIAL-4 administration and measures of achievement. These findings echo those of previous studies which demonstrated the use of kindergarten screening measures as predictors of distal academic outcomes (Halle et al., 2012; Jeon et al., 2018; Li-Grining et al., 2010).

The results of the study did not support the hypothesis that the predictive ability of kindergarten screening on academic achievement would be moderated by behavioral and emotional functioning. Though the literature of the impact of behavioral and emotional functioning on subsequent academic achievement is abundant (Eklund et al., 2017; Halle et al., 2016; Hernandez et al., 2018; Metcalfe et al., 2015; Reid et al., 2016), there had previously been no studies which examined how the predictive ability of

kindergarten screening measures on academic achievement is moderated by behavioral and emotional functioning. Therefore, despite there being no significant moderating role found, the results of this study still provide new information regarding the influence of students' behavioral and emotional functioning on the prediction of their academic achievement.

While there was no significant moderating effect of behavioral and emotional functioning found on predicting student achievement, results highlighted an inverse relationship between students' levels of behavioral and emotional functioning and their subsequent achievement in mathematics. This suggested that students with higher levels of dysfunctional symptoms tended to obtain lower scores on the NYS Math test. This is consistent with research that demonstrates higher levels of anxiety (Galla & Wood, 2012; Wu et al., 2012) and emotional dysregulation (Williams et al., 2014) can negatively impact student performance in mathematics. Although the results did not demonstrate a similar relationship between behavioral and emotional functioning and achievement on the NYS English Language Arts exams, other work has suggested significant impacts of behavioral and emotional functioning with levels of achievement in both English language arts and mathematics (Eklund et al., 2017; Metcalfe et al., 2013; Sabol & Pianta, 2012). Additionally, there was an inverse relationship noted between BERI scores and F&P reading levels in the moderation analysis focusing on outcome measures at the end of first grade. Results suggested that students who had higher risk levels of behavioral and emotional concerns had lower reading ability at the end of first grade. This is consistent with previous work that outlines the relationship between early self-regulation trajectories and the development of decoding and comprehension (Skibbe et

al., 2020) Contrastingly, this inverse relationship was not identified in the moderation analysis which focused on outcome measures at the end of second grade. Taken together, the results of the current study allude to potential differences in the impact of behavioral and emotional functioning on achievement across different academic subject areas and at different grade levels.

Consistent with the emerging literature regarding the impact of the COVID-19 pandemic on socioemotional functioning (Hammerstein et al., 2021; Irwin, et al., 2022; Panda et al., 2021; Xie et al., 2020), the results of the study demonstrate that the onset of the COVID-19 pandemic had a statistically significant, negative impact on the behavioral and emotional functioning of students in the 2017 and 2019 cohorts when controlling for performance on the DIAL-4. Controlling for performance on the DIAL-4 increased the strength of the findings since it demonstrated that kindergarten readiness level was not a significant factor when examining student functioning pre- and post- COVID. It is important to highlight again that though there were increases in BERI scores, the average BERI scores for these cohorts following the onset of the pandemic did not surpass the non-clinical range. The students in these cohorts were in second grade and kindergarten respectively at the onset of the pandemic. Therefore, the results suggest that younger students, particularly those in kindergarten, as well as students in second grade, were more emotionally impacted by the unprecedented shift in their education. This is consistent with the literature that demonstrates how resilience in children varies based on the age of onset of adversity (Masten, 2014). Clinically, given that kindergarten is a period of transition where there are more social and emotional demands placed on students (Welchons & McIntyre, 2017), the stronger affect had by the abrupt pause of in-

person learning of these students makes sense. Interestingly, the same significant difference in behavioral and emotional functioning was noted for students nearing the end of second grade. The BERI scores of students in the 2017 cohort that were recorded after the pause of in-person learning (when the students were in third grade), were significantly higher than those obtained prior. In third grade, there is a noted increase in demands placed on students as evidenced by the first year of mandated state exams in New York (NYSED, 2021). It is possible that the structural differences of third grade, in conjunction with the onset of the pandemic, contributed to the observed differences in BERI scores. The results of this study highlight differences in behavioral and emotional response pattern of students at different grade levels.

Additionally, consistent with preliminary findings of the academic deficits caused temporary shut-down of in-person schooling (Dorn et al., 2020), there was a notable decrease in rate of improvement of student F&P reading levels for some students as compared to their rate of improvement prior when controlling for scores on the DIAL-4. This decrease in rate of improvement was noted for all cohorts of students except for the cohort of students who were in fourth grade during the suspension of in-person schooling. The literature highlights third grade as a pivotal academic year, where students transition from learning how to read to reading to learn information in the academic years to follow (Center for Public Education, 2015; Feister, 2010; Feister, 2013). The lack of a significant attenuation in reading achievement growth of students in fourth grade following the onset of the pandemic, is consistent with research that notates differences in the trajectory of student reading ability upon reaching and completing third grade (Feister, 2013).

Limitations

Although the present results offer significant implications and add to the literature, it is appropriate to recognize several potential limitations embedded within the study. The first limitation concerns the sample size. Roughly 20% of the original participants were excluded from this study due to screening administration errors or their relocation to a different school. This decrease in usable data and corresponding decrease in sample size, though justified by resource constraints (Larkens, 2022), lessened the statistical power of the study overall (Cohen, 1992; Shreffler & Hueker, 2022). Further, the number of students in each cohort ranged from 45 to 104, with the number of participating students increasing from 2015-2019. This difference in sample size across cohorts raises a concern since unequal sample sizes and corresponding unequal variances amongst those samples both impact statistical power and rate of Type I errors (Rusticus & Lovato, 2014). As a result of the longitudinal design and the staggered years of kindergarten entry amongst the participants, there is less outcome data available for participants within the later cohorts which limited the number of analyses conducted with the data.

Furthermore, the scope of the data collected within this longitudinal study was not optimal as there were instances where F&P reading levels and BERI scores were not collected. Based on school administration decisions, the teachers of participating students only began to complete BASC-3 BESS forms in June of 2017. At that time, the students in the 2015 cohort were at the end of first grade. Therefore, there were no available data to examine the potential moderating role of behavioral and emotional functioning on the achievement of these students in kindergarten. Further, as previously mentioned, the

COVID-19 pandemic resulted in the lack of F&P reading levels and BERI scores collected for all participants during the 2019-2020 academic year. There were also no BERI scores obtained throughout the 2021-2022 academic year which prevented the analyses of the moderating effect of behavioral and emotional functioning on academic achievement during the final year of the study. Statistical concepts suggest that less data points hinder the ability to draw meaningful conclusions from studies (Johnson, 2013; Myers et al., 2010). Thus, this limitation should be taken into consideration when interpreting the results of the performed analyses as it could mean that the uncovered correlations and moderation effects were attenuated by the limited information used to generate them.

Another limitation that warrants consideration is the lack of measurement of specific variables that have been demonstrated to influence academic achievement. While socioeconomic status was measured through obtaining the participants' eligibility for free lunch, other notable factors that have known effects on academic achievement were not recorded. For example, preschool experience (Sierens et al., 2020; Sun et al., 2018; Tucker-Drob, 2012), English Language Learner status (Ardasheva et al., 2012; Shin, 2018), student attendance (Gottfried, 2010; Morrissey et al., 2018), and receipt of special education services (Ehrhardt et al., 2013; Judge & Bell, 2010) are all variables demonstrated to influence trajectories of student achievement. Unfortunately, this information was not made available to the researcher. Examining the impact of these variables within the context of the predictor and outcome variables could have strengthened the findings of the present study. There is a risk that the effects of these

variables on the participants' academic achievement impacted the significance of the results.

While the results of the study suggest that the predictive ability of kindergarten screening on later academic achievement is not moderated by behavioral and emotional functioning, there exist weaknesses in the methodology this finding was derived from. Behavioral and emotional functioning of the participants was measured using a single informant modality- specifically by use of the BESS teacher rating form. Given the longitudinal nature of the study, the participating students' teachers varied by year, thus resulting in different raters of the BESS form. The differences in teacher ratings could have been a confounding variable as previous research has demonstrated differences amongst teacher ratings (Splett et al., 2020). Additionally, although teacher reports of student behavioral and emotional functioning have been demonstrated to positively correlate to academic achievement and externalizing problems (Cleary & Callan, 2014), research indicates that internalizing symptoms are less detected (Naser & Dever, 2020) and teacher ratings of student behavior are subject to bias (Mason et al., 2014). Further, using a single informant approach to assess behavioral and emotional functioning deviates from best practice of evidence-based assessment (De Los Reyes et al. 2013; Dirks et al, 2012; Hunsley & Mash, 2007). A multi-informant approach incorporating either parent or self-report measures would have provided more insight into the students' functioning than the teacher report alone (Naser & Dever, 2020; van Dulmen & Egeland, 2011; Zuffianò et al., 2020). Additionally, although using the BERI score alone as an outcome measure rather than independently analyzing the scores of the three subindices has been done in previous research (Opuka, 2019), doing so limited the ability of the

present analyses to examine the moderating effect of specific areas of behavioral and emotional functioning on predicting academic achievement. It is possible that elevated levels of internalizing, externalizing or maladaptive behavior of participants was undetected by using the overall BERI score.

An additional limitation of the study is the use of only F&P reading levels as measures of achievement for most of the cohorts (2016, 2017, 2018 and 2019). While F&P reading levels are supported in the literature as reliable measures of reading achievement (Bongle, 2018; Heinemann Publishing, 2012; Klingbeil et al., 2015) and have been demonstrated to correlate with performance on standardized tests of reading (Harrington, 2017; Walker, 2016), using this measure alone does not paint the full picture of the student's academic potential. Reading ability is correlated to academic achievement (Crawford et al., 2001; Stage & Jacobsen, 2019); however, students with weaknesses or specific learning disabilities in reading can present with average levels of academic ability in other areas (Wagner et al., 2020). Further, there exists the possibility of bias in teacher ratings on the F&P reading levels, as teacher beliefs/attitudes towards students have been demonstrated to impact their rating of student academic achievement (Chetty et al., 2014; Goldberg, 2019, Peterson et al., 2016). For these reasons, using only F&P reading levels limits the generalizability of the overall findings. Further, given what is known about children's development, it is expected that as children progress throughout elementary school, their ability to read will naturally increase (Logan et al., 2013), which can limit the effectiveness of using reading levels as a measure of overall achievement of on this population.

The COVID-19 pandemic brought about several previously described limitations to the study in the form of disruption of in-person schooling and gaps in the data collection. While the onset of the pandemic prompted its own research question regarding the impact had on student functioning after its onset, the timeframe of the study (2015-2022) limited the available data for analyses. There was only one BERI score recorded in June 2021 following the onset of the pandemic. Therefore, the analysis of student's behavioral and emotional functioning after the pause of in-person learning was based on comparing the BERI scores just prior to shutdown (November 2019) with that in June 2021 data point which significantly limits the power of the findings (Shreffler & Hueker, 2022). Using one data point as a measure of behavioral and emotional functioning is not recommended practice as it can grossly underestimate or overestimate presentation of symptomatology (Jones et al., 2015). Further, the fact that different raters (teachers) completed the BASC-3 BESS at each timepoint for the students, the difference in rater adds another possible source of error (Splett et al., 2020).

Future Research

Reviewing the results of this study as well as its limitations points towards areas of future research. Future studies can enhance knowledge of predicting academic achievement at kindergarten entry by efforts to increase sample size. Having a larger sample can help to increase the statistical power and generalizability of the findings. Further, research should examine whether students who received interventions after obtaining below average DIAL-4 scores, as this could have impacted the predictive ability of the measure overall. In addition, future research should measure other empirically supported confounding variables in using kindergarten screeners to predict

academic achievement such as preschool experience, school attendance, English Language Learner status and receipt of special education services. Doing so will allow for there to be stronger evidence for the impact of behavioral and emotional functioning.

Future research can utilize multiple measures of academic achievement rather than the two used in this study. Expansion to more measures of achievement can help to obtain a more comprehensive measure of overall student achievement (Flanagan & McDonough, 2018). To obtain a more comprehensive measure of behavioral and emotional functioning aligned with best practices, future studies should utilize a multi-informant approach (De Los Reyes et al. 2013; Dirks et al, 2012; Hunsley & Mash, 2007). Obtaining information from parents and participants themselves can provide unique information that is not available through teacher report alone (Naser & Dever, 2020; van Dulmen & Egeland, 2011; Zuffianò et al., 2020). Future research can utilize the Parent Questionnaire of the DIAL-4 screening system as a prekindergarten measure of socioemotional functioning.

Given the results of the study which demonstrated a relationship between BERI scores and math achievement and not achievement in English, future studies, using a larger sample size can further explore the differences between the impact had by behavioral and emotional functioning on differing areas of achievement. Additionally, future studies should collect scores on standardized measures of achievement for multiple cohorts of students to better examine the predictive ability of kindergarten screening on later standardized achievement measures.

Implications for Elementary Education

This study emphasizes the utility of prekindergarten screening as a method to predict academic achievement of the students in later elementary grades, thus encouraging widespread practice of prekindergarten screening as measures of predicting academic achievement in elementary schools. In the United States, there are currently no federal regulations for screening students prior to kindergarten entry (Stedron & Berger, 2014; Weisenfeld, 2020). There are even some states where kindergarten attendance is not mandatory (Slutzky & DeBruin-Parecky, 2019). The results of this study shed light on the value of early assessment of student abilities in order to effectively predict future academic achievement early on in student's educational career. Given the proven ability to predict distal academic outcomes from prekindergarten screening measures, the results of this study pave the way for students to receive necessary interventions earlier with the goal of improving academic outcomes.

The results further support the utility of recording and monitoring student's behavioral and emotional functioning. As previously mentioned, the monitoring of student's socioemotional functioning is less frequently mandated (Dowdy & Kamphaus, 2010; Kremer et al., 2016). Results of this study indicate a relationship between student behavioral and emotional functioning and academic achievement. An understanding of student's behavioral and emotional functioning can further support the efforts to provide early academic, behavioral, or emotional interventions. Although teachers can make comments of student behavior on report cards, the results of this study encourage more extensive reporting utilizing a more specific measure of behavioral and emotional risk. The methodology of this study is useful as it offers a model for monitoring progress of

student academic achievement and behavioral and emotional functioning over time. School districts can utilize the framework of this study and adjust as necessary to fit their specific needs and resources available to them.

Lastly, the significant impact that the pandemic and pause of in-person learning had on the academic achievement of students in kindergarten through second grade emphasizes the fragility of emerging reading ability. This knowledge can help elementary schools to frontload extra reading supports for students in earlier grades in effort to help them reach grade-level achievement. Extra supports earlier on can help to increase the likelihood of continual growth in ability and prevent academic regression (Christodoulou et al., 2015).

Chapter 7

Implications for the Practice of School Psychology

These results also offer significant implications for the practice of school psychology. School psychologists can use kindergarten screening data to engage in more proactive strategies of academic intervention for students who exhibit at-risk scores. Beyond the common utility of class placements (Shields et al., 2016), screening data can guide proactive instructional strategies such as response to intervention supports, instructional support meetings and referring for extra help. Further, school psychologists can communicate with parents regarding their child's performance on the screening measures, what the results indicate, and provide resources for helping strengthen the child's skills at home if needed (Lin et al., 2019). As indicated in the literature, early intervention improves the chances of closing gaps between high and low performing students (Fricke et al., 2013; Heckman 2011; Zhang et al., 2014). Results of this study exhibit that data from kindergarten screenings provide educational personnel with an opportunity to intervene early in the educational environment of students who show signs of potential struggle.

This study assists school psychologists and faculty in elementary schools by providing a glimpse into the patterns of functioning of students before and after the onset of the COVID-19 pandemic. An understanding of the degree to which student's emotional and behavioral functioning differed after the onset of this unprecedented occurrence can help equip school psychologists and other educational personnel to better provide interventions for students. The differences noted in the level of impact had on students of different grade levels provides guidance on which students' behavioral and

emotional functioning are most vulnerable to adversity. This can assist school psychologists and other support staff in planning socioemotional learning efforts. Further, this information can inform support staff of counseling caseloads. In turn, this knowledge can guide efforts to check-in with students who are exhibiting higher levels of at-risk behavioral and emotional functioning. An understanding of the way students is impacted by significant events can help educational personnel to foster resilience in students. School psychologists can utilize this information to engage in preventative and proactive strategies to help students thrive when faced with obstacles.

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