FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

EXAMINING SELF-REGULATORY BEHAVIORS AND ATTENTION DIFFICULTIES IN EARLY CHILDHOOD LITERACY ACHIEVEMENT

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by

Obi Bryan Lawrence

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To: Dean Michael R. Heithaus
College of Arts, Science and Education

This dissertation, written by Obi Bryan Lawrence, and entitled Examining Self-regulatory Behaviors and Attention Difficulties in Early Childhood Literacy Achievement, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Florida International University, 2023

DEDICATION

I dedicate this research to my paternal grandmother, who raised me, and my great-aunts.

They instilled in me a love for reading and learning.

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ABSTRACT OF THE DISSERTATION

EXAMINING SELF-REGULATORY BEHAVIORS AND ATTENTION DIFFICULTIES IN EARLY CHILDHOOD LITERACY ACHIEVEMENT

by

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This collected studies dissertation examined students' self-regulatory behaviors, attention difficulties, and first-grade literacy achievement, and whether self-regulatory behaviors had a long-term effect on second and third-grade literacy. Additionally, these studies explored first-grade students' autonomy, adaptation, and persistent behaviors in literacy achievement. The motivation for these studies was to expand national educational reforms calling for preparing K-12 students to become college and career ready based on state academic standards. Academic self-regulatory behaviors are vital factors that contribute to students' literacy success beyond students' sociodemographic differential effects. To understand the contributions of self-regulatory behaviors to the increasing academic complexities and expectations in today's K-12 classrooms, these studies examined students' characteristics and behaviors using methodologically comprehensive models that include target and background variables to explain literacy achievement using an existing national dataset. The data used for the studies came from the Early Childhood Longitudinal Study (ECLS) collected by the National Center for Education

Statistics (NCES). The data included the second kindergarten cohort that began in 2010-2011 (ECLS-K:2011) and followed participants through fifth grade (2015-2016). While conducting analyses to reach research goals, the study created primary constructs utilizing several indicator variables. Teachers completed surveys relating to students' self-regulatory behaviors and attention in first grade. The studies considered students' sociodemographic characteristics as the primary source for student diversity and analyzed the differential effects of constructs for the diverse population. The sociodemographic variables were collected through parent interviews when the student entered the cohort of the ECLS study. The collection of studies expands the understanding of the effects of students-self-regulatory behaviors on literacy achievement by considering students' sociodemographic characteristics using structural equation modeling, hierarchical linear modeling, and hierarchical regression. The studies found that first-grade students' self-regulatory behaviors and attention difficulties significantly mediate literacy achievement and noted the differential effects for various sociodemographic groups. Additionally, the study found the long-term effect of first-grade students' self-regulatory behaviors extending to their second and third grades. Lastly, the studies showed that students' autonomy, adaptability, and persistence accounted for the significant variance in literacy achievement.

TABLE OF CONTENTS

LIST OF TABLES

TABLE PAGE

Chapter 2

Chapter 3

Chapter 4

LIST OF FIGURES

FIGURE PAGE

Chapter 2

Chapter 3

Chapter 4

CHAPTER I

INTRODUCTION

Collected Studies

Self-regulatory behaviors are vital factors that contribute to students' literacy success regardless of sociodemographic backgrounds (Eccles & Wigfield, 2002; Heyder & Kessels, 2017; Metallidou & Vlachou, 2007; Pintrich & de Groot, 1990; Pintrich & Schrauben, 1992). To understand the contributions of young students' self-regulatory behaviors to their literacy achievement beyond academic challenges (Blair & Razza, 2007; Ratcliff et al., 2021; Yogman et al., 2018), this collective studies dissertation examines elementary school-age students and their academic behaviors using structural equation modeling, hierarchical linear modeling, and hierarchical regression modeling. These models explained the concurrent and long-term differential effects on students' academic behaviors and literacy achievement with various groups of students from different backgrounds, cultural experiences, English language proficiency, and learning abilities.

The three quantitative studies for the doctoral dissertation provide comprehensive models that include cross-sectional and longitudinal effects of first-grade students' self-regulatory behaviors on their literacy achievement. To fulfill the goals, three related studies are presented as follows:

(1) Chapter 2: Explored the effects of students' sociodemographic characteristics (parent income, non-English, dual-language, gender, age, and disability) as mediated by students' academic self-regulatory behaviors and attention difficulties on literacy achievement. Students' academic self-regulatory

behaviors and attention difficulties were examined as the direct effects on literacy achievement.

(2) Chapter 3: Investigated the longitudinal effects of students' self-regulatory behaviors, parent income, home language, gender, age, and disability on literacy achievement. The longitudinal effects analyzed three years of students' literacy achievement from the first through the third grade.

(3) Chapter 4: Examined the effects of students' autonomy, adaptability, and persistence on their literacy achievement after controlling for demographic factors such as parent income, home language, gender, age (in months), and disability.

The data used for this collected paper study came from the Early Childhood Longitudinal Study (ECLS) program at the National Center for Education Statistics (NCES). The data included the second kindergarten cohort that began in 2010-2011 (ECLS-K:2011) and followed them to the fifth grade (2015-2016). The ECLS data series are federally sponsored studies that began in the late 1990s to collect national data to facilitate the creation of public policies to benefit children's learning.

While conducting analyses to reach the research goals, the researcher created primary constructs (self-regulatory behaviors and attention difficulties) utilizing several indicator variables. The items of those constructs include teachers' reports of students' behaviors during the fall (self-regulatory behaviors) and spring terms (attention difficulties) of the first-grade school year. Teachers also reported information relating to students' autonomy, adaptation, and persistent behaviors during the fall term of the first-grade year. The primary dependent variable of the studies was literacy achievement

collected during the spring of the first grade. In addition, the studies considered students' sociodemographic characteristics as the primary sources of diversity in the student population and analyzed the differential effects of constructs for diverse groups. The sociodemographic variables were collected through parents' interviews when the student entered the cohort of the ECLS study.

The motivation for the three studies was to expand the national educational reforms calling for preparing K-12 students to become college and career ready, which considers students' cognitive skills and self-regulatory behaviors, which have shown to be instrumental to academic success (Blair & Diamond, 2008; Diamond, 2010; Lonigan et al., 2017; McClelland et al., 2014; Montroy et al., 2014; Skibbe et al., 2019). To underscore the urgency to develop students' academic behaviors in conjunction with cognitive skills, this study attempted to provide critical information on outcomes relating to current academic demands and student expectations in the K-12 classrooms and long-term outcomes.

Background of the Problem

Current education reforms focus on students' academic achievement; students are evaluated based on their standards-based mastery (Anderson, 2018). The standards articulate objectives and goals students are expected to master for each grade level from kindergarten to twelfth grade. The expectations for kindergarten through twelfth-grade students are to achieve according to the outlined demands of the Common Core State Standards (CCSS, 2010) or specific state standards for Language Arts and Mathematics. First, student achievement is measured based on standardized test scores. Then, the student's scores are used to predict students' future college and career readiness (National

Governors Association Center for Best Practices & Council of Chief State School Officers [NGACBPCCSSO], 2010). Moreover, teachers (Steele et al., 2010; Valli & Buese, 2007), principals (Branch et al., 2012), and schools (Mandinach, 2012; U.S. Congress, 2002) are accountable for students' performance on standardized tests. Therefore, teachers are expected to prioritize state standards, develop real-world learning experiences, and incorporate evidence-based practices (Saunders et al., 2013). Nevertheless, researchers have explained that students' future academic success is better predicted by students' self-regulatory behaviors than by cognitive skills (Blair & Diamond, 2008; Diamond, 2010; Lonigan et al., 2017; McClelland et al., 2014; Montroy et al., 2014; Skibbe et al., 2019).

Common Core State Standards

The CCSS are high-quality academic standards in mathematics and English language arts/literacy (National Governors Association Center for Best Practices & Council of Chief State School Officers [NGACBPCCSSO], 2010). These standards outline what students should know and goals that students should meet by the end of each grade level from kindergarten through twelfth grade. In addition, these standards ensure that all students, regardless of where they live, graduate from high school and are ready for college, career, and life (NGACBPCCSSO, 2010).

English Language Arts Standards

The English Language Arts Standards show guidelines for English language arts (ELA) and literacy in history/social studies, science, and technical subjects (NGACBPCCSSO, 2010). The standards emphasize that students must learn to read, write, speak, listen, and use language effectively in varied content areas promoting the

literacy skills and concepts needed for college and career readiness in multiple disciplines.

Schools Incentives to Reform their K-12 Education System

The U.S. Department of Education (USDOE, 2009) supplied incentives to States via the Race to the Top Act (RTTT, 2011) to ensure that students are taught based on state standards. The RTTT (2011) grant program was created under the American Recovery and Reinvestment Act (ARRA, 2009). This grant program incentivizes states to reform their K-12 education system by creating comprehensive teacher evaluations to increase low-performing schools' achievement scores and effectiveness in teachers (Saeki et al., 2015) and school principals' practices (Ballou & Springer, 2015). However, measurement errors (systems that ignore estimation error and rely on t-statistics as a summary measure of teacher performance) have been found in the design and implementation of the evaluation systems, resulting in an unfair assessment of teacher performance (Ballou & Springer, 2015).

Standardized Tests as Predictors of Students' Success

The standardized-state assessments, conforming to the CCSS, measure students' achievement in language arts (including writing and reading) and mathematics. Then, students' scores are used to predict future students' achievements in those areas. However, researchers have found that standardized assessments may not be an accurate or a strong determinant of students' achievement because these assessments do not include students' academic behaviors, personal goals, learning motivation, and preferences that contribute positively to a person's career, schooling and beyond (Succi & Canovi, 2020). For example, Students' academic aptitudes (Heyder & Kessels, 2017) and academic effort

(Eccles & Wigfield, 2002; Metallidou & Vlachou, 2007; Pintrich & de Groot, 1990; Pintrich & Schrauben, 1992) positively contribute to educational outcomes. Additional studies have explained that although teachers focused on students' academic achievement, they understood the need to consider non-academic factors such as students' effort and classroom behaviors conducive to learning (Tierney et al., 2011). In addition, other studies have found that when teachers provide students with opportunities to be conscious about their learning (agency), students develop a sense of exploration and investigation that increases their academic achievement (Kangas et al., 2015). Although state standardized testing does not consider non-academic factors such as students' self-regulatory behaviors as predictors for academic achievement and later success, common core standards incorporate problem-solving skills that require students' self-regulatory behaviors (Fletcher, 2014; Furey et al., 2017).

Problem Statement

The "No Child Left Behind Act" of 2001 (NCLB); "Every Student Succeeds Act" of 2015 (ESSA), which is the NCLB's successor law; and states adopted statewide accountability policies and systems conform to what the U.S. Department of Education shows as fundamental for school accountability reform. These policies and reforms hold teachers (Steele et al., 2010; Valli et al., 2007), principals (Branch et al., 2012), and schools (Mandinach, 2012; U.S. Congress, 2002) responsible for students' college and career readiness by the time they graduate from high school. In addition, states annually evaluate teachers based on their effectiveness in students' achievement in standardized tests under the RttT initiative (U.S. Department of Education, 2009).

These test-based accountability measures in which students' standard-based mastery is accounted for (Anderson, 2018) seem to instill in some teachers the idea that students' cognitive skills are more important than students' self-regulatory behaviors (Al-Mutawah & Fateel, 2018). However, other teachers have recognized the effectiveness of self-regulatory behaviors on students' academic achievement (Kangas et al., 2015; Tierney et al., 2011). Furthermore, a substantial number of studies have explained that students' self-regulatory behaviors are better predictors than cognitive skills for students' future academic achievement (Blair & Diamond, 2008; Diamond, 2010; Lonigan et al., 2017; McClelland et al., 2014; Montroy et al., 2014; Skibbe et al., 2019). Therefore, researchers have promoted the explicit instruction of self-regulatory skills (Dignath & Buttner, 2017; Kistner et al., 2010; Korinek & deFur, 2016; Lawson et al., 2019) arguing that students who do not demonstrate academic self-regulation engage in task-avoidant behaviors that negatively affect students' literacy achievement (Georgiou et al., 2017; Greulich et al., 2014). Additionally, studies have explained that other specific students' self-regulatory behaviors, such as academic autonomy (Brody et al.,1994; Chance, 1961; Genesee, 1980; Guthrie et al.,2000; Marjoribanks, 1981), adaptability (Cook & Coley, 2017; Joussemet et al., 2005; Lee & Bierman, 2015; Robinson & Diamond, 2014; Sattler & Gershoff, 2018), and persistence (Bulotsky-Shearer et al., 2011; Kikas & Silinskas, 2016; Kikas & Magi, 2017; Woods-Groves & Choi, 2017) are contributing factors in literacy achievement.

Based on these findings, it is necessary to understand the dynamics of students' regulatory behaviors and literacy achievement while considering the

differential effects of students' self-regulatory behavior for students from different sociodemographic characteristics such as parent income, home languages (non-English, dual language), gender, age, and disabilities. Additionally, exploring other behaviors closely related to regulatory behaviors, such as attention, autonomy, adaptability, and persistence, is necessary. Moreover, it is crucial to investigate how these dynamics change to understand the long-term effect of nurtured regulatory behavior in early schooling on students' literacy achievement.

Purpose of the Collected Studies

The overarching goal of the three studies was to understand the relation between students' regulatory behaviors and literacy achievement while considering the differential effects of students' self-regulatory behavior for students with different sociodemographic characteristics. In the same manuscript and the subsequent articles, other behaviors closely related to regulatory behaviors, such as attention difficulties, autonomy, adaptability, and persistence, were examined. Additionally, one study investigated how these associations change to understand the long-term effect of self-regulatory behavior in early schooling on literacy development.

Research Questions to the Overarching Problem

The following research questions were considered based on the overall goal of the multi-study dissertation.

1. What are the mediating effects of students' academic self-regulatory behaviors and attention difficulties on literacy achievement? Do the effects differ for students from various sociodemographic backgrounds? Does the outcome have a long-term effect from first to third grade?

2. What is the effect of autonomy, adaptability, and persistence on students' literacy? Do the effects differ for students from various sociodemographic backgrounds?

Overarching Framework for the Study

The overarching theories framing this study are the Expectancy-Value Theory of Achievement Motivation (Wigfield & Eccles, 2000), the Theory of Achievement Goals (Linnenbrink & Pintrich, 2002), and the Self-Determination Theory (Deci & Ryan, 1994, 2008).

The Expectancy-Value Theory of Achievement Motivation

This theory posits that previous negative learning experiences may decrease students' self-concept and self-efficacy, hence increasing the likelihood of expecting the same negative learning experience of failure in future tasks, consequently decreasing interest and employing less effort for completing tasks (Eccles, 1983; Wigfield & Eccles, 2000; Wigfield et al., 2004). Students are not motivated to attempt learning when they perceive an unattainable outcome generating a conflict between approach (hope for success) and avoidance (fear of failure; Schunk, 2012, p. 359).

Self- Determination Theory

The Self-determination Theory (Deci et al., 1991) focuses on students' internalization and social mores or personal values, explaining that students "produce good behavior and social functioning" (Schunk, 2012, p. 389) when their autonomy increases by feeling in control of their behaviors and capable of taking action for learning and attaining goals. Additionally, this theory explains that students' self-determination occurs when their extrinsic motivation turns intrinsic as they develop competence

awareness and perception of control over their learning (Schunk, 2012, p. 389), developing autonomy to gain knowledge.

Significance of the Study

Past studies tend to explain self-regulatory behaviors and attention difficulties in isolation. These collected studies consider both constructs: self-regulatory behaviors and attention difficulties in the same context. It is essential for teachers, administrators, and parents, among other stakeholders involved in early childhood education, to understand that there are concurrent and longitudinal effects of self-regulatory behaviors on early childhood literacy achievement (Blair, 2003; Blair & Razza, 2007; Lonigan et al., 2017; McClelland et al., 2006; Meuwissen & Carlson, 2018; Timmons & Pelletier, 2016). Additionally, teachers need to know that students who demonstrate self-regulatory behaviors in the classroom can succeed academically (Birgisdottir et al., 2015; Blair & Raver, 2014; Hubert et al., 2015). The present collected studies dissertation provides insights to teachers and school stakeholders about the substantial benefits of first-grade students' self-regulatory behaviors on their concurrent and longitudinal literacy achievement. Mainly, the findings of these studies explain that when students in the classroom can keep their belongings organized, follow classroom rules, and pay attention well in addition to showing eagerness to learn, adapting to changes in classroom routines, working independently, and persisting to completing academic tasks show increased literacy achievement at the end of the first-grade year and beyond (second, third grade). Additionally, the findings of these studies support that students who show autonomy, adaptation, and persistence during academic tasks show more significant literacy variance.

Moreover, teachers, administrators, education leaders, and policymakers should understand the positive effects of students' self-regulatory behaviors on academic achievement when developing lessons and curricula. Studies have found that when instruction focuses on subject-matter-related content, and students are unable to succeed, students feel hopeless and ashamed and tend to engage in task-avoidant behaviors detrimental to early childhood literacy achievement (Greulich et al., 2014).

Description of Collected Studies

The overarching goal of the collected studies was to understand the efforts of students' self-regulatory behaviors on literacy achievement while considering the differential effects and how outcomes change over the years. Three independent studies were quantitatively analyzed using the national data from the Early Childhood Longitudinal Study K-4 (ECLS-K-4:2010-2011).

Study 1 – Structural Equation Modeling (SEM)

The first study, titled *Effects of Academic Self-Regulatory Behaviors and Attention Difficulties on Literacy Achievement of First-grade Students* explored the mediating effects of self-regulatory behaviors and attention difficulties between students' sociodemographic characteristics: parent income, non-English, dual-language, gender, age, and disability, and literacy achievement. Additionally, students' academic self-regulatory behaviors and attention difficulties were examined as the direct effects on literacy achievement.

The following research questions guided the analysis of this study.

1. Are self-regulatory behaviors and attention difficulties significant mediators between students' sociodemographic characteristics and literacy achievement?
2. Do first-grade students' self-regulatory behaviors, attention difficulties, parent income, non-English, dual language, gender, age, and disability status show significant effects on students' literacy achievement?

This study applied exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) with SPSS and AMOS to develop the constructs: students' self-regulatory behaviors and attention difficulties. Structural Equation Modeling (SEM) was adopted for the model of variable relationships using the software AMOS. The analysis sought for the (1) direct and indirect effects of parent income, non-English, dual-language, gender, age, disability, self-regulatory behaviors, and attention difficulties on students' literacy and (2) mediating effects of self-regulatory behaviors and attention difficulties on literacy achievement.

Study 2 – Hierarchical Linear Modeling (HLM)

The second study, titled *Longitudinal Effects of First-grade Students' Self-Regulatory Behaviors on First-, Second-, and Third-Grade Literacy Achievement,* investigated the longitudinal effects of students' self-regulatory behaviors, parent income, home language, gender, age, disability, and literacy achievement.

The following research questions guided the analysis of this study.

1. Are there significant differences in students' literacy development with different growth patterns over time?

2. Are there significant longitudinal effects of parent income, home language, gender, age, and disability on students' literacy development?
3. Are there significant effects of students' self-regulatory behaviors developed in first grade on the longitudinal growth of students' literacy?

This study utilized Hierarchical Linear Modeling (HLM) using SPSS and HLM software. The longitudinal effects analyzed three years of students' literacy achievement from first through third grade. The analysis sought students' literacy development (1) over time with different growth patterns, (2) influenced by parent income, home language, and gender, and (3) if students' literacy growth pattern was significantly influenced by their self-regulatory behavior developed in their first grade.

Study 3 – Hierarchical Regression (HR)

The third study, titled *Predictors of First-Grade Students' Academic Autonomy, Adaptability, and Persistence on Literacy Achievement,* aimed to examine the effects of autonomy, adaptability, and persistence on students' literacy achievement after controlling for demographic factors such as parent income, home language, gender, age (in months), and disability.

The following research questions guided the analysis of this study.

1. Do autonomy, adaptability, and persistence predict literacy achievement after controlling for each other and demographic variables? If it does, how much literacy achievement will be explained?
2. Do parent income, home language, gender, age, and disability significantly affect literacy achievement?

This study employed hierarchical regression analysis using SPSS to identify the predictability of first-grade students' autonomy, adaptability, and persistence in their literacy achievement above and beyond sociodemographic demographics.

Definition of Terms

Young Students

Young students are referred through the three studies to students from preschool to third grade whose average age ranges from four to eight years.

Self-regulatory Behaviors or Self-regulatory Learning

Self-regulatory behaviors refer to the way learners "systematically activate and sustain their cognitions, motivations, behaviors, and affects, toward the attainment of their goals" using the description of Schunk and Greene (2018, P. 1) and how students control and direct their attention, thoughts processes, emotions, and behaviors (McClelland & Cameron, 2012).

Effortful Control

Effortful control refers to the students' ability to plan, activate a sub-dominant response, and inhibit a dominant response (Blair & Razza, 2007).

Cognitive Development

Cognitive development refers to the students' knowledge growth in a subject matter, such as literacy skills (Byrnes et al., 2019).

Cognitive Skills

Cognitive Skills refer to the students' higher-order thinking skills to decode, read fluently, and extract meaning from text (Afflerbach, 2022).

Inhibitory control

Inhibitory control refers to the students' ability to restrain impulsive behaviors and ideas to carry out predetermined activities (Suppalarkbunlue et al., 2023).

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CHAPTER II

EFFECTS OF ACADEMIC SELF-REGULATORY BEHAVIORS AND ATTENTION DIFFICULTIES ON LITERACY ACHIEVEMENT OF FIRST-GRADE STUDENTS

Abstract

Studies have found a robust positive association between students' self-regulatory behaviors and literacy achievement. Also, prior studies have identified a negative relationship between students' attention difficulties and literacy achievement. However, past studies tend to explain self-regulatory behaviors and attention difficulties in isolation. The current study explored the effects of students' sociodemographic characteristics on literacy development using self-regulatory behaviors and attention difficulties as mediators. This study used national representative data from the Early Childhood Longitudinal Studies Program (ECLS-K: 2011) and structural equation modeling to analyze the pathways by which first-grade students' self-regulatory behaviors (n = 4,985) and attention difficulties (n = 13,384) mediate literacy achievement while considering students' sociodemographic characteristics such as parent income, non-English language used at home, dual language status, gender, age, and disability. Students' self-regulatory behaviors were measured during the fall term of their first-grade year, and attention difficulties and literacy achievement during the spring term of the same school year. Findings showed the positive self-regulatory behaviors and negative attention difficulties mediating effects on first-grade students' literacy achievement. Additionally, this study found differential direct and mediating effects based on students' sociodemographic characteristics. The current study stresses the importance of

developing first-grade students' self-regulatory behaviors as a way to manage attention difficulties and increase literacy achievement.

Keywords: Self-regulatory behaviors, attention difficulties, literacy achievement, structural equation modeling

Introduction

Researchers underscore the significance of self-regulatory behaviors in early childhood because they are vital precursors of future academic achievement and school success (Moffett & Morrison, 2020). Self-regulated students could use their cognitive skills, motivations, and emotions to respond to tasks and challenges (Blair & Razza, 2007) regardless of environmental distractions (Ratcliff et al., 2021; Yogman et al., 2018). Other researchers draw reciprocal paths between self-regulatory behaviors and literacy achievement (Connor et al., 2016), which can be effectively taught to students in elementary schools and English language learners (Liew et al., 2020), and students with disabilities (Lichtinger & Kaplan, 2015).

Students' attention shifting, off-task behaviors, or inhibitory control can also directly and indirectly influence reading (Keiffer et al., 2013) and listening comprehension (Kim and Phillip, 2014). Although students' attention-shifting behaviors showed a negative association with students' literacy achievement, not all off-task behaviors have a negative impact. For example, Moffett and Morrison (2020) explained that students who engaged in off-task behaviors with peers in other appealing and related activities did not necessarily demonstrate a lack of literacy achievement. The authors suggested that teachers should stop students' off-task behaviors only when they are detrimental to their academic achievement. In a similar vein, the study of McGee et al.

(2015) explained the significant association between students' learning actions and literacy achievement, where students who engaged in monitoring and self-correcting behaviors demonstrated literacy growth. Their study added to prior study that students who monitored their reading comprehension demonstrated higher literacy, including listening comprehension (Kim & Phillips, 2014). Roberts et al. (2020) supported that children with high levels of attention showed later higher literacy achievement and claimed that students' participation and affect behaviors increased literacy achievement.

However, these studies have explored self-regulatory and attention behaviors in isolation, failing to explain the dynamic paths of those two behaviors affecting students' literacy development. Therefore, the present study conducted an integrated analysis to explore the differential direct and indirect effects of self-regulatory behaviors and attention difficulties on their paths to literacy achievement considering diverse students' characteristics such as parent income, the non-English language used at home, dual language status, gender, age, and disability. This study makes significant contributions to the field of literacy by investigating the differential effects of students' sociodemographic characteristics on literacy achievement. Specifically, it examines the effects of student from low-income homes who often face limited opportunities for literacy learning experiences and academic resources, hindering their school readiness and self-regulatory behaviors necessary for academic success. Additionally, the study highlights the influence of age on literacy performance, indicating that older students outperform their younger counterparts. Consequently, it emphasizes the significance of providing additional support to younger students to enhance their literacy skills.

These findings regarding sociodemographic differential effects underscore the sense of urgency for teachers to recognize and address the specific needs of children based on their unique sociodemographic differences. Teachers should adopt explicit and tailored practices to accommodate the diverse requirements of students, fostering an inclusive and equitable learning environment.

Literature Review

Self-Regulatory Behaviors and Literacy Development

Self-regulation is a broad construct that needs clear definitions (McClelland & Cameron, 2012). This study focused on self-regulatory behaviors as the way learners "systematically activate and sustain their cognitions, motivations, behaviors, and affects, toward the attainment of their goals" using the description of Schunk and Greene (2018, P. 1) and how students control and direct their attention, thoughts processes, emotions, and behaviors (McClelland & Cameron, 2012). Importantly, self-regulatory behaviors are non-academic skills essential to students' literacy achievement (Birgisdóttir et al., 2015; Mills et al., 2019). Students develop self-regulatory skills when they can control their thoughts and behaviors during academic tasks, solve academic problems, plan for learning, and complete academic tasks (McClelland & Cameron, 2019); and organize their physical environment, take notes, record their performances, rehearse, minimize distraction, and self-punish/-reward (Schunk & Greene, 2018). Briefly, self-regulatory behaviors are complex and motivationally demanding, requiring students to engage in behaviors that facilitate the attainment of goals consciously.

Students' reading competence is the foundation for academic success; however, reading ability is not innate. It is a learning process that can be frustrating for struggling

readers (Liew et al., 2020), which may include English language learners (Lonigan et al., 2017; Swanson et al., 2016) and students with disabilities (Woolley, 2016). From the preschool years, children's self-regulatory behaviors are strongly associated with literacy achievement (Lonigan et al., 2016). According to Liew et al., developing reading competence is a complex process that requires students to regulate their emotions and persistence. They suggested the importance of teachers integrating instructional approaches into students' emotional self-regulation and literacy contexts. The authors explained that person-in-context dynamics mediated by reading motivation and engagement influence reading competence positively. Thi-Thu-Hien et al. (2019) also showed that teachers should continue exposing their students to advanced academic content during these integration processes due to the benefits of teaching students with high academic expectations.

Attention, Persistence, Regulation, Effortful Control

Self-regulation requires students to exhibit attention, persistence, regulation, and effortful control. When students are motivated during the early childhood years of school, they demonstrate sustained attention and higher academic achievement than their counterparts (McDermott et al., 2014). However, as academic expectations increase and students struggle in academic contexts, their motivation and attentional persistence deteriorate. Therefore, teachers identifying their students' lack of motivation and attention persistence can develop strategies to improve those skills to avoid students' future academic failure.

Academic attention is a necessary factor in increasing literacy achievement. Students in the early grades with higher attention levels demonstrated higher literacy

competence, particularly in writing during kindergarten and oral language in first grade (Kent et al., 2014). In a study, Zevenbergen and Ryan (2010) suggested that boys with attention problems showed limited expressive language, whereas girls' attention problems showed low academic achievement. In addition, studies examining kindergarten students' inattention across genders explained that boys engaged in more academic off-task behaviors with another activity, whereas girls engaged with peers (Moffett & Morrison, 2020).

Teachers' attention to their students' effortful control and frustration levels can promote positive learning experiences that develop students' motivation and engagement. Effortful control refers to the students' ability to plan, activate a sub-dominant response, and inhibit a dominant response (Blair & Razza, 2007). Students with higher levels of effortful control at the beginning of first grade demonstrate higher literacy achievement at the end of the school year (Zhang & Rao, 2017). Equally important, students' perceptions of their effortful control and frustration levels also predict their literacy achievement. For example, Huang and Yeh (2019) commented that students with higher perceptions of their effortful control have higher literacy achievement. Huan and Yeh also explained that students' high frustration levels moderated the predictive effects of students' attention control on reading comprehension. Based on these findings, Zhang and Rao exhorted that teachers should foster effortful control in students as early as in the first and second grades of their schooling.

Students' Emotions and Attention Behaviors

Kindergarten and first-grade students' sustained attention may depend on their emotional regulation. O'Connor et al. (2014) explained that students' temperament

conducive to learning increases literacy achievement. They found that reduced disruptive behaviors positively mediated kindergarten and first-grade students sustained attention and literacy achievement. The authors showed that when students develop social-emotional skills, they also showed fewer disruptive behaviors and increased attention and literacy achievement, and the effect was more substantial for students from low-income homes. Interventions developing these skills as early as kindergarten to reduce students' disruptive behaviors are beneficial and positively impact literacy achievement, particularly for students with disabilities (Kulkarni & Sullivan, 2019). First-grade students' disruptive and externalizing behaviors that affect their learning achievement predict special education placement in third grade (Kulkarni & Sullivan, 2019). Therefore, Kulkarni and Sullivan argued the importance of early intervention to reduce the severity of students' disruptive and externalizing behaviors to increase the possibility of academic achievement. Other factors contributing to kindergarten students' inattention are their response inhibition and working memory (Ahmed et al., 2019). Students entering their first formal year of schooling experience increased academic expectations. Students are expected to follow directions, listen to instructions, sit for an extended time, meet task deadlines, organize their immediate learning environment (e.g., pencils, notebook, textbooks, desk), and engage in independent and collaborative learning. These activities are specific examples supported by the definition of self-regulatory behaviors explained by Schunk and Greene (2018), and those activities combined require students to have self-regulatory skills.

Attention Difficulties and Literacy Achievement

Greulich et al. (2014) suggested that first-grade students participating in challenging literacy tasks and demonstrating limited engagement, detrimental behaviors, and emotions showed hopelessness, shame, and task-avoidant behaviors. These findings are consistent with Magi et al. (2013) and Torppa et al. (2017), who argued that students with pre-literacy skills engaged in more minor task-avoidant behaviors. Furthermore, students who demonstrated higher levels of task-avoidant behaviors demonstrated low literacy skills, whereas students who showed lower levels of task-avoidant behaviors demonstrated higher literacy skills.

In early childhood, the classroom learning environment is an essential consideration in promoting the academic achievement of young children and can increase students' attentional and behavioral classroom expectations (Blair & Raver, 2012, 2015). Additionally, a classroom environment that provides opportunities for peer interactions during academic and social activities develops students' self-regulatory behaviors (Holmes et al., 2016; Huston et al., 2015), which is beneficial for children to be better able to pursue goals and avoid distractions (Yogman et al., 2018).

Task-avoidant behaviors strongly predict literacy achievement over cognitive skills (Niemi et al., 2011), and the two are negatively associated (Georgiou et al., 2017). In addition, task avoidance resulting from students' prior failure experiences decreased students' self-concept and self-efficacy beliefs; hence students avoided tasks to prevent the possibility of future failures (Georgiou et al., 2017).

Moffett and Morrison (2020) examined how off-task (task-avoidant) behaviors negatively impacted first-grade students' literacy achievement and found that high

proportions of students' time spent in off-task behaviors negatively impacted literacy achievement. They also found that students who engaged in other activities with peers, productive non-instruction, unproductive non-instruction, and teachers' managed classrooms significantly affected literacy achievement. The authors suggested that students who engaged in off-task behaviors that included other activities demonstrated lower literacy achievement, whereas students who engaged in off-task behaviors with peers showed literacy growth.

Self-Regulatory Behaviors and Attention Difficulties for English Language Learners and Students with Disabilities

Many researchers have explained the significant effect of students' self-regulatory behaviors and literacy achievement dynamics affecting English language learners (Palacios & Bohlmann, 2020). English language learners come from homes whose primary language is other than English. Self-regulation and language knowledge are two important factors for academic and life success (Best & Miller, 2010) that can be interdependent (Hanno & Surrain, 2019). When English language learners score below average in preschool-entry English vocabulary, they will likely demonstrate academic concerns in kindergarten (Lonigan et al., 2017). Their study found that students who exhibited inhibitory control regardless of their primary language (English or Spanish) showed higher academic achievement than their counterparts. However, English language learners needed to develop phonological awareness before succeeding in tasks that included language-specific information such as print knowledge and vocabulary.

Lichtinger and Kaplan (2015) have concluded that students engage in self-regulatory behaviors based on personal and varied motivational orientations. Elementary

school students with learning disabilities with different backgrounds and social characteristics engaged in academic tasks in various ways based on their purpose, goals, content knowledge, and strategy awareness. Their case study explained that seven to twelve-year-old students with learning disabilities in inclusive classroom settings, who had prior knowledge, a purpose and goals for completing tasks, and were aware of strategies they could use, such as purpose and self-regulation of engagement, demonstrated higher literacy achievement levels when compared to other students with learning disabilities. Students with disabilities who know strategies to increase their learning feel equipped and have the self-efficacy to succeed academically. Conderman and Hedin (2011) and Ozbek et al. (2019) argued that teaching students with disabilities learning strategies effectively increase their academic achievement.

Methods

The present study explored the effects of students' sociodemographic variables such as parent income, non-English, dual language, gender, age, and disability status on literacy achievement. Also, the study examined the mediating effects of students' academic self-regulatory behaviors and attention difficulties of sociodemographic variables on literacy achievement.

Research Questions

The following two overarching research questions were attempted to be answered:

1. Are self-regulatory behaviors and attention difficulties significant mediators between students' sociodemographic characteristics and literacy achievement?

2. Do first-grade students' self-regulatory behaviors, attention difficulties, parent income, non-English, dual language, gender, age, and disability status show significant effects on students' literacy achievement?

Data

The study analyzed US national data, the Early Childhood Longitudinal Study K-5 (ECLSK-5:2010-2011), which collected data from kindergarteners in 2010-2011 and followed them to their fifth grade. From the available data, the study used first-grade data. Missing cases were treated for each construct: self-regulatory behaviors (n = 4,985) and attention difficulties (n = 13,384).

Variables

Dependent Variables

The dependent variable (endogenous variable) is the literacy performance score assessed using Item Response Theory (IRT) in the first-grade spring semester 2012. The 1st grade Spring IRT assessment was administered to students in two parts for reading subject areas and drove item response theory (IRT) scale scores. The overall IRT scale scores were generated by criterion-referenced assessment at each time point. The test was categorized into three levels of difficulty, and students would receive one of the three tests depending on their performance level. The reading assessment included questions measuring students' basic reading skills (print familiarity, letter recognition, beginning and ending sounds, rhyming words, word recognition, vocabulary knowledge, and reading comprehension). For example, the reading comprehension section of the assessment required students to identify text-specific information such as definitions, facts, and supporting details, make complex inferences within the text, evaluate the text

objectively, and judge the text's appropriateness and quality. This adaptive design maximized the accuracy of measurement and minimized test administration time.

Mediating Variables

The mediating variables: students' self-regulatory behaviors and attention difficulties, were latent variables constructed using seven and four observed (manifest) variables, respectively. The data were collected by teachers using a questionnaire that included the items from the Short Form of the Children's Behavior Questionnaire (Putnam & Rothbart, 2006). In addition, teachers reported how often students exhibited the behaviors. The data for the mediating latent variable of students' self-regulatory learning were collected in the fall of first grade in 2011 (See Appendix A). The seven indicator variables for the construct of self-regulatory behaviors are that the (1) *student keeps belongings organized*, (2*) shows eagerness to learn new things*, (3) *works independently*, (4) *easily adapts to changes in routine*, (5) *persists in completing tasks*, (6) *pays attention well*, and (7) *follows classroom rules*. The data for the second mediating latent variable of students' attention difficulties were collected in the first-grade spring in 2012 (See Appendix B). The four indicator variables for attention difficulties were (1) *student distracts easily doing activities*, (2) *moves task to task without completing*, (3) *distracts easily listening to the story*, and (4) *has trouble sitting still when told*.

Independent Variables

This study's sociodemographic characteristics specified as independent variables (exogenous variables) were students' parent income, non-English speaking homes (non-English), dual language, gender, age, and disability status. Student's parent income data

were collected from parent interviews in the spring of 2011 and revised in the spring of 2012. The parent income ranges were grouped into 18 categories, with a $5,000 increment from $5,000 or less to $200,001 or more. Home language data were collected from parents' interviews during kindergarten in the fall of 2010. Missing data were recollected in later parent interviews during the spring of 2011in kindergarten and the spring of 2013 in the first-grade year. Student home language was coded with 1 (non-English language), 2 (English language), and 3 (cannot choose primary or two languages equally) and recoded into two dummy variables (non-English and dual language) for structural equation modeling analysis. The student's gender was first collected from parents' interviews in fall kindergarten and later confirmed during parents' interviews in the spring kindergarten. Missing information was recollected during parents' interviews in later terms. The student gender was initially coded with 1 (male) and 2 (female) and re-coded into a dummy variable (male=0, female=1) for the primary analysis. Students' age is represented in months at the time of the assessments. The data collection identifying students with disabilities was collected by parent interviews responding if their child was diagnosed with a disability or if the child has received specialized services. Students were coded as 1 (disability diagnosed, therapy received) and 2 (no disability diagnosed, no therapy services received).

Data Analyses

The two mediator variables: self-regulatory learning and attention difficulties, were latent variables constructed using indicator variables. Those two variables were constructed for two paths: One is for preliminary analysis, and the other for the primary analysis. For preliminary analysis, Cronbach's Alpha was used for internal consistency as

a reliability measure for each construct. After ensuring the internal consistency of each construct, the study created two composite variables using Barlette's scores of exploratory factor analysis (EFA). This was used to analyze the correlation with other variables. The results of preliminary analyses are presented in Tables 1–3.

The study's primary analyses were done through two-stage structural equation modeling (SEM). In the first stage, the study conducted confirmatory factor analysis (CFA) by using the analysis of moment structures (AMOS) software (Arbuckle, 2003). The CFA analysis provided information on how well the proposed model constructed two latent variables using indicator variables with fit statistics. After validating two constructs, the study analyzed the full structural model in the second stage with all variables. The structural model explored the direct and indirect effects of first-grade students' sociodemographic characteristics: students' parent income, non-English, dual language, disability, gender, and age on first-grade spring IRT reading scores and examined the effects of two mediating variables: self-regulatory learning, and attention difficulties.

Findings

Preliminary Analysis for Two Constructs

The study conducted correlation analyses among indicator variables on each construct (Table 1). All indicators for both constructs were significantly correlated with its construct at the .01 level, although indicators of attention difficulty tended to show higher coefficients (range =.588 to .756) than those of self-regulatory learning (range =.449 to .714).

The study also conducted an exploratory analysis for two constructs to ensure the one-dimensionality of each construct and sufficient loadings of indicators to each construct.

Table 1

Correlations Among Items for Self-Regulatory Behaviors and Attention Difficulties

Self-Regulatory Behavior							
	1	2	3	4	5	6	7
1. Keeps belongings organized	__						
2. Shows eagerness to learn	.449**	__					
3. Works independently	.565**	.633*	__				
4. Easily adapts to changes	.452**	.481**	.531**	__			
5. Persists in completing tasks	.566**	.588**	.696**	.512**	__		
6. Pays attention well	.609**	.613**	.714**	.529**	.693**	__	
7. Follows class rules	.545**	.469**	.575**	.503**	.559**	.714**	__
Attention Difficulties							
	1	2	3	4			
1. Distracts easily doing activities	__						
2. Moves task to task w/o completing	.756**	__					
3. Distracts easily listening story	.737**	.651**	__				
4. Trouble sitting still when told	.660**	.588**	.724**	__			

Note: ** indicates correlation is significant at the 0.01 level (2-tailed).

Exploratory Factor Analysis

The exploratory factor analysis for the two constructs produced acceptable fit statistics suggesting that the indicators adequately represented each construct, as shown in Table 2. The two composite variables were created using Bartlett scores for correlation

analyses with other exogenous and endogenous variables. All indicators were significantly loaded on the factors of self-regulatory learning with loadings from .708 to .882 ($p < 0.001$) and attention difficulty with loadings from .847 to .904 ($p < 0.001$). The EFA results indicated a similar pattern as shown in correlation analysis, with attention difficulty higher loading than self-regulatory learning behaviors.

Table 2

Item and Descriptive Statistics for Scales

Scale and Item	*M*	*SD*	*Factor Loading from EFA*	*Factor Loading From CFA*
1st Grade Fall Self-regulatory behaviors *Cronbach α=.903, KMO=. 915, Total variance explained=63.550*				
Keeps belongings organized	2.84	.905	.748	.696
Shows eagerness to learn	3.12	.857	.758	.702
Works independently	3.06	.868	.852	.825
Easily adapts to changes	3.11	.804	.708	.631
Persists completing tasks	3.01	.921	.833	.800
Pays attention well	2.92	.897	.882	.883
Follows classroom rules	3.25	.773	.784	.751
1st Grade Spring Attention difficulties *Cronbach α=.897, KMO= .815, Total variance explained=76.510*				
Distracts easily doing activities	3.39	2.002	.904	.888
Moves task to task w/o completing	3.01	1.939	.855	.807
Distracts easily listening story	3.35	1.954	.891	.846
Trouble sitting still when told	3.14	2.010	.847	.776

Correlation Among all Variables

Using the two construct variables created by indicator items, the study conducted a correlation analysis and presented it in Table 3. The correlation matrix indicates significant correlations among the primary dependent variable (literacy achievement) and

the independent variables (income, non-English, dual language, disability, gender, age), and two mediator variables (self-regulation and attention difficulties).

When employed preliminary analyses, variables were normally distributed and linear. Additionally, there was no indication of a violation of the multivariate normality.

Table 3

Correlations among Variables

Self-Regulatory Behavior									
	1	2	3	4	5	6	7	8	9
1. Income									
2. Non-English	-.266**								
3. Dual language	-.020*	-.050**							
4. Disability	-.022*	-.094**	-.012						
5. Gender	-.001	-.011	-.001	.127**					
6. Age	-.011	-.089**	-.024**	.090**	.066**				
7. Self-regulation	.171**	.016	-.012	-.159**	-.236**	.069**			
8. Attention difficulties	-.173**	-.047**	-.006	.158**	.250**	-.011	-.687**		
9. Literacy achievement	.351**	-.164**	-.022**	-.140**	-.110**	.069**	.441**	-.426**	

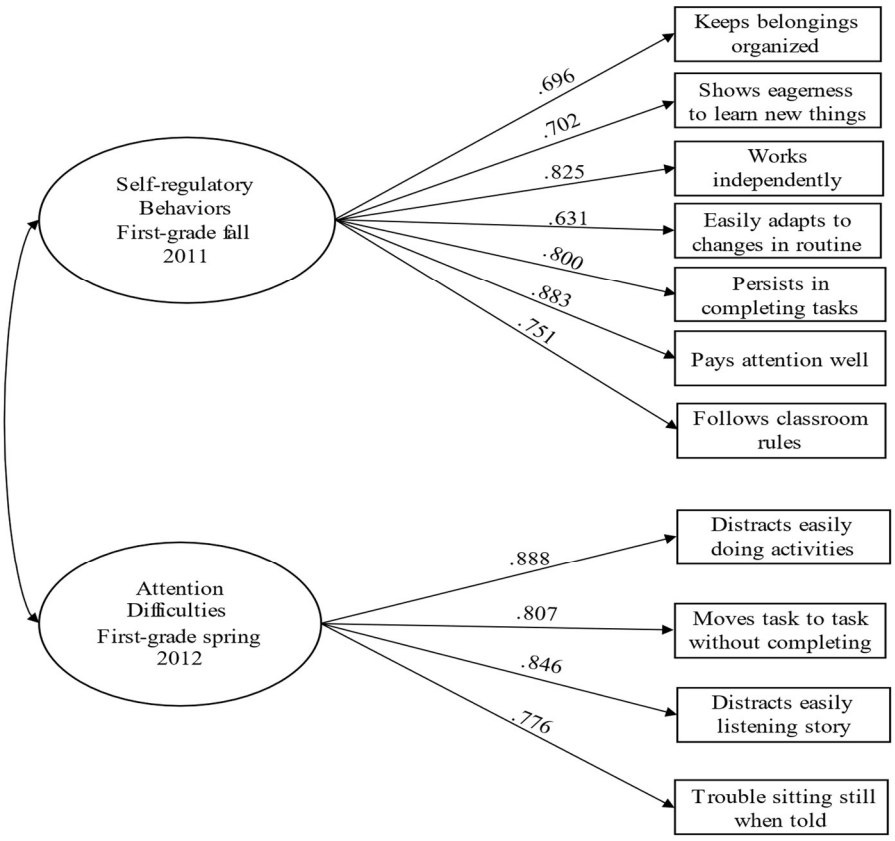
Note: ** indicates correlation is significant at the 0.01 level (2-tailed).

Primary Analyses

As a prior model requisite to our full structural model that composed all paths of exogenous and mediator variables to endogenous variables, the study conducted a confirmatory factor analysis (CFA), as presented in Table 2 and Figure 1. All indicator variables were significantly loaded on self-regulatory behavior and attention difficulty factors. The indicators' loadings of self-regulatory behavior ranged from .631 to .883 ($p <$ 0.001), and those of attention difficulty ranged from .776 to .888 ($p < 0.001$). The CFA results indicated a similar pattern as shown in correlation analysis and EFA, with higher attention difficulty loading than self-regulatory behaviors.

Figure 1

Loadings of Indicator Variables for Two Constructs from Confirmatory Factor Analysis



The structural model included students' demographic characteristics (parent income, non-English home, dual language, disability, gender, and age), self-regulatory behaviors, attention difficulties, and first-grade spring literacy achievement. As indicated in Table 4, the overall model showed an acceptable fit with the Root Mean Square Error of Approximation (RMSEA) value of 0.058 which is less than 0.08 (Schumacker & Lomax, 2015). Additionally, the Normed Fit Index (NFI) was 0.886, and the Goodness of Fit Index (GFI) was 0.886, slightly lower than 0.90. Although a chi-square with the value of 7500.984 (p <0.01) did not support the model, the chi-square produces a significant result with a large sample (Joreskog & Sorbom, 1989; Bentler, 1990).

Table 4

Goodness-of-Fit Statistics

Indicators	β	df	P-Value
Chi-Square	7500.984	122	0.000
RMSEA	0.058		
*NFI	0.886		
*CFI	0.888		

In the subsequent analyses, the study interpreted three main sets of individual paths: the first set was students' sociodemographic paths to mediator variables, the second set was mediators to the endogenous variable, and the last set was paths from students' sociodemographic via mediators to the endogenous variable. In the first set of analyses, students' demographic characteristics directly affected self-regulatory behavior. Students from families with high home incomes demonstrated high self-regulatory behaviors. Per one-unit increased income, a student's self-regulatory score increased by 0.220 points, which is significant ($\beta = .220$, $p < .001$). Students from homes that speak a language other than English as a primary language were .083 points higher than students

with English as a primary language, which is significant (β = .083, p < .001). Students from homes that speak a dual language (English and another language) are not significantly different from students whose primary language is English (β = .003, p > .001). Students with disability showed a significantly lower literacy performance by .160 points than students without disabilities (β = -.160, p < .001). Females were significantly higher by .235 points than males (β = .235, p < .001). Students' age was also significantly related to literacy performance, in which for each monthly increase in age, students scored .110 higher in self-regulatory behaviors (β = .110, p < .001).

When evaluating direct paths, there are differences from students' demographic characteristics to attention difficulty. Students from homes with a one-point increase in salary showed .225 points lower in attention difficulties (β = -.225, p < .001), as the expected reverse relationship between home income and attention difficulties. Interestingly, students from homes that speak a language other than English as a primary language were significantly lower by .100 points than students from homes with English as a primary language (β = -.100, p < .001). Students from homes that speak a dual language (English and another language) were not significantly different from students whose primary language was English (β = -.018, p > .001). Students with disability were significantly higher by .145 than those without disabilities (β =.145, p < .001). Females were significantly lower by .248 points from the reference group, males (β = -.248, p < .001). Students' age was also significantly related to literacy performance. When a student is a month older than a student with an average age, the student has .071 points lower in attention difficulties (β = .071, p < .001).

The study noted significant direct paths from mediators to literacy achievement in the second set of analyses. For example, when self-regulatory behavior increased by one point, literacy achievement was increased by .187 (β =.187, $p < .001$), and when attention difficulties increased by one point, literacy achievement decreased by .383 (β = -.383, $p < .001$).

The last set of the analysis showed that students from homes with higher income outperformed their counterparts (Total Effect: β = .334, $p < .001$; Direct Effect:(β = .207, $p < .001$; Indirect Effect: β = .127, $p < .001$). Students from homes that speak a language other than English as a primary language performed lower than students from home with English as a primary language, which is significant (Total Effect: β = -.085, $p < .001$; Direct Effect: β = -.139, $p < .001$; Indirect Effect: β = .054, $p < .001$). Students from homes that speak a dual language (English and another language) also displayed a lower literacy performance than students whose primary language was English (Total Effect: β = -.018, $p < .001$; Direct Effect: β = -.025, $p < .001$; Indirect Effect: β = .007, $p < .001$). Students with disability showed a significantly lower literacy performance than those without disabilities (Total Effect: β = -.148, $p < .001$; Direct Effect: β = -.063, $p < .001$; Indirect Effect: β = -.085, $p < .001$). There was a significant difference between males and females in their first-grade students' literacy achievement. Females outperformed compared to males, which was significant (Total Effect: β = .102, $p < .001$; Direct Effect: β = -.037, $p < .001$; Indirect Effect: β = .139, $p < .001$). Students' age was significantly related to literacy performance. When a student is a month older than a student with an average age, he or she has performed higher in literacy achievement (Total Effect: β = .081, $p < .001$; Direct Effect: β = .033, $p < .001$; Indirect Effect: β = .048, $p < .001$).

Table 5

Structural Equation Model Examining Relationships of All Variables

Variables	Direct Effect	Indirect Effect	Total Effect
Mediator: Self-regulatory behaviors			
Income	.220***	---	.220***
Non-English	.083***	---	.083***
Dual language	.003	---	.003
Disability	-.160***	---	-.160***
Gender	.235***	---	-.235***
Age	.110***	---	.110***
Mediator: Attention difficulties			
Income	-.225***	---	-.225***
Non-English	-.100***	---	-.100***
Dual language	-.018*	---	-.018*
Disability	.145***	---	.145***
Gender	-.248***	---	-.248***
Age	-.071***	---	-.071***
Outcome Variable: First Grade Spring IRT Reading Score			
Income	.207***	.127	.334***
Non-English	-.139***	.054	-.085***
Dual language	-.025*	.007	-.018*
Disability	-.063***	-.085	-.148***
Gender	-.037***	.139	.102***
Age	.033***	.048	.081***
Self-regulatory	.187***	---	.187***
Attention difficulties	-.383***	---	-.383***

*p < 0.05; **p < 0.01; ***p < 0.001.

Figure 2

The Full Structural Model with Loadings.

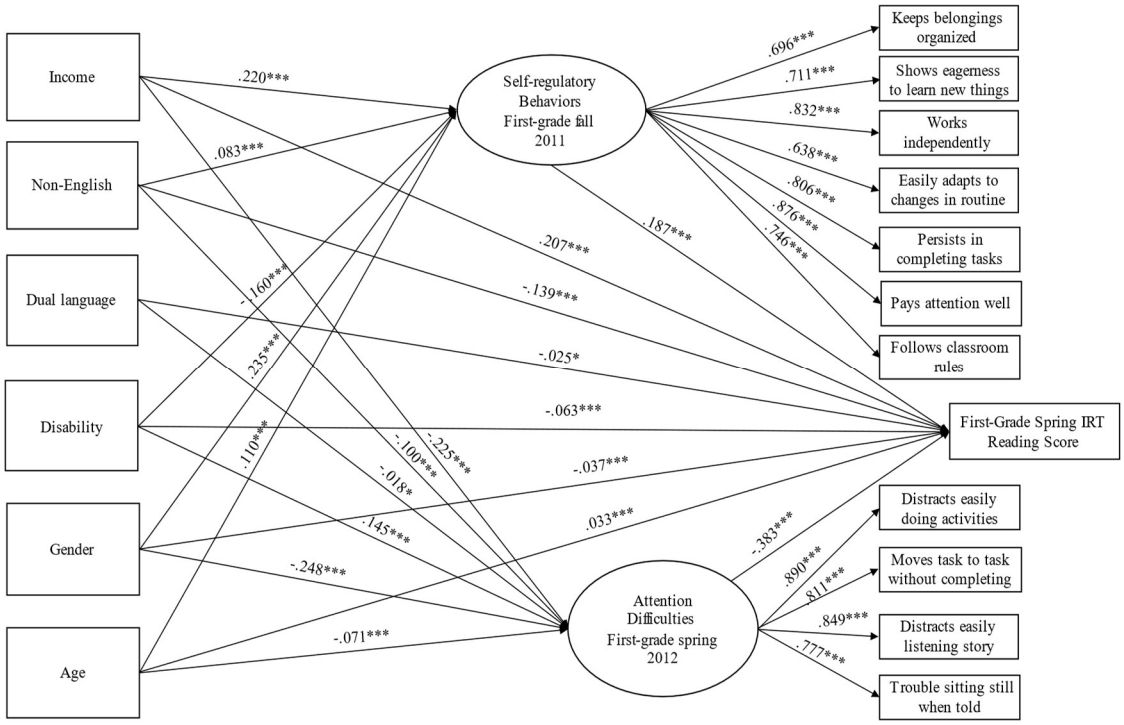


Figure 2 illustrates the full model, including students' sociodemographic characteristics and the two mediators: self-regulatory behaviors, attention difficulties, and literacy achievement with all their loadings.

Discussion

This study explored the direct and indirect effects of first-grade students' sociodemographic characteristics on their literacy achievement by introducing two mediator variables of self-regulatory behavior and attention difficulties. Self-regulatory behaviors were used as mediators. Exploring the mediating effects of self-regulatory behavior and attention difficulty was based on prior research showing that those two separately significantly affected students' school success. However, the prior research did

not examine those two effects in the same context, although they can make significant paths. Therefore, this study aimed to identify the effects of those.

Another significant contribution of this study is the exploration of the sociodemographic background of students on their literacy performance using thorough analyses using a US national data set of 21,000 participants to control for other possibly confounding variables. In addition, multiple preliminary analyses that included advanced statistical methods (SEM), reliability and internal consistency tests, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) were conducted.

Mediating Effects. Addressing Research Question 1

Self-regulatory Behaviors

Investigating the mediating effects of students' self-regulatory behaviors between their sociodemographic characteristics and literacy achievement, the results from the study indicate that first-grade students' self-regulatory learning behaviors measured during the fall term positively mediate their spring-term literacy achievement. This finding validates that elementary students with abilities to regulate their behaviors in academic tasks demonstrate higher literacy performance (Hubert et al., 2015) and future school success (Moffett & Morrison, 2020).

Attention Difficulties

Analyzing the indirect path between students' sociodemographic characteristics and literacy achievement mediated by students' attention difficulties, the current study found significant associations. This finding concurred with O'Connor et al. (2014), who explained that kindergarten and first-grade students demonstrating behaviors conducive to learning showed higher literacy achievement. Specifically, the current study identified

the significant adverse effects of students from low-income and speaking a non-English language or a dual language on literacy achievement when mediated by students' attention difficulties. These findings were consistent with Mills et al. (2019), whose results indicated that students from low-income homes underperformed their counterparts, mainly when exhibiting less inhibitory behaviors toward complex literacy tasks. Mills et al. also explained that students who spoke a language other than English performed below those who spoke English at home, attributing this phenomenon to limited inhibitory behaviors among students of languages other than English. However, there is limited empirical evidence about students who equally speak English and another language at home. The extensive evidence found in the literature centers on students who speak a non-English language at home and English at school or are in dual language instruction at school. Limited evidence has been found addressing homes that use dual language indistinctively – that is, parents cannot identify a primary language spoken at home.

Direct Effects

Direct effects Between Sociodemographic Characteristics and Self-regulatory Behaviors

Five of the six students' sociodemographic characteristics (i.e., income, non-English, disability, gender, and age) were significantly associated with self-regulatory behavior. Therefore, the current study confirmed that students from higher-income homes, those who spoke languages other than English, and older students demonstrated more self-regulatory behaviors. On the other hand, males have significantly fewer self-regulatory behaviors than females.

Home Income. The study confirmed that students with higher home incomes displayed higher self-regulatory behaviors than those with lower incomes. The study's findings add new information to the field, in which students who came from homes with higher incomes outperformed their counterparts in literacy achievement (Cadima et al., 2015), and when they have a higher level of self-regulatory behavior, the effects can be strengthened. The researcher of the present study attributes this finding to home factors that are detrimental to students' academic achievement. For example, Blair and Razza (2007) showed that students from lower-income homes demonstrated lower literacy achievement, recommending promoting effortful and inhibitory control for literacy development. Stormont et al. (2013), Rojas (2016), and Ansari et al. (2021) also commented that students from low-income homes had limited school readiness due to their limited self-regulatory behaviors. Stormont et al. explained that family stressors such as family conflicts and social, emotional, and academic limitations factored in limited students' self-regulatory behaviors. Rojas argued that the lack of parental involvement in their children's education affected students' self-regulatory behaviors. Ansari et al. argued that students from low-income homes who did not attend pre-kindergarten showed less school readiness and self-regulatory behaviors.

Non-English Language at Home. The results concerning students who spoke a language at home other than English demonstrated significant positive effects on self-regulatory behaviors. These findings are consistent with Caughy et al. (2022), who found that students who spoke a language other than English (mainly Spanish) demonstrated higher growth in self-regulatory behaviors than students with a balanced dual language knowledge. However, researchers have provided explanations for the enhancement of

executive function and self-regulatory behaviors through bilingualism, attributing it to the development of set-shifting skills associated with learning multiple languages (Bialystock, 2007; Bialystock & Craik, 2010). However, some researchers have contested this viewpoint, arguing that there is a lack of evidence supporting the positive effects of bilingualism on self-regulatory behaviors (Dick et al., 2019).

Importantly, this study found a direct effect of dual language that is directly associated with literacy achievement, with self-regulatory behavior and attention difficulties mediating the relation between dual language and literacy achievement.

Disabilities. The study noted that students with disabilities showed limited self-regulatory behaviors, confirming previous studies (Conderman et al., 2011; Kulkarni et al., 2019; Lichtinger et al., 2015; Ozbek et al., 2019). Lichtinger et al. stressed that students with disabilities need explicit instruction on behavioral strategies to increase their academic achievement. They stressed the importance of teachers developing behavioral strategies in students and awareness of strategies they can use to increase their academic achievement. The authors also explained that when students with disabilities were aware of and knew how to use self-regulatory behavior strategies, students increased their literacy achievement. Similarly, Kulkarni et al. emphasized the importance of early intervention in self-regulatory skills, particularly in attention and social-emotional skills. They explained that students with attention and social-emotional skills demonstrated self-regulation behaviors. Notably, students who received early intervention for strategies could use them to understand academic tasks' principles, procedures, processes, and rules (Conderman et al., 2019).

Age. The study found that students' age was significantly positively associated with self-regulatory behaviors. This finding is consistent with other researchers who explained that older students demonstrate more self-regulatory behaviors explained by the students' experiences or training in self-regulatory skills as they become ready to learn (Murray & Harrison, 2011) academic learning experience and improve their self-regulatory behaviors throughout the years (Bodovski & Youn, 2011).

Gender. Investigating if male students had a differential effect on their self-regulatory behaviors, the study determined that males demonstrated fewer self-regulatory behaviors than females. The finding is consistent with prior research. Veijalainen et al. (2021) and Veijalainen et al. (2019) explained that from childhood to 83 months of age, male students expressed less self-regulatory behaviors than females, particularly when males tended to express more surprise, curiosity, anger, or frustration-related emotions when they had limited self-regulatory skills. Montroy et al. (2016) also described gender differences trajectories. Montroy et al. argued that young students demonstrated less self-regulatory behaviors, evidenced by male students being more sensitive to environmental circumstances than females.

Direct Effects Between Sociodemographic Characteristics and Attention Difficulties

Home Income. The researcher of this study found that students whose parents with high incomes demonstrated lower attention difficulties, confirming prior studies (Blair et al., 2015; Brandes-Aitken et al., 2019; Reinelt et al., 2019). Some studies showed a negative association between student poverty and attention difficulties, later affecting self-regulatory behaviors (Blair et al., 2015; Brandes et al., 2019). Reinelt et al. have included factors in students' socioeconomic status that are not in the school's

control, such as family level of education, occupation, income, and quality of the residential area, and advocated for early childhood intervention programs to support the families.

Non-English Language. The study found that first-grade students who speak a language other than English at home displayed lower attention difficulties than those who used English as the primary language at home. However, the data of this study does not allow to identify the English language proficiency level of the students nor other factors contributing to this finding. Notably, although there has been limited evidence regarding English learners' attention difficulties due to English language proficiency, two studies conducted by Wang et al. (2021) and Skinner et al. (2010) discussed high school students and adults. They noted that students demonstrated attention difficulties when English skills were limited and engaged only when the learning environment was relaxed. Therefore, the researcher of the present study may conclude that the age of the first-grade students, their English proficiency level, and the classroom environment may have contributed to their lower attention difficulties.

Dual-language. The study did not find a significantly different effect on dual language users whose parents did not report whether English or another language was primarily spoken at home over students whose parents reported English as their primary home language. There is a lack of evidence in the literature discussing specifically the equal use of dual language at home. The literature discusses bilingual children using one language at home and English as the language of school instruction or students learning in a dual language program. However, studies have determined that students who speak dual language tend to underperform English monolinguals because students' learning

time is divided into learning two languages concurrently, affecting strong language development in both languages (Mancilla-Martinez et al., 2020).

Disability. The study found a direct association between student disability and attention difficulties, as expected. Students with disabilities need more time to adjust behaviors and control their attention to engage in academic tasks, which is challenging for young students with disabilities or at risk of developmental delay (Coelho et al., 2019). Academic tasks demanding self-regulatory behaviors and attention during collaborative learning, including peer interactions and support, understanding others' perspectives, and conflict resolutions, in addition, to following procedures and expectations, could be confusing for students with disabilities due to their social-emotional abilities (McCollow, 2019; O'Brennan et al., 2015), developmental delays (McDermott et al., 2018), and the impact of pragmatic language (Lin et al., 2019). It is necessary that teachers collaborate to identify and develop instructional interventions to remediate student achievement (Vasquez et al., 2021), particularly literacy skills (Denton et al., 2020) and self-regulatory behaviors in students with disabilities (Denton et al., 2020; Vasquez et al., 2021).

Gender Differences. The study result revealed that males demonstrated significant attention difficulties from their counterparts. This finding is in line with other studies that argued that there are gender differences in students' attention difficulties in academic tasks favoring female over male students (Kirkic & Demir, 2020; Yamamoto & Imai-Matsumara, 2019; Zakszeski et al., 2020). Furthermore, male students tend to be easily distracted, engage in unrelated activities, and cope with emotions differently (Veijalainen et al., 2019), affecting their attention to tasks.

Age. After investigating the direct effects of students' age in months on attention difficulties, the researcher of this study concluded that older students demonstrated fewer attention difficulties than females. As children grow older and acquire schooling experiences, they are ready to learn (Murray & Harrison, 2011) and meet academic expectations, focusing more on academic tasks. When students grow older, they have more opportunities to develop an awareness of their academic responsibilities. Additionally, as students progress through their academic grade levels, they acquire academic skills and schooling experiences such as academic expectations, procedures, and classroom logistics. All the above factors may contribute to increased student attention to their academic responsibilities that facilitate literacy achievement.

Direct Effect Between Self-Regulatory Behaviors and Literacy Achievement

The researcher of this study found direct associations between self-regulatory behaviors and literacy achievement. Students who demonstrated self-regulatory behaviors outperformed their counterparts in literacy achievement. These findings align with other studies arguing that students who are self-regulated and engage in academic tasks longer (Bohlmann & Downer, 2016; Duncan et al., 2018) have higher literacy achievement. The present study's findings are significant because students who have inhibitory control and persist in academic tasks have better opportunities to succeed in literacy (Lonigan et al., 2017). Teachers must engage in professional development that would help them to equip with the necessary knowledge to be able to develop and promote self-regulatory behaviors in their students (Pianta et al., 2017; Pratt & Martin, 2017) so that they can create instructional practices that requires students to plan, elaborate, and organize ideas such as storytelling, think-aloud, and reader's theater to increase the likelihood of literacy

achievement (Allee-Herndon & Roberts, 2018). Allee and Roberts also recommend that teachers provide students with opportunities to engage in dramatic or imaginary play, games, and puzzles to develop working memory, inhibitory control, and cognitive flexibility in students.

Direct Effect Between Attention Difficulties and Literacy Achievement

The current study showed that there are direct associations between attention and literacy. Students who showed attention difficulties and engaged in task-avoidant behaviors underperformed compared to their counterparts. These finding parallels other studies explaining that students with attention difficulties who engaged in task-avoidant behaviors have limited literacy achievement (Georgiou et al., 2017). Students have different reasons to engage in task-avoidance behaviors, for example, a lack of pre-literacy skills knowledge (Greulich et al., 2014; Magi et al., 2013; Torpa et al., 2017). The classroom learning environment can determine students' on-task behaviors, mainly when the classrooms and learning experiences are conducive and adaptive (Blair & Raver, 2012, 2015) and provides opportunities for peer interactions (Holmes et al., 2016; Huston et al., 2015). Students need to have the necessary skills for the task at hand to avoid frustration (Huang &Yeh, 2019), which could lead to task-avoidant behaviors. A classroom environment conducive to learning provides opportunities for students to pursue goals and avoid distractions (Yogman et al., 2018).

Direct Effects Addressing Research Question 2

Direct Effects Between sociodemographic characteristics and Literacy Achievement

Home Income. The results showed that students from higher-income homes outperformed their counterparts, adding to the findings of Kim & Quinn (2013), who

argued that students from low-income homes underperform their counterparts, particularly those with limited home literacy environments stressing the importance of home- and classroom-based reading intervention, particularly during summer. Additionally, O'Connor et al. (2014) explained that socioeconomically disadvantaged students exhibit limited behaviors conducive to learning and underperform in literacy achievement (Collings et al., 2017).

Non-English Language. The findings indicated that students from homes with non-English language demonstrated lower literacy achievement, aligning with the findings of Dussling (2020, 2020), Macilla-Martinez (2020), and Swanson et al. (2016). In addition, consistently underperforming English learners (Els) are at risk of being classified as students with reading disabilities (Swanson et al., 2016). Therefore, it is essential that teachers develop early literacy interventions (Dussling, 2020; 2020) to increase reading comprehension in the ELs population (Mancilla-Martinez, 2020). Teachers providing opportunities for first-grade English language learners at-risk of reading difficulties to engage with native English speakers in explicit and systematic small-group interventions to develop phonemic awareness and phonics increases the likelihood of literacy achievement Dussling, 2020). The interventions should include sound-symbol correspondences, decoding skills, phonetically regular words, oral reading, and dictation (Dussling, 2020). Additionally, students' learning experiences that include explicit instruction in receptive and expressive vocabulary, word-level reading and passage comprehension, and single-word spelling and writing also increase students' decoding skills, reading comprehension, writing fluency, and contextualized spelling (Zhan et al., 2022).

Dual language. This study found that students who equally use dual language at home negatively affected literacy achievement. This finding was consistent with the argument of Mancilla-Martinez et al. (2020), suggesting that students who speak dual languages demonstrated lower literacy skills. The authors attributed their findings to the students' limited vocabulary knowledge of both languages, which parallels Guan et al. (2018) and Arteagoitia et al. (2020), who claimed that although students who speak dual languages increased their literacy skills over time, they exhibited a low pace in their literacy learning. Guan et al. attributed the low-pace literacy achievement to these students simultaneously learning literacy in both languages. However, other researchers have explained that bilingualism develops executive function and self-regulatory behaviors, arguing that bilingual students develop a set-shifting ability that facilitates executive function development (Bialystok, 2007; Bialyhstok & Craik, 2010) that are crucial for literacy achievement. To ensure that students continue developing literacy skills, equally in two languages, their learning experiences should include explicit instruction in receptive vocabulary, phonological awareness, and word reading, as these skills are strong predictors of later first-grade reading achievement (Edyburn et al., 2017). Teachers can use strategies to equally develop dual language in students in general education or special education programs, including explicit instruction in bilingual vocabulary using interactive storybook reading and multimodal hands-one vocabulary (Guan et al., 2018).

Disabilities. Studying the effects of students' disabilities on literacy achievement, the researcher observed that students with disabilities underperformed in literacy achievement when compared with students without disabilities. This finding concurs with

other researchers (Conderman et al., 2019; Kaye et al., 2022; Lichtinger & Kaplan, 2015; Ozbek, 2019; Pufpaff, 2021) who argued that students with a disability underperform their counterparts in literacy achievement. It is advised that teachers identify students' literacy deficiencies (Pufpaff, 2021) and specific disabilities (Kaye et al., 2022) to develop appropriate interventions to increase the likelihood of literacy achievement. Understanding that students with disabilities tend to be unaware of the strategies they can use (Lichtinger & Kaplan, 2015) throughout their learning experiences to increase their understanding of literacy skills, teachers should explicitly teach literacy strategies and how to use them for better literacy knowledge. Studies have shown that teaching learning strategies to young students is possible and efficient (Conderman et al., 2019; Ozbek, 2019).

Gender Differences. The study concluded that gender is associated with literacy achievement in which male students underperformed female students. Consistent with this study, researchers have explained literacy achievement differences between males and females (Collings et al., 2017), particularly with male children who have limited language and literacy and exhibit externalizing behaviors (Sparapani et al., 2019). Sparapani et al. emphasized the importance of educators considering children's differences, including gender, to increase academic achievement. For example, Sparanpini et al. suggest that teachers should observe their students' behaviors (e.g., withdrawal or disengagement, lack of self-advocating, not asking for help or clarification) and address students' behavioral profiles with effective and practical strategies to develop students' social and emotional needs that would support academic involvement and growth literacy achievement. McTigue et al. (2021) contended that

although girls tend to outperform boys in literacy during the early grades, gender differences decrease over time. McTigue et al. (2021) questioned if students' opportunities for self-selecting academic learning experiences affected the literacy achievement gender differences.

Age. The results of the present study revealed that older students outperformed their counterparts, which adds to prior findings that students' age also affects their literacy achievement as they become ready to learn (Murray & Harrison, 2011) and improve their self-regulatory behaviors throughout the years (Bodovski & Youn, 2011). Mavilidi et al. (2022) and Whitely et al. (2021) further explained the relative age effects (RAEs), which significantly affect students' literacy achievement. In both studies, Mavilidi and Whitely argued that RAEs had enduring effects on children during their primary grades; however, these effects decline as children grow older.

Limitations and Future Research

As with any research using secondary data sets, there are limitations worth considering due to the lack of detailed information on many variables. First, this study analyzed the effects of students with disability status on reading scores, self-regulatory learning behaviors, and attention difficulties. However, the data analyzed for the current study does not allow examining the type of exceptionality; it only indicates parents' reports about the students receiving additional academic support due to their disability status. Accordingly, this study cannot explore the association between outcomes and two mediating variables and the students' differential levels (e.g., mild, moderate, severe) of disability or the exceptionalities' specific limitations or challenges. Therefore, the findings of the present study suggest that future studies collect more detailed information

on students' disability status and their outcomes to understand the different types of barriers caused by disability and to come to necessary policy suggestions (Alquraini & Rao, 2020). One step further, future research on long-term specific self-regulatory behaviors' effects on literacy achievement is warranted, mainly for students with varied levels of learning disabilities. Understanding the differential effects of students' self-regulatory behaviors with a more significant impact on literacy achievement, based on students' different levels of disabilities, can provide teachers about the importance of creating meaningful and relevant, practical instructions that would develop self-regulatory behaviors for students' specific needs related to their disability.

Second, for the non-English language variable, there is no indication of the primary language proficiency level of the students, as noted in different types of disability. Research has found that students' primary language competence predicts second language learning (Shum et al., 2016; Winsler et al., 2014). Future research is needed to explore how, within this study's dynamics, the primary language proficiency levels further explain the long-term effects on literacy achievement.

A final limitation was that even though the study investigated the effects of household income, it did not explore how many family members lived in the household. The more people depend on the same household income, the more detrimental effects may occur. In addition, this study cannot presume that the household size was constant for all income ranges, as prior research has discussed the negative impact of household size and literacy (Mustapha et al., 2019).

Implications for Educators

Based on the findings of this study, first-grade students who demonstrate self-regulatory behaviors and no attention difficulties show increased literacy achievement, particularly English language learners and students with learning disabilities. Therefore, it is beneficial to ensure that English language learners and students with disabilities acquire self-regulatory and attention behaviors conducive to learning to increase their literacy achievement.

There are practical strategies that teachers could use to develop self-regulatory behaviors in these populations while they engage in literacy (e.g., vocabulary, reading comprehension, writing) activities. For one, personalized anchor charts provide opportunities for teachers and students to outline/label content and procedures that teachers and students can refer to throughout literacy teaching and learning experiences (Bacchioni & Kurstedt, 2019). Teachers regularly using the anchor charts while teaching literacy may develop in students the awareness of the importance of the anchor chart for learning. Students understanding the benefits of using the anchor charts for their literacy and English language achievement may motivate them to regulate themselves and be more attentive while completing tasks by referencing the information in the anchor chart for literacy success. These anchor charts would also provide additional opportunities for students to read and engage with familiar text independently. Additionally, these anchor charts would facilitate students who would benefit from additional guidance and structure while completing literacy tasks with a peer or independently, particularly students with disabilities.

Another practical strategy that could develop self-regulatory behaviors and attention in English language learners and students with disabilities is incorporating learning experiences that require students to organize materials and time management; and organization of ideas, goal setting, and planning (Dias & Seabra, 2017). Teachers training students to organize their instructional materials (e.g., writing implements, manipulatives, text) and understand time management (e.g., steps, procedures) before they begin the academic task could enable students to feel competent to establish goals and develop a plan to follow through task completion. Training students to establish goals and develop a plan may provide a scaffolded and structured learning experience that could help students with limited English language proficiency and learning disabilities. Structured learning experiences also benefit students with behavioral problems (Bulotsky-Shearer et al., 2011).

Conclusion

Unlike previous studies on self-regulatory behaviors or attention difficulties in young students, this investigation focused on both constructs in the same context on a larger scale. This perspective allowed an exploration of the mediating effects of self-regulatory behaviors and attention difficulties while considering the differential effects of students' sociodemographic characteristics. Based on the findings of this study, critical factors of limited academic behaviors conducive to learning that warrant further research include 1) effects of specific family stressors at home preventing children from developing self-regulatory behaviors before entering formal schooling, 2) classroom quality instruction, and 3) teacher professional development that includes self-regulation and dual language development of effective strategies.

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Appendix A

Teacher Reported of Students' Social Skills in the Classroom

16755

Social Skills

Teachers rated children in their classroom on social skills (including their ability to exercise self-control, interact with others, resolve conflict, and participate in group activities); externalizing and internalizing problem behaviors (e.g., fighting, arguing, anger, depression, low self-esteem, impulsiveness); and learning dispositions or "approaches to learning" (e.g., curiosity, self-direction, organization, and persistence). The social skills and problem behavior items were adapted from the Social Skills Rating Scale (SSRS) by Gresham and Elliot 1990 and are published by NCS Pearson. These items are copyright protected and are not listed. The approaches to learning items were created for the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K) by Atkins-Burnett. They are not copyright protected and, therefore, are listed below.

For the set of items below, please think about this child's behavior during the past month or two. Decide how often the child demonstrates the behavior described. We realize that some items apply more to older children, but please answer as accurately as you can. For each item, mark one of the following responses:

Never	→	Child never exhibits this behavior.
Sometimes	→	Child exhibits this behavior occasionally or sometimes.
Often	→	Child exhibits this behavior regularly but not all the time.
Very often	→	Child exhibits this behavior most of the time.
No Opportunity	→	No opportunity to observe this behavior.

	How Often?				
	Never	Some-times	Often	Very Often	No Opportunity to Observe
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
11. Keeps belongings organized.	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
14. Shows eagerness to learn new things.	☐	☐	☐	☐	☐
15. Works independently.	☐	☐	☐	☐	☐

5

16755

	How Often?				
	Never	Some-times	Often	Very Often	No Opportunity to Observe
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
21. Easily adapts to changes in routine.	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
23. Persists in completing tasks.	☐	☐	☐	☐	☐
24. Pays attention well.	☐	☐	☐	☐	☐
25. Follows classroom rules.	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

Appendix B

Teacher Reported of Students' Behaviors in the Classroom

16130

Classroom Behaviors

Please read each statement and decide whether it is a "true" or "untrue" description of this child's reaction to a number of situations within the past six months. If you cannot answer one of the items because you have never seen the child in that situation, then mark "not applicable."

The child:	Extremely untrue	Quite untrue	Slightly untrue	Neither true nor untrue	Slightly true	Quite true	Extremely true	Not applicable
1. When practicing an activity, has a hard time keeping her/his mind on it.	☐	☐	☐	☐	☐	☐	☐	☐
2. Will move from one task to another without completing any of them.	☐	☐	☐	☐	☐	☐	☐	☐
3. When drawing or coloring in a book, shows strong concentration.	☐	☐	☐	☐	☐	☐	☐	☐
4. When building or putting something together, becomes very involved in what s/he is doing, and works for long periods.	☐	☐	☐	☐	☐	☐	☐	☐
5. Is easily distracted when listening to a story.	☐	☐	☐	☐	☐	☐	☐	☐
6. Sometimes becomes absorbed in a picture book and looks at it for a long time.	☐	☐	☐	☐	☐	☐	☐	☐
7. Can wait before entering into new activities if s/he is asked to.	☐	☐	☐	☐	☐	☐	☐	☐
8. Plans for new activities or changes in routine to make sure s/he has what will be needed.	☐	☐	☐	☐	☐	☐	☐	☐
9. Has trouble sitting still when s/he is told to (story time, etc.).	☐	☐	☐	☐	☐	☐	☐	☐
10. Is good at following instructions.	☐	☐	☐	☐	☐	☐	☐	☐
11. Approaches places that s/he thinks might be "risky" slowly and cautiously.	☐	☐	☐	☐	☐	☐	☐	☐
12. Can easily stop an activity when s/he is told "no."	☐	☐	☐	☐	☐	☐	☐	☐

Source: Putnam, S. P., & Rothbart, M. K. (2006). Development of Short and Very Short forms of the Children's Behavior Questionnaire. *Journal of Personality Assessment, 87 (1)*, 103-113. Used with permission.

CHAPTER III

LONGITUDINAL EFFECTS OF FIRST-GRADE STUDENTS' SELF-REGULATORY BEHAVIORS ON FIRST, SECOND, AND THIRD-GRADE LITERACY ACHIEVEMENT

Abstract

Existing evidence explains the longitudinal associations between early childhood self-regulatory behaviors and literacy achievement. However, given the limited work modeling the longitudinal effects of students' self-regulatory behaviors, parent income, the non-English language used at home, dual language equally spoken and home, gender, age, disability, and literacy achievement, the researcher analyzed these associations for three years of students' literacy achievement from the initial effects in first grade to the long-term effects to second and third grade. National representative data from the Early Childhood Longitudinal Studies Program (ECLS-K: 2010-2011) was used for this study. Hierarchical Linear Modeling (HLM) was employed using SPSS and HLM software. This study revealed a significant association between students' first-grade self-regulatory learning behaviors and later literacy achievement in second and third grade after controlling for students' sociodemographic characteristics. Results indicate that all students' average literacy achievement growth rate increased by 17.21 for every wave. However, the effect of self-regulatory behaviors was lower over the years. This finding suggests that the effect of self-regulatory behaviors on first-grade literacy achievement reduced in subsequent years: second and third-grade levels. Specifically, non-English language users displayed literacy growth over time. Additionally, students from higher family incomes and older showed literacy growth over the three years. Although students with disabilities tended to show higher scores in literacy achievement over time, the

effect was insignificant. Additionally, the gender differences became insignificant over time. Implications for practice are explained.

Keywords: Self-regulatory behaviors, literacy achievement, longitudinal, disability, dual language

Introduction

Self-regulatory behavior is defined as the way students systematically initiate and sustain their cognitions, motivations, behaviors, and affects to attain their goals (Schunk & Greene, 2018) and control and direct their attention, thoughts, emotions, and actions (McClelland & Cameron, 2012). Self-regulated Students who demonstrate self-regulatory behaviors are likely to organize their physical environment, take notes, record their performances, rehearse, minimize distractions, and self-punish /reward themselves (Schunk & Greene, 2018).

Studies have evidenced the longitudinal effects of young students' self-regulatory behaviors on later literacy achievement. Furthermore, researchers argued that students who demonstrate self-regulatory behaviors in the early years positively impact their literacy achievement throughout elementary school (Sawyer et al., 2015), adolescence (Ahmed et al., 2019), and even college enrollment (Pan et al., 2023).

The present study makes a valuable contribution to the field of literacy by highlighting the transient nature of students' self-regulatory behaviors across successive school years. The findings underscore the importance for teachers to foster the development of self-regulatory behaviors explicitly and systematically in students. By doing so, teachers can ensure that students possess the necessary learning behaviors to enhance their literacy achievement.

Furthermore, this study also adds to the literature by demonstrating that students with disabilities who exhibit effective self-regulatory skills experience increased literacy achievement. Although the magnitude of improvement may not be statistically significant compared to students without disabilities, it emphasizes the need to provide students with disabilities tailored opportunities to develop self-regulatory behaviors specifically aimed at supporting their literacy skills.

Therefore, it is imperative to expose students with disabilities to targeted self-regulatory interventions that are customized to their unique needs and designed to enhance their literacy skills. By addressing these specific requirements, teachers can foster a more inclusive and supportive learning environment for students with disabilities.

Literature Review

Literacy Skills and School Readiness

In times of academic accountability, students are expected to succeed in high academic demands when they enter formal schooling. Therefore, school readiness is an issue for discussion among scholars. Scholars have explained the benefits of school readiness before students enter formal schooling (Duncan et al., 2018; Skibbe et al., 2010). As early as pre-kindergarten, students with higher self-regulatory learning behaviors, such as inhibitory control, attention, and working memory, demonstrate higher literacy achievement (McClelland et al., 2007; Sasser et al., 2015; Skibbe et al., 2011). Pre-kindergarten students' self-regulatory behaviors are vital for school readiness and adaptation to school contexts and crucial for later literacy success (Neuenschwander et al., 2012).

Unfortunately, not all preschool-age students develop self-regulatory behaviors before formal schooling, particularly those with poverty-related risk factors with limited sustained attention skills (Brandes-Aitken, 2019), home income, language (Mills et al., 2019; Skibbe et al., 2011), and family risk experiences (Pratt et al., 2016). For example, Brandes-Aitken argued that students coming to kindergarten with limited sustained attention skills demonstrate weak self-regulatory learning behaviors, affecting their literacy achievement. Conversely, students who demonstrate self-regulatory behaviors in preschool (Rademacher, 2022; Zhang et al., 2018), kindergarten (Lenes et al., 2020), and first grade (Cerda et al., 2014) show higher literacy achievement in later years.

Limited self-regulatory learning behaviors, particularly in students from low socioeconomic (Cerda et al., 2014; Finders et al., 2021) and non-English language-speaking homes, establish literacy gaps (Finders et al.) and lower literacy achievement (Zhang et al., 2018). Students from low-income homes possess limited literacy, social and self-regulatory skills that affect their school readiness entering kindergarten. These limited skills affect students' future academic achievement in first grade. Similarly, students from homes that speak a language other than English possess limited English language proficiency. During their first year of schooling, in kindergarten, these students have to simultaneously learn the English language and the academic content for the grade level. Therefore, English learners tend to underperform their counterparts. Self-regulatory behaviors are better predictors of literacy achievement in later years than prior academic achievement (Hernandez et al., 2018). Researchers defend the positive benefits of attending full over half-day kindergarten programs, particularly for socioeconomically disadvantaged students, because these programs develop literacy skills (Pelletier &

Corter, 2019) and self-regulatory behaviors (Pelletier & Fesseha, 2019) early on in their formal schooling. Students who attend full-day kindergarten programs have more specialized learning opportunities to develop academic and self-regulatory skills in the school setting with their teachers and classmates, which is an opportunity that could not be provided in homes with socioeconomic and language proficiency disadvantages. Pelletier and Fesseha also claimed that full kindergarten programs benefit students at risk for special education placement. First-grade students' self-regulatory behaviors strongly predict advanced literacy development in upper elementary school (Birgisdottir et al., 2020). Understanding that students' self-regulatory skills depend on psychological factors that can vary within-person change and between-personal individual differences (Galla et al., 2014), it is vital that teachers continue developing literacy and self-regulatory skills for students to increase literacy achievement (Byrnes et al., 2019). Students with pre-literacy and self-regulatory skills increase their effortful engagement and self-efficacy (Galla et al., 2014). Similarly, Magi et al. (2018) explained that students with higher effortful control and task persistence outperform their counterparts. Student engagement is crucial for academic success, mainly academically at-risk students due to temperament and behavior problems (Luo et al., 2009).

Developing Cognitive Skills

Increasing cognitive development in kindergarten students is essential to self-regulatory behaviors and literacy achievement (Byrnes et al., 2019). Cognitive development refers to the students' knowledge growth in a subject matter (e.g., literacy). Developing prior knowledge, academic skills, and self-regulatory learning behaviors provide the foundation for new learning (Byrnes et al.). Young children's language skills

have a longitudinal effect on self-regulatory behaviors two to four years later, mainly when students have limited language skills; they are prone to behavior problems (Lonigan et al., 2017). In addition, kindergarten students' language skills predict longitudinal literacy achievement throughout the elementary and secondary school years (Pace et al., 2019). Researchers have explained the long-term reciprocal effect (852 students from first to second grade) of learning to read and self-regulatory behaviors (Auerbach et al., 2019; Connor et al., 2016). Additionally, Meixner et al. (2018) explained the bidirectional relationship (1657 students from first through third grade) between reading comprehension and self-regulatory behaviors in later primary school years. Moreover, there is a bidirectional relationship between executive function and academic achievement (McKinnon & Blair, 2019).

Behavior Problems

A negative association exists between students' self-regulatory learning behaviors and behavior problems. Limited self-regulatory behaviors in early childhood negatively affect their academic attention throughout early elementary school (Lonigan et al., 2017). Students with high inhibitory control can manage their impulsive behavior at preschool and thus exhibit fewer behavior problems (Lonigan et al., 2019) and better academic performance (Rademacher, 2022). Temperamental effortful control is vital for students' school adjustment, which is necessary for literacy achievement (Johns et al., 2019; Neuenschwander et al., 2012). Significantly, kindergarten students' misbehavior negatively affects their short-term longitudinal literacy achievement and the learning environment of others, particularly peers' effortful control and engagement (Johns et al., 2019). Although behavior problems directly affect literacy achievement, effortful control

and academic engagement are also negatively affected. Learning in a structured environment requires self-regulatory behaviors, a vital component in students' adaptation to school (Neuenschwander et al., 2012), as they meet challenging academic expectations. Preschool self-regulatory behaviors relate to later behavior problems (Rademacher, 2022). Correspondingly, the prior study by Sasser et al. (2015) concluded that students with higher inattention underperformed their counterparts. Students' sustained attention and trajectory varied based on students' characteristics (e.g., disability), home-specific circumstances, and school quality (Sasser et al. 2015). For example, Lonigan et al. (2017) explained the strong correlation between later externalizing behavior and inattention, particularly for boys. The boys engaged in more externalizing and inattentive behaviors than girls (Lonigan et al., 2017). Similarly, Daly and Corcoran (2019) explained that girls showed higher levels of self-control in kindergarten and higher literacy achievement throughout elementary school.

Developing Self-regulatory Behaviors

School readiness is essential for later self-regulatory behaviors and literacy achievement (Duncan et al., 2018; Skibbe et al., 2011). Self-regulatory behaviors (attention, inhibitory control, working memory) and literacy skills (decoding, letter knowledge) are vital for school readiness and later literacy achievement (Skibbe et al., 2011). Students who enter formal schools with limited self-regulatory behaviors establish literacy gaps; however, teachers developing self-regulatory learning behaviors such as inhibitory control and attentional flexibility decrease literacy gaps (Finders et al., 2021). Duncan et al. (2018) described the effectiveness of developing self-regulatory behaviors in preschool students during the summer prior to entering formal schooling. They (2018)

explained that students who received intervention in self-regulation demonstrated improved self-regulatory behavior during the summer and kindergarten, including improved literacy achievement. Duncan et al. implemented circle time games that focused on working memory, attentional shifting, and inhibitory control, allowing students to practice self-regulation with their peers. Self-regulatory behaviors may decrease later as regulation demands (Magi et al., 2016) and cognitive expectations (Stipek et al., 2016). Therefore, it is crucial to continue developing self-regulatory skills in students to increase literacy achievement (Fienders et al., 2021).

Learning Environment

Students' biopsychological characteristics and home and classroom learning environments provide a better understanding of students' literacy achievement (Auerbach et al., 2019). Auerbach et al. explained the students' biopsychological characteristics as the students' academic abilities, experiences, knowledge, and skills, as well as students' dispositions (temperament). Home characteristics are also associated with students' self-regulatory learning and literacy achievement. Auerbach et al. concluded that children from homes with high cognitive and language stimulation and responsive parents later showed higher literacy achievement. Similarly, Rose et al. (2018) argued that children's home literacy environment is associated with later social-emotional competence. They argued that students whose parents provided books at home and engaged children in shared book reading demonstrated higher cooperative and lower aggressive behaviors in the classroom. Comparably, Hayes and Berthelsen (2020) explained that preschool students who engaged in shared reading activities at home positively affected later literacy achievement in school. The student-teacher relationship is crucial in students'

self-regulatory learning and literacy achievement. Students with higher levels of conflict with their teacher showed lower executive function and literacy achievement (McKinnon & Blair, 2019).

Social Aspects

Students' social competence is associated with self-regulatory behaviors (Denham & Bassett, 2021; Pace et al., 2018; Perry et al., 2019) and classroom adjustment (Denham & Bassett, 2021; Pace et al.). Students with limited literacy achievement when entering formal schooling may demonstrate difficulties in classroom adjustment. Denham and Bassett described that students with social competency adapt to classroom environments and likely engage in social interactions with peers and teachers and in academic tasks, increasing their literacy achievement. Social competence and self-regulatory behaviors are more complex for low socioeconomic students who enter school with limited school readiness, which is a factor for these students' social competence and literacy achievement in later years (Perry et al., 2018).

Parental Involvement

Children involved in early literacy activities at home regulate their emotions toward academic tasks (Hayes & Berthelsen, 2020; Rose et al., 2018;) and demonstrate higher task completion persistence (Hayes & Berthelsen, 2020) and higher literacy achievement (Alston-Abel & Berninger, 2018; Hayes & Berthelsen, 2020; Hindman & Morrison, 2012). Moreover, parents who developed management/discipline at home demonstrated self-regulatory learning behaviors in school (Hindman & Morrison, 2012). Parental involvement in literacy activities with their children is higher with students with literacy difficulties (Alston-Abel & Berninger, 2018).

School-based parental involvement is also essential. Students whose parents were involved in school activities demonstrated higher literacy achievement in later years regardless of the student's socioeconomic and English proficiency levels (Daniel et al., 2016). In addition, students' collaborative skills were higher, and complaints were lower for students with positive home learning environments (Hindman & Morrison, 2012). Parental involvement in their children's development also includes caregiving and physical activities. Bockneck et al. (2017) concluded that parent-children's good relationships and engagement in physical activities positively affect students' later self-regulatory learning and emotional regulation. However, parental involvement in students' cognitive and emotional development may vary by family due to challenging personal circumstances (Hornby & Lafaele, 2011).

Purpose of the Study

This study investigated the longitudinal effects of students' self-regulatory behaviors, parent income, home language, gender, age, disability, and literacy achievement. Given the current understanding of the concurrent benefits of students' self-regulatory behaviors and literacy achievement, this study investigated the longitudinal effects of self-regulatory behaviors on literacy achievement. The longitudinal effects analyzed three years of students' literacy achievement from first through third grade. Hierarchical Linear Modeling (HLM) was applied using SPSS and HLM software.

Research Questions

Based on the aim, the researcher of this study attempted to answer the following questions:

1. Are there significant differences in students' literacy development with different growth patterns over time?
2. Are there significant effects of parent income, home language, gender, age, and disability on students' literacy development?
3. Are there significant effects of students' self-regulatory behaviors developed in first grade on the longitudinal growth of students' literacy?

Research Design

This study used a quantitative approach consisting of two parts. The first part explored the data using Factor Analysis (FA), and the second was Hierarchical Linear Regression (HLM).

Description of the Population and Setting

The participants used for this study are first-grade students from the 2011-2012 school year who were followed through their third-grade level in the 2013-2014 school year. This data collection comes from the cohort of the kindergarten class of 2010-2011, which is part of The Early Childhood Longitudinal Study (ECLS). The kindergarten cohort was followed from kindergarten (2010-2011) to third grade (2013-2014). This statistical data collection represents the condition and progress of the education system in the United States.

Variables

The variables used for this study are the construct of self-regulatory learning, three waves of indicators: first-, second-, and third-grade students' Item Response Theory **(**IRT) reading score spring term, parent income, home language, gender, age, and disability.

Primary Independent Variable

The main independent, observable variable, self-regulatory learning, was constructed using seven indicators (unobservable variables) that include (1) keeps belongings organized (N= 5,005), (2) shows eagerness to learn new things (N= 5016), (3) works independently (N=5,020), (4) easily adapts to changes in routine (N=4,972), (5) persists in completing tasks (N=4,992), (6) pays attention well (N= 5,015), and (7) follows classroom rules (N=5,019). The data in the construct of self-regulatory learning were collected by teachers completing a questionnaire responding to how often students exhibited the behaviors during the fall of 2011 in first grade (See Appendix A).

Table 1

Component Matrix with Correlations of Independent Variable Construct

Student Self-Regulatory Learning Construct		*Correlations*						
Reliability *Cronbach α=.903, KMO=. 917, Total variance explained=64.224*								
Items	Loading	1	2	3	4	5	6	7
1. *Keeps belongings organized*	*.752*	__						
2. *Shows eagerness to learn*	*.759*	.454**	__					
3. *Works independently*	*.854*	.570**	.636**	__				
4. *Easily adapts to changes*	*.725*	.472**	.494**	.552**	__			
5. *Persist completing tasks*	*.838*	.575**	.596**	.706**	.525**	__		
6. *Pays attention well*	.883	.613**	.615**	.714**	.549**	.701**	__	
7. *Follows classroom rules*	.785	.549**	.469**	.575**	.521**	.566**	.714**	__

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

All items in the construct of self-regulatory behaviors are significantly correlated among themselves. The correlations within the items in the construct of self-regulatory behaviors showed a significant value at the 0.01 level (2-tailed). The internal consistency of the construct is Cronbach αlpha) was .903, the Kaiser-Meyer-Olkin (KMO) is .917, and the total variance explained is 64.224.

Figure 1

Self-Regulatory Behaviors Construct Indicator Variables

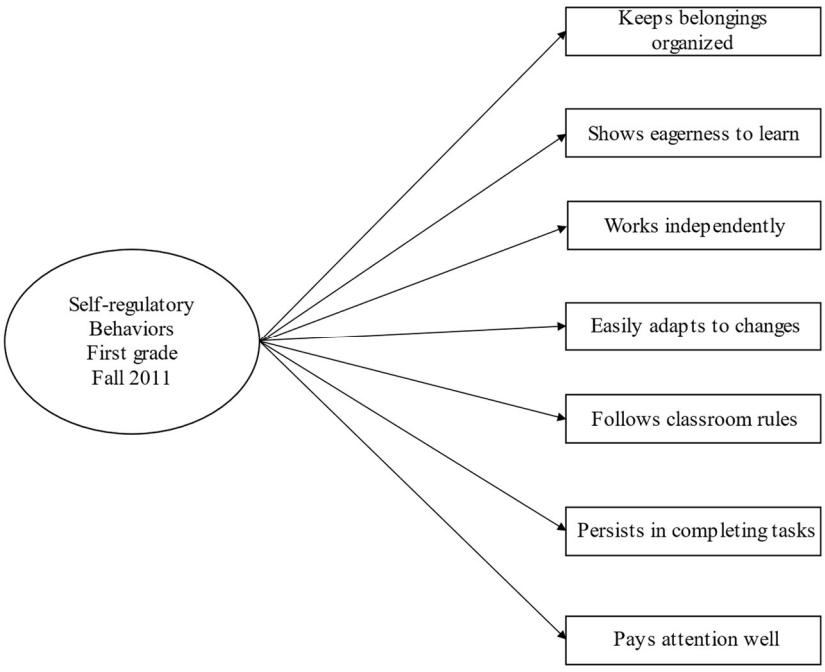

Figure 1 illustrates the seven factors explaining the construct of students' self-regulatory learning behaviors exhibited during the fall term of first grade.

Primary Dependent Variable

The dependent variables (outcome) are *first-, second-, and third-grade spring IRT reading score.* The first-, second-, and third-grade spring IRT reading assessments were administered in two parts to students using the reading subject area assessment to derive item response theory (IRT) scale scores. The overall IRT scale scores are criterion-referenced status measures at a time point. The second part of the test varied in complexity: low, middle, or high. The type of test complexity students received for this second part depended on the students' performance score level in part one. This adaptive design maximized the accuracy of measurement and minimized test administration time.

The spring first-grade IRT reading assessment consisted of the assessor asking children to respond to image-related questions. Additionally, students were asked questions to respond to short reading selections. Students were required to respond to the questions orally or point to the answers. The students were not asked to write or explain their responses' reasoning. The reading assessment measured students' basic literacy skills, such as print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition.

Additionally, the assessment measured students' knowledge of vocabulary and reading comprehension. The reading comprehension part asked students to identify information stated in the text, such as definitions, facts, and supporting details. Moreover, students were asked to make text and cross-text complex inferences while considering the text objectively and judging its appropriateness and quality.

The spring IRT reading assessment at the second-grade level included questions measuring students' basic reading skills, such as print familiarity, letter recognition,

beginning and ending sounds, rhyming words, and word recognition. Additionally, students were measured on their vocabulary knowledge and reading comprehension. Finally, the reading compression section of the assessment required students to find text-specific information such as definitions, facts, and supporting details, make complex inferences within the text, evaluate the text objectively, and judge the text's appropriateness and quality.

The third-grade spring IRT reading assessment measured students' basic literacy skills, such as word recognition, vocabulary knowledge, and reading comprehension. The reading comprehension section of the assessment measured students' skills to identify information stated in the text, such as definitions, facts, and supporting details. Additionally, students were asked to make complex inferences within and across the text while considering the text objectively and judging its appropriateness and quality.

Independent Variables

The independent variables are parent income, home language, gender, age, and disability covariates. The household income data were collected from parents' interviews in the spring of 2012 by parents reporting their household income range. Students' home language data were initially collected from parents' interviews in kindergarten and screened in the spring of their first grade in 2012. Any missing home language data were later collected during the spring of second and third-grade years. Students' gender (composite variable X_CHSEX_R) was collected from schools during sampling and data storage. Students' gender was obtained from parent interviews in fall kindergarten and later confirmed during parents' interviews in the spring kindergarten. Missing gender information was asked during parent interviews in later terms (fall 2011, spring 2012, fall

2012, or spring 2013). Students' age at the time of assessment was determined by the number of days since birth when the assessments were administered. Disability data were collected through parent interviews in kindergarten in the spring of 2011. The parents responded if their child was diagnosed with a disability or received therapy services. Students whose parents responded yes to any of these questions were coded as 1. If parents' response was no, then students were coded as 2.

Data Analyses

Factor Analysis

This study examined students' self-regulatory learning manifested through seven variables. Exploratory factor analysis (EFA) was used as a preliminary analysis of inter-correlations between the variables will be determined to create one composite variable to determine that the variables are highly correlated. Figure 2 illustrates inter-correlations among indicator variables that will be identified for each wave (first-, second-, and third-grade level).

Hierarchical Linear Modeling (HLM)

Using three waves (time points) allows to examine if the relationship between first-grade students' spring IRT reading score, parent income, home language, gender, age, disability, and students' self-regulatory behaviors are different for early (first grade) and later years (second-, third-grade levels) – an issue not studied before.

For this analysis, students' performances at three waves were analyzed at the first level and students' data at the second level, having three performances at three grades (first-, second-, and third-grade springs) nested within each student. The analysis examined students' first-grade literacy achievement evidenced by the literacy

achievement measures at different students' grade levels when the predictor variable for students' self-regulatory learning was measured at first grade during the fall term, parent income, home language, gender, age, and disability.

Figure 2

Full HLM Model of First-grade Students Spring Self-Regulatory Learning and Literacy across Three Waves

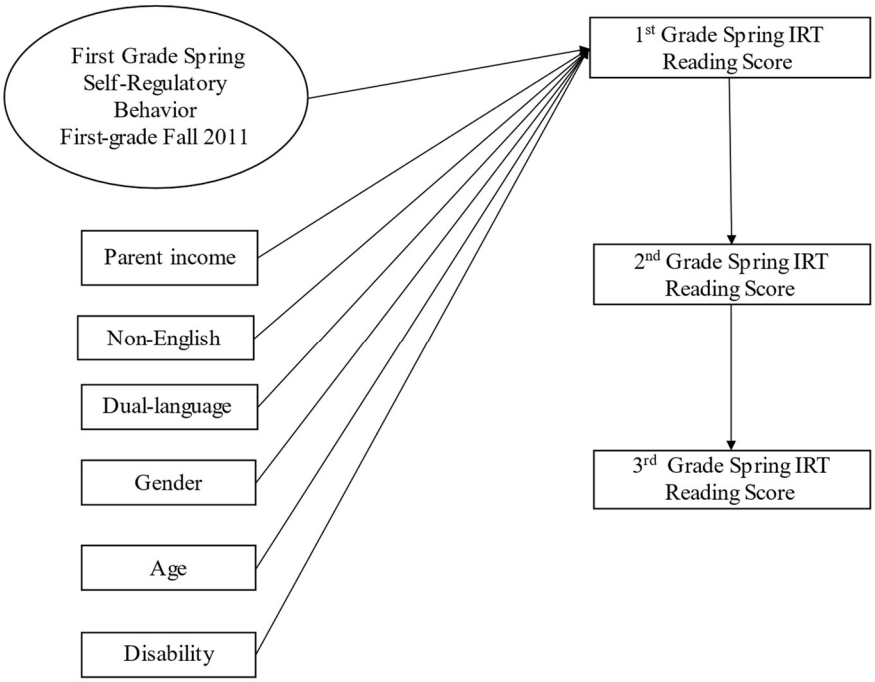

Figure 2 shows the full model, including first-grade students' spring self-regulatory learning and literacy achievement scores across three waves (first-, second-, and third-grade levels). Each wave is the assessment time students' literacy achievements were measured.

Findings

Correlations

The matrix statistics among independent and dependent variables (Table 2) show significant correlations between self-regulatory learning, the three waves of literacy achievement (first-, second-, and third-grade), and students' sociodemographic characteristics (English language, non-English language, dual language spoken at home, age in months, home income, disability, and gender).

Table 2

Matrix Correlations among Independent and Dependent Variables

		1	2	3	4	5	6	7	8	9	10	11
1	Literacy Spring 1st	__										
2	Literacy Spring 2nd	.860**	__									
3	Literacy Spring 3rd	.785**	.842**	__								
4	Self-Regulatory Learning	.445**	.421**	.387**	__							
5	English Language	.179**	.186**	.173**	.009	__						
6	Non-English Language	-.140**	-.147**	-.142**	.022	-.690**	__					
7	Dual Language	-.018*	-.023**	-.017	-.009	-.156**	-.044**	__				
8	Age in Months	.069**	.046**	.019*	.073**	.079**	-.081**	-.022**	__			
9	Home Income	.351**	.369**	.375**	.169**	.266**	-.265**	-.020*	-.011	__		
10	Disability	-.140**	-.152**	-.148**	-.157**	.095**	-.094**	-.012	.090**	-.022*	__	
11	Gender	.110**	.109**	.081**	.239**	-.014	.009	.000	-.066**	.001	-.127**	__

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

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3

First-grade Literacy Achievement and Change Over Time

Fixed Effect	Coefficient	Standard error	t-ratio	Approx. d.f.	p-value
For Intercept1, β_0 Intercept2, γ_{00}	77.17	0.176	437.9	15310	< 0.001
For Time Slope, β_1 Intercept2, γ_{10}	17.22	0.048	356.9	15310	< 0.001

The study began with an initial model that contained only intercept and time slope coefficients. Then, after several iterations of models with other variables, the study arrived at the final model with final coefficients of covariates.

Table 3 illustrates the initial model with three measures of literacy achievement confirming the use of HLM. In the initial model, the estimated fixed effects revealed an average literacy achievement of 77.17 for 1st-grade students in the spring of 2012, significantly different from zero (β_0 =77.17 s.e. = 0.176, $p < 0.001$). The time slope at intercept was 17.21, indicating that all students' average literacy achievement growth rate was increased by 17.21 for every wave (γ_{10}= 17.21, *s.e.* = 0.048, $p <.001$).

All independent variables were specified at the second level in the final model. Table 4 shows the final model effects. The intercept coefficient indicated the reference group's average literacy achievement at the first-grade wave. The time slope indicated the average annual literacy growth rate for the second and third-grade data points. The average literacy achievement of the male students who spoke English only (reference group) was 53.502 in the spring semester of the first-grade year in 2012. The literacy achievement growth increased by 24.248 per year, indicating a significant literacy growth

during the second- and third-grade waves (γ_{00}= 53.50, *s.e.* = 5.43, p <.001). In the above model, it was 77.17.

The initial data collection of students' self-regulatory learning experienced a significant positive effect on their literacy achievement. These students scored 8.270 points higher per every one-point increase in self-regulatory learning (γ_{07} = 8.270, *s.e.* = 0.333, p <.001). This finding indicates that the effects of self-regulatory learning on literacy achievement confirmed that self-regulatory learning is an essential element in students' literacy achievement. However, the effect of self-regulatory learning reduced over the years (γ_{17}= -0.960, *s.e.* = 0.099, p <.001), suggesting that self-regulatory learning demonstrated in the first-grade wave on literacy achievement was not as strong in subsequent years: second-, and third grade.

Exploring students from the non-English language used at home, the effect was significant (-7.719) in the initial wave during the spring semester of the first-grade year (γ_{02}= *-7.719*, *s.e.* = 0.799, p <.000), indicating non-English language users displayed significantly lower literacy performance than English only users. Importantly, this study found a significant effect over time on students who spoke a non-English language at home. Students who spoke a non-English language at home showed an increased literacy achievement in subsequent years: second, and third-grade waves (γ_{12}=1.076, *s.e.* = 0.239, p <.001).

Analyzing students from the dual language used at home, the effect was insignificant (-6.442) in the initial wave during the spring semester of the first-grade year (γ_{03}= *-6.442*, *s.e.* = 2.428, p >.000). Therefore, the literacy performance of dual language users was not significantly different from those who speak only English at home.

Additionally, this study found that although students who spoke the dual language at home scored higher in literacy achievement over time, the dual language had an insignificant effect in subsequent years: second-, third-grade waves (γ_{13}=1.241, *s.e.* = 0.719, p >.001). Evaluating the parent home income, the effect was significant in the first-grade wave, with an increase of 0.894 in higher literacy achievement when home income increased by one level (γ_{01}= 0.894, *s.e.* = 0.597, p <.001). Nevertheless, parent home income was insignificant in subsequent years: second- and third-grade waves (γ_{11}=-0.019, *s.e.* = 0.017, p >.000).

Evaluating students with disabilities, the effect was significant (-3.557) in the initial wave during the spring semester of the first-grade year (γ_{06}= *-3.557*, *s.e.* = 0.805, p <.000). However, results indicate that although students with disabilities tended to show higher scores in literacy achievement over time, the effect was insignificant in subsequent years: second-, third-grade waves (γ_{16}=0.095, *s.e.* = 0.242, p >.001).

Investigating students' age, the effect was significant (0.236) in the initial wave during the spring semester of the first-grade year (γ_{05}= *0.236*, *s.e.* = 0.072, p <.000), indicating that older students outperformed younger students at the first grade. However, the effect of students' age reduced over the years (γ_{15}= -0.098*, s.e.* = 0.021*, p* <.001), suggesting that students' age effect in the first-grade wave on literacy achievement faded in subsequent years: second, and third-grade.

Investigating gender differences, the effect of gender on literacy achievement was insignificant (0.075) in the initial wave during the spring semester of the first-grade year (γ_{04}=0.075, *s.e.* = 0.644, p >.000). Additionally, gender differences over time were insignificant (γ_{14}= -0.132, *s.e.* = 0.192, p >.000).

Table 4

Final Estimation of Fixed Effects[a] of all independent variables on literacy performance at first grade and growth

Parameter	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For Intercept1, β_0					
Intercept2, γ_{00}	53.502907	5.433224	9.847	3572	<0.001
Income, γ_{01}	0.894820	0.059757	14.974	3572	<0.001
Non-English, γ_{02}	-7.719689	0.799241	-9.659	3572	<0.001
Dual-language, γ_{03}	-6.442860	2.428642	-2.653	3572	0.008
Gender, γ_{04}	0.075935	0.644243	0.118	3572	0.906
Age, γ_{05}	0.236595	0.072442	3.266	3572	0.001
Disability, γ_{06}	-3.557021	0.805392	-4.417	3572	<0.001
Self-regulation, γ_{07}	8.270735	0.333771	24.780	3572	<0.001
For Time slope, β_1					
Intercept2, γ_{10}	24.248349	1.625853	14.914	3572	<0.001
Income, γ_{11}	-0.019339	0.017957	-1.077	3572	0.282
Non-English, γ_{12}	1.076814	0.239035	4.505	3572	<0.001
Dual-language, γ_{13}	1.241357	0.719583	1.725	3572	0.085
Gender, γ_{14}	-0.132939	0.192402	-0.691	3572	0.490
Age, γ_{15}	-0.098556	0.021649	-4.552	3572	<0.001
Disability, γ_{16}	0.095898	0.242035	0.396	3572	0.692
Self-regulation, γ_{17}	-0.960454	0.099831	-9.621	3572	<0.001

a. Dependent Variable: Literacy Scores of Three Years.
b. Reference Group: Male Students, English Only, No Disability

Discussion

The present study makes several research contributions. The primary aim of this study was to investigate the longitudinal effects of first-grade students' self-regulatory learning behaviors on literacy achievement over a period of second and third grade. First, this study provides evidence of student literacy development differences with different growth patterns over time. Additionally, this study illuminates the significant long-term effects of students' sociodemographic characteristics on students' literacy achievement in second and third grade. Finally, it clarifies the significant longitudinal effects of students'

self-regulatory behaviors developed in first grade. To explore these relations, the construct of self-regulatory learning was developed based on seven items from the ECLS representing students' behaviors reported by teachers: keeps belongings organized, shows eagerness to learn, works independently, easily adapts to changes, follows classroom rules, persists in completing tasks, and pays attention well. The items were strongly correlated to one another, validating the construct. Students' sociodemographic characteristics, such as parent income, home language, gender, age, and disability were also considered in the model.

The study theorized two challenging models for the link between early self-regulatory learning behaviors on first-grade literacy achievement. One model explains that current first-grade self-regulatory learning behaviors strongly influence literacy achievement toward the end of that school year. The other model describes a significant level of the reduced effect of self-regulatory behaviors through second and third grade.

Self-Regulation Effects on Literacy Achievement

This study first analyzed the initial effects of first-grade students' self-regulatory behaviors during the spring term. Then, it investigated if these behaviors affected literacy achievement during the spring of the school year. This study revealed that self-regulatory behaviors positively predicted students' literacy achievement toward the end of first grade. Researchers have explained the long-term positive effects of early childhood self-regulation behaviors. Students who exhibit self-regulatory behaviors as early as first grade demonstrate growth in academic achievement in later years (Ahmed et al., 2019; Pan et al., 2023; Sawyer et al., 2015). The aspects of early childhood self-regulatory learning behaviors, such as task attentiveness and emotional regulation, significantly

impact later years of literacy achievement, particularly receptive vocabulary and nonverbal reasoning skills, which are essential for literacy achievement (Sawyer et al., 2015). Working memory is another aspect of self-regulatory learning behavior that positively impacts literacy achievement in later years (Ahmed et al.). When reflecting on the long-term effect of early behavioral skills, it is vital to understand their positive effect through the school years and beyond (Pan et al., 2023). Teachers should promote working memory by incorporating music activities into students' learning experiences (Suppalarkbunlue et al., 2022). Suppalarkbunlue et al. explained that music allows students to recognize and memorize musical rules and symbols as they integrate singing, rhythm, role-playing, and music appreciation. Also, teachers should expose students to group and training games such as *The Circle Game*, *The Radish Game*, and *The Bomb Avoidance Game* (Jiao et al., 2021) to develop working memory as early as kindergarten. Despite the positive associations found between students' early self-regulatory learning behaviors and literacy achievement in later years, it is necessary to clarify that these behaviors are one element in academic success over time.

When analyzing the trajectory of the self-regulatory behavior on literacy achievement, this study found that self-regulatory learning effects on literacy achievement diminished over time through the second and third-grade years. This finding supports other studies claiming that although self-regulatory behaviors are essential in early literacy achievement, they fade out as regulation demands increase from one grade level to another (Magi et al., 2016) and cognitive operations (e.g., phonics, fluency, vocabulary, comprehension) increase in later years (Stipek &Valentino, 2015). This study builds the sense of urgency that as students' progress through grade levels, teachers

should emphasize concurrent interventions to develop task-attentiveness (Sawyer et al., 2015), working memory (Ahmed et al., 2019), and academic skills (Pan et al., 2023).

Demographic Effects on Literacy Achievement

Income

This study found initial significant positive effects of home income on literacy achievement. This finding is consistent with Mills et al. (2019) and Skibbe et al. (2011), who concluded that student with higher home income outperformed their counterparts. Predominantly, Mills et al. argued that students from low-income households lacked the necessary self-regulatory behaviors to achieve academically in kindergarten and first grade. Additionally, Skibbe et al. explained that students from low-income homes entering kindergarten with no prior preschool education underperform compared to their counterparts. They found that even students with prior preschool education underperformed students from higher-income homes. Home income differential negatively affects students' literacy achievement due to the quality of parental involvement in students' development at home and academically (Hindman & Morrison, 2012). The researcher of this study found that home income, although its significant initial effect, the growth effects on literacy achievement were insignificant. The home income effect found at the initial data point was inconsistent over the years. This finding explains why there are beneficial factors over income. Parental involvement and classroom instruction quality are better predictors of literacy achievement than income (Gay et al., 2021). Understanding that family factors hinder parents from involving in their children's academic experiences (Brandes-Aitken, 2019), teachers and schools should make all efforts to assist parents in ways to attract them to get involved in their

children's schools, mainly when parents' involvement is a better predictor of academic success than home income. Schools should promote parental involvement through participatory family-centered practices: relationship-building, participatory (Mas et al., 2022). Mas et al. explained that relationship-building promotes parents' active and reflective listening and effective communication skills. Also, Mas et al. suggest involving parents in activities that develop their beliefs about their family strengths. Mas et al. explained that parental participatory practices include developing parents' and families' skills in informed choice and decision-making practices by promoting the development of knowledge about resources and skills that supports their children in academic achievement.

Non-English Language

The study noted significant adverse effects of students who did not speak English on literacy achievement at the first-grade level measuring point. Dussling (2020) commented that students from homes where a non-English language was primarily spoken underperform compared with students whose primary language at home was English. Limited language comprehension is also linked to low literacy achievement (Mancilla-Martinez, 2020). Examining the longitudinal effects of students with no English spoken at home, this researcher found positive significant long-term effects of non-English on literacy achievement in subsequent years: second and third grade. This study concluded that students from homes where a non-English language was primarily spoken increased their literacy achievement from first to third grade. These findings are consistent with a recent study describing that developing emerging literacy skills during early childhood is vital for later literacy skills and academic success in general (Kennedy

& McLoughlin, 2023). Kennedy and McLoughlin explained that students acquiring literacy and English language skills during early childhood grades set a positive trajectory for later literacy achievement. Teachers developing and encouraging self-regulatory behaviors as students develop English language and literacy skills may increase the likelihood of further literacy and English language achievement. Therefore, teachers should equip students with self-regulatory strategies that could be used to increase literacy skills and English proficiency. Significantly, students understanding of the benefits of self-regulatory behaviors and how and when to employ those behaviors could facilitate academic and English language proficiency.

Dual language

The findings from this study revealed that students who spoke a dual language at home had an insignificant initial and growth effect on literacy achievement. However, these students demonstrated growth in literacy achievement from first to second and third grade, although the change was not significant. This finding uncovers that dual language students increase literacy achievement over time at a slower pace than their counterparts. This finding supports Arteagoitia et al. (2020), Guan et al. (2018), and Mancilla-Martnez et al. (2020), who explained that students developing dual-language skills underperform in literacy compared to their counterparts. They attribute this finding to the idea that students simultaneously learning dual language demonstrate limited vocabulary knowledge in English. The dual language student population is fast growing, and they consistently underachieve in literacy compared to White monolingual students (Edyburn et al., 2017; Niklas et al., 2018). Research to identify appropriate interventions to help close the English literacy gaps of dual language learners to increase their academic

achievement may be overlooked (Edyburn et al., 2017; Niklas et al., 2018). It has been established that English language learners who demonstrate self-regulatory behaviors increase their literacy skills. Therefore, teachers should focus on continuously developing self-regulatory skills in dual language learners to equip them with behaviors that would further increase academic achievement.

Further research is needed to develop knowledge on how to tailor instruction specifically for dual language learners. Teachers engaging dual language students in high-quality instructional activities, teacher-student interactions, and classroom learning environments conducive to learning facilitate dual language students' literacy achievement (Niklas et al., 2018). Additionally, it is vital that teachers create instructional experiences to develop English language proficiency (Halle et al., 2012) and English literacy (Petersen et al., 2015). A later study by Byington and Kim (2020) discussed the importance of teachers creating concurrent learning experiences for students to develop language and literacy skills. A recent study described the effect of using music to foster language and literacy development simultaneously (Rowe et al., 2023).

Disability

The study noted significant negative effects of students with a disability on literacy achievement at the first-grade level measuring point. Students with a disability underperformed their counterparts in first-grade literacy achievement, consistent with Grimm et al. (2018) and Kaye et al. (2022) studies. Grimm et al. clarified that students with reading disabilities are at risk of underperforming in literacy skills if they do not receive adequate academic intervention. Their study concluded that first-grade students with reading disabilities scored lower in literacy skills than students without a disability.

Additionally, Kaye et al. claimed that first-grade students with disabilities underperformed their counterparts in literacy achievement and stressed the importance of specific interventions for students with dyslexia.

Additionally, the current study revealed insignificant long-term effects of students with disability on later literacy achievement in second and third grade. This finding parallels Fuchs et al.'s (2012) and Titley et al.'s (2014) descriptions of the adverse effects of students with disabilities' limited literacy skill knowledge in first grade on later years' achievement. However, despite this insignificant finding, these students performed higher in literacy achievement in second and third grade than in their initial performance in first grade. This finding explains that students with a disability demonstrate growth in literacy at a slower pace than students with no disabilities. Therefore, it is vital for teachers to identify at-risk students for having a disability and develop learning experiences tailored to students with specific characteristics that hinder them from learning at the pace of students without disabilities.

Age

This study investigated the associations between age and literacy achievement. The finding showed that age positively affected literacy achievement in the first-grade assessment. First-grade students who were a month older outperformed the younger students. This finding supports other studies where older first-grade students outperform in literacy because they have more learning experiences and acquired self-regulatory learning behaviors (Zachariou & Whitebread, 2019). However, this study also noted that as students grew older, their literacy achievement faded. This last finding aligns with other researchers that concluded that learning gaps widen for students with specific

characteristics such as age, home socioeconomic status, disabilities, and English language proficiency. For example, as students grow older and move from one grade level to another, literacy achievement wanes due to several factors, such as self-regulatory learning behaviors fading through the years (Martinek et al., 2016), home low socioeconomic status (Cerda et al., 2014), learning disabilities (Sasser et al., 2015), and English as a second language (Finders et al., 2021).

Gender

Exploring if there were associations between students' gender and literacy achievement, this study found that student literacy achievement was not significantly related to gender in the first and subsequent years: second and third grade. Although gender was found longitudinally insignificant, its effects on student literacy achievement over time decreased. This finding is consistent with McTigue et al. (2021), who could not justify gender differences and concluded that there were intragroup more than intergroup differences in literacy achievement. McTigue et al. suggested that gender differences are secondary to other literacy skills and learning experiences preferred by gender. Males and females may prefer different literacy skills, text content, and learning experiences.

Limitations and Future Research

This study had a few limitations, although the study was able to examine the longitudinal effects of first-grade self-regulatory learning behaviors on later literacy achievement through second and third grade taking advantage of extensive numbers of participants and comprehensive options of data variables from US nationally representative data. First, the findings of the effects of self-regulatory learning behaviors in the study are interpreted as correlational and do not illustrate specific causal effects

(Galla et al., 2020). However, the study did not explore the differential effects of indicator variables on the construct of self-regulatory learning behaviors. Further research should investigate the long-term differential effects of first-grade students' specific self-regulatory academic behaviors that made the construct for this study. For example, students keeping belongings organized, showing eagerness to learn, working independently, adapting to changes, persisting in completing tasks, paying attention well, and following directions would provide practical information for teachers. Understanding the differential effects of students' behavior with more significant longitudinal impact may facilitate teachers to continue developing or fostering such students' academic behaviors to increase the likelihood of literacy achievement. Also, further research should explore specific strategies that develop and strengthen those specific behaviors.

Second, the teacher reported the students' behaviors encompassing the construct for self-regulatory behaviors using a child-level teacher questionnaire for teachers to report how often ECLS-K:2011 first-grade students exhibited specific behaviors. Understanding that there is vast support in the literature that teachers' reports of students' self-regulatory behaviors are better predictors than parents' reports for literacy achievement, future research should include data on students' self-regulatory behaviors measured using other strategies. For one, the data could come from the Head-Toes-Knees-Shoulders task (HTKS; McClelland et al., 2014) and the Remembering Rules and Regulation Picture Task (RRRP; Day & Connor, 2017), which are direct assessments of students' behaviors addressing students' working memory, inhibitory control, and cognitive flexibility through explicit behavior. Another method for collecting data could be using the Preschool Self-Regulation Assessment Report (PSRA-AR; Smith-Donald et

al., 2007), which assesses students' self-regulatory behaviors after administering a direct-child assessment such as the HTKS and RRRP. The data analysis using these other self-regulatory measures may reveal additional robust longitudinal findings.

Lastly, the variable of dual languages only indicated that parents could not identify the primary language used at home. The parents reported that they equally used English and another language at home. However, the data did not provide information on the proficiency levels of the two languages. If the information on proficiency levels had been given, they might have allowed researchers to analyze and provide that dual language's long-term differential effects differed by proficiency levels on the reading achievement and mediator variables.

Implications for Educators

The present longitudinal study revealed that students' self-regulatory behaviors exhibited in first grade diminished in later years: second and third grade. Therefore, teachers continuously training students in developing self-regulatory behavior is crucial for literacy achievement. Teachers can use practical literacy strategies to develop self-regulatory behaviors in students, particularly students with disabilities and limited English language proficiency. For example, teachers should instill in students an eagerness to read by training and motivating them to monitor (eg., visualize, ask yourself questions, draw conclusions, reread to clarify) regulate (e.g., plan, time management) their learning for better reading comprehension. Developing reading motivation and eagerness to learn reading in students could happen as early as preschool (Altun, 2019). Therefore, training students throughout the early grades of elementary school (K-3) to regulate their learning with the ultimate goal of reading comprehension is beneficial for

literacy achievement. Another practical strategy that teachers can use to develop self-regulation is by incorporating concept mapping. Concept mapping is a graphical representation of a fundamental structure to extract text meaning. Concept mapping improves students' understanding of the content that could be challenging to students with reading difficulties (Morfidi et al., 2018), learning disabilities (Miller, 2016), and limited English language proficiency (Brown, 2007; Chen & Hwang, 2020), particularly in the content area subject matter. Additionally, concept mapping increases critical thinking skills (Chen & Hwang, 2020, Khajeloo & Siegel, 2023) necessary for developing literacy skills. Moreover, students creating concept mapping to enhance their understanding of text also develop organizational skills. Students creating concept maps engage in critical thinking as they negotiate where in the graphical representation they should connect a concept, which also helps to develop organizational skills in students.

It is important that students are exposed to these strategies in explicit and systematic ways to develop an awareness of the benefits of these strategies and how and when to use them to improve their literacy skills.

Conclusions

Researchers have emphasized the positive effects of young students' self-regulatory behaviors on literacy achievement (Birgisdottir et al., 2015). The present study expands on their findings, specifically on the positive longitudinal effects of first-grade students' self-regulatory learning behaviors to second and third-grade levels after controlling for parent income, non-English language spoken at home, dual-language use at home, gender (male), age, and disability. The current investigation expands the notion that despite the negative impact of students' differential sociodemographic effects on

later literacy success, self-regulatory behaviors positively impact later achievement. Therefore, it is vital that teachers continue fostering self-regulatory behaviors in students along with cognitive skills, mainly when this researcher found that self-regulatory behaviors fade through the years. Teachers developing academic behaviors along with cognitive skills may increase the likelihood of literacy achievement.

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Appendix A

Teacher Reported of Students' Social Skills in the Classroom

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Social Skills

Teachers rated children in their classroom on social skills (including their ability to exercise self-control, interact with others, resolve conflict, and participate in group activities); externalizing and internalizing problem behaviors (e.g., fighting, arguing, anger, depression, low self-esteem, impulsiveness); and learning dispositions or "approaches to learning" (e.g., curiosity, self-direction, organization, and persistence). The social skills and problem behavior items were adapted from the Social Skills Rating Scale (SSRS) by Gresham and Elliot 1990 and are published by NCS Pearson. These items are copyright protected and are not listed. The approaches to learning items were created for the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K) by Atkins-Burnett. They are not copyright protected and, therefore, are listed below.

For the set of items below, please think about this child's behavior during the past month or two. Decide how often the child demonstrates the behavior described. We realize that some items apply more to older children, but please answer as accurately as you can. For each item, mark one of the following responses:

Never	→	Child never exhibits this behavior.
Sometimes	→	Child exhibits this behavior occasionally or sometimes.
Often	→	Child exhibits this behavior regularly but not all the time.
Very often	→	Child exhibits this behavior most of the time.
No Opportunity	→	No opportunity to observe this behavior.

	How Often?				
	Never	Some-times	Often	Very Often	No Opportunity to Observe
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
11. Keeps belongings organized.	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
14. Shows eagerness to learn new things.	☐	☐	☐	☐	☐
15. Works independently.	☐	☐	☐	☐	☐

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	How Often?				
	Never	Some-times	Often	Very Often	No Opportunity to Observe
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
21. Easily adapts to changes in routine.	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
23. Persists in completing tasks.	☐	☐	☐	☐	☐
24. Pays attention well.	☐	☐	☐	☐	☐
25. Follows classroom rules.	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

CHAPTER IV

PREDICTED EFFECTS OF FIRST-GRADE STUDENTS' ACADEMIC AUTONOMY, ADAPTABILITY, AND PERSISTENCE ON LITERACY ACHIEVEMENT

Abstract

The present study examines whether students' academic autonomy, adaptability, and persistent behaviors, as teachers rated during the first-grade fall term, directly contribute to literacy achievement assessed in the fall term of the same school year among students from different sociodemographic characteristics. This study used the kindergarten cohort of 2010-2011 of the nationally representative data from the Early Childhood Longitudinal Study (ECLS-K:2011). The analysis was done with a hierarchical regression model to explain the literacy achievement gaps and later gap reductions as each variable (autonomy, adaptability, and persistence) was added to the subsequent models. The model included four blocks: students' sociodemographic characteristics, autonomy, adaptability, and persistence. This study found that after including all eight predictors (parent income, non-English, gender, student age, disability, autonomy, adaptation, and persistence), the final model accounted for approximately 34% of the variance in literacy achievement. The results highlight the significance of students' autonomy, adaptability, and persistence in literacy achievement and suggest that teachers promoting the three skills in students may reduce initial literacy gaps.

Introduction

Early childhood academic self-regulatory behaviors have repeatedly been positively associated with literacy, with students from low socioeconomic and non-English language-speaking homes and with disabilities lagging behind their counterparts'

achievement (Mills et al., 2019; Montroy et al., 2016; Neuenschwander et al., 2012; Pintrich & De Groot, 1990). Students learn academic content, tasks, and expectations with high behavioral demands from kindergarten through early elementary grades (Blair & Raver, 2012, 2015). Academic autonomy (Bacchioni & Kurstedt, 2019; Lamme et al., 2002; Meyer & Schendel, 2014), adaptability (Gnaedinger et al., 2016), and persistence have been identified as primary factors explaining students' literacy underachievement. For instance, students' autonomy is defined as the student-centered learning values (what they know and want to learn, their learning motivation) in which they self-direct their behaviors based on personal values (culture, beliefs) and goals (aspirations) and take responsibility for their learning experiences in a teacher-created safe learning environment (Deci & Ryan, 2008). Adaptability is when students can adjust to classroom learning tasks by engaging in self-directed activities and cooperatively participating in classroom learning experiences (Ladd et al., 1999). Persistence is students' ability to adapt their behaviors to endure and complete academic tasks (Onatsu-Arvilomni & Nurmi, 2000), regardless of the task complexity and academic challenges (Drake et al., 2014; Zhang et al., 2011).

By examining the positive influence of autonomy, adaptability, and persistence on first-grade students' literacy achievement, the present study makes a significant contribution to the field of literacy. It emphasizes the importance of not only nurturing these behaviors in students but also for teachers to be attentive to the factors that contribute to their development. This awareness enables teachers to continuously cultivate and reinforce these factors effectively.

Furthermore, this study provides valuable insights into the significance of creating tailored learning experiences for students who come from non-English or dual-language backgrounds, as well as students with disabilities. It highlights the consistent underperformance of these student groups when compared to their peers. Consequently, the study advances the notion that teachers should proactively design learning experiences that specifically address the unique learning needs of these students.

Overall, this research underscores the importance of fostering autonomy, adaptability, and persistence in students, while also emphasizing the crucial role of teachers in facilitating and supporting these behaviors. Additionally, it highlights the necessity of addressing the specific needs of diverse student populations to promote equitable and inclusive literacy achievement.

Literature Review

Autonomy

Student autonomy has been explained as a student-centered learning personal value in which students self-direct themselves based on their beliefs and goals and take responsibility for their learning experiences in a teacher-created safe learning environment (Deci & Ryan, 2008). Bacchioni and Kurstedt (2019) stated that teachers' scaffolding of the learning process through the gradual release of responsibility and outlined procedures (e.g., anchor charts), enable students to take ownership and achieve autonomy in their learning experiences. In addition, to expose students to new content through the gradual release of responsibility, researchers have stressed the importance for teachers to create developmentally appropriate instructions and ensure that students possess the necessary background information to learn new content (Lamme et al., 2002).

Modeling learning experiences that include content and learning strategies provide a supportive learning environment that will enable students for future autonomy (Lamme et al., 2002).

Studying the link between young students' autonomy or independence skills and literacy achievement is nothing new (Brody et al., 1994; Chance, 1961; Genesee, 1980; Guthrie et al., 2000; Marjoribanks, 1981). Many studies support the notion that students who can complete tasks independently demonstrate higher literacy achievement (Joussemet et al., 2005), including students with reading disabilities (Denton et al., 2021).

There are factors attributed to students' academic independence in completing literacy tasks that increase literacy achievement, such as teacher professional development activities (De Naeghel et al., 2016), student-teacher relationship (Zee et al., 2013), classroom self-regulatory climate and autonomy-supportive instruction (Adams & Palmer, 2017). Additionally, students' sociodemographic factors also contribute to students' independence, such as mothers' employment and educational attainment (Yetis-Bayraktar et al., 2013) and mother autonomy support (Doctoroff & Arnold, 2017; Meuwissen & Carlson, 2018; Viljaranta et al., 2018).

Researchers have explained that engaging students in autonomy-supporting instruction develops students' academic independence, increasing literacy achievement (Taboada & Rutherford, 2011). Studies have identified varied student learning experiences that foster students' independence that, include literature circles (Meyer & Schendel, 2014), anchor charts (Bacchioni & Kurstedt, 2019), and hands-on experiences (Dahl, 1998) that positively contributed to students' literacy achievement. Anchor charts are large chart paper used for teachers and students to anchor meaningful and relevant

information students could use for learning. Bacchioni & Kurstedt recommend the creation of an anchor chart for teachers and students to document modeled steps and thinking processes. Bacchioni and Kurstedt further suggest that teachers display the anchor charts around the classroom for students to use during independent learning.

Additionally, researchers have explained that guidance and support from parents, teachers, and other adults (Lamme et al., 2002) increase the likelihood of literacy achievement. Furthermore, studies revealed that parents' high expectations and family experiences (Wang et al., 2014) contribute to literacy success. Finally, providing opportunities for students' choice of learning experiences fosters students' independence which increases students' literacy achievement (Evans & Boucher, 2015).

Adaptability

Adaptability is explained as students' ability to adjust to classroom demands by engaging in self-directed behaviors and cooperatively participating in academic tasks (Ladd et al., 1999). In addition, students' prior cognitive and strategy skills facilitate their adaptability behaviors because they are cognitively ready with prior literacy skills and equipped with a repertoire of reading strategies they can and know how to use to fix their reading comprehension (Gnaedinger et al., 2016).

Researchers have studied the association between students' social and academic adjustment and literacy achievement during the early childhood years (Cook & Coley, 2017; Joussemet et al., 2005; Lee & Bierman, 2015; Robinson & Diamond, 2014; Sattler & Gershoff, 2019), including students with exceptionalities (Allen et al., 2014; Nielsen; et al., 2018). Additionally, studies have found the importance of classroom interventions that promote students' positive academic skills (Sattler & Gershoff, 2019). For example,

some classroom interventions should include meaning-focused (e.g., vocabulary, comprehension) and code-focused (e.g., phonological awareness, letter knowledge) classroom interventions (Lonigan et al., 2013) that increase the overall literacy achievement of students. Additionally, teachers should focus on developing classroom environments that foster students' academic positive academic skills. For example, prior studies have identified varied factors that affect students' adaptability in the classroom dynamics, such as student-teacher (Eisenhower et al., 2015; Lee & Bierman, 2015; Liew et al., 2018; Pratt et al., 2019) and peer relationships (Liew et al., 2018), teacher flexibility and judgment when selecting teaching materials and approaches (Hassett, 2008), classroom environment (Maier et al., 2012), and classroom emotional (Lee & Bierman, 2015) and pedagogic (Ezhovkina & Ryabova, 2015; Hassett, 2008) support. Teachers creating learning experiences that foster these factors may increase the likelihood of students' literacy achievement.

Many factors predict students' ability to adapt to the academic dynamics in the classroom**.** For example, researchers have identified emotional knowledge and regulation, executive functioning, and metacognition as crucial predictors of students' school adjustment and literacy achievement (Blankson et al., 2017). Other researchers have found that temperamental effort, executive function (Neuenschwander et al., 2012), and student learning engagement (Halliday et al., 2018) are critical factors in students' ability to adapt to the classroom environment and learning expectations and challenges.

Studies have emphasized that explicit classroom interventions promoting executive functioning skills that enable students to control and regulate their thoughts, behaviors, and emotions (Dias & Seabra, 2017) and social and emotional learning skills

(Ashdown & Bernard, 2012) improve students' regulation and literacy achievement. For instance, providing opportunities for students to have choices for learning (de Bilde et al., 2015; Murawski & Scott, 2019) and the suggested learning activity such as the, *You Can Do It! Early Childhood Education Program* approach (Ashdown & Bernard, 2012) promotes student adaptations through their engagement and motivation in literacy tasks, improving their literacy achievement.

Other factors such as limited family engagement and home learning experiences (Jung, 2016), cumulative family stressors (Pratt et al., 2019), low family socioeconomic status (Hammes et al., 2016; Murray & Harrison, 2011), and lack of school readiness (Haidkind et al., 2011; Hammes et al., 2016; Murray& & Harrison, 2011) negatively affect students' school adjustment and literacy achievement.

Persistence

Persistence is described as students' ability to adapt their behavior (Onatsu-Arvilomni & Nurmi, 2000) and endure academic task completion regardless of the classroom environment, task complexity, and academic challenges (Drake et al., 2014; Zhang et al., 2011). Studies have found associations between students' academic persistence and literacy achievement (Bulotsky-Shearer et al., 2011; Kikas & Magi, 2017; Kikas & Silinskas, 2016; Woods-Groves & Choi, 2017). Researchers have explained that students' lack of persistence in academic tasks is detrimental to students' literacy achievement (Bulotsky-Shearer, 2011).

Researchers argue about factors influencing students' persistence while completing literacy tasks. For instance, students' prior literacy skills (Kikas & Silinskas, 2016), mastered peer relationships (Jozsa & Barrett, 2018), and teacher emotional support

(Kikas & Magi, 2017) are strong predictors of higher students' persistence in task completion in literacy. In addition, other predictors such as teacher emotional support (Kikas & Silinskas, 2016) and social and emotional learning skills (Ashdown & Bernard, 2012) have positive effects on students' literacy achievement, mainly through mediating factors such as students' confidence, persistence, organization, resilience (Ashdown & Bernard, 2012), and mothers' help (Kikas & Silinskas, 2016).

The studies above about students' autonomy, adaptability, and persistence used statistical methods to examine those effects in isolation. However, other studies have examined independence, flexibility, and persistence, among other variables, concerning the effect of time on reading instruction on reading growth during kindergarten and first grade (Puccioni, 2015). The current study examined first-grade students ‘autonomy, adaptability, and persistence while considering students' sociodemographic characteristics, such as parent income, students who spoke a language other than English at home, gender, age, and disability in an integrated model.

Figure 1

Predictability of Autonomy, Adaptability, and Persistence Hierarchical Regression Model

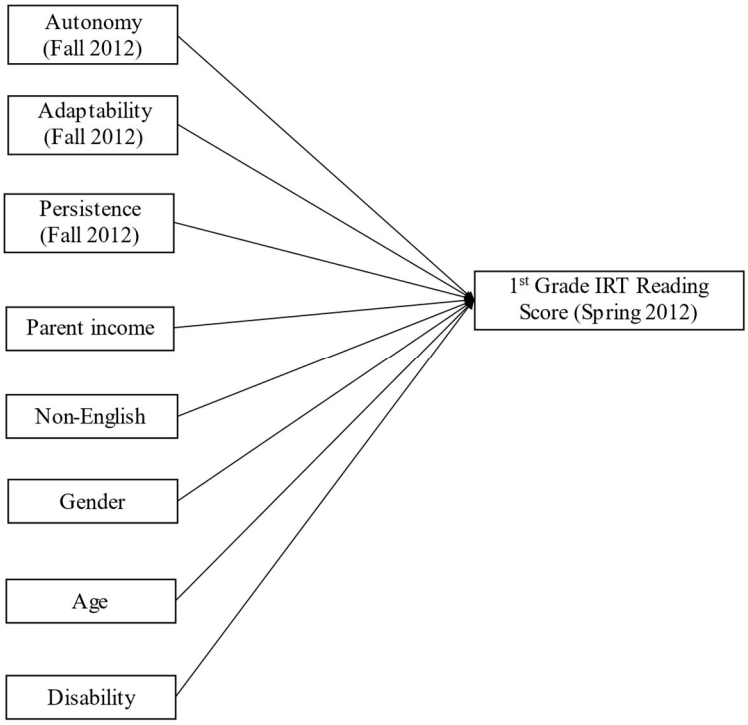


Figure 1 illustrates the model depicting first-grade students' autonomy, adaptability, and persistence predictability variance in literacy achievement considering students' sociodemographic characteristics (parent income, non-English, gender, age, disability).

Methods

This study used Hierarchical Regression (HR) to examine the effects of students' academic autonomy, adaptability, and persistence on students' literacy after controlling for demographic factors such as parent income, home language (non-English), gender, age, and disability. When examining the three constructs in the same context considering the highly correlated characteristics of the three factors, the outcomes were less biased.

Another benefit of the integrated analysis was examining each factor's effect after controlling for the other two. In other words, this study understood each effect in consideration of the other two. Moreover, this analysis investigated the comparative importance of each factor in affecting literacy achievement. Limited research uses an integrated model to predict literacy achievement based on autonomy, adaptability, and persistence. After controlling for demographic variables, the integrated model used a series of regression analyses created by adding each factor (autonomy, adaptability, persistence). By conducting a hierarchical regression model, the study found whether each variable (autonomy, adaptability, persistence) significantly contributed to explaining literacy achievement. The proportion of the explained variance in literacy achievement (dependent variable) and regression coefficients in each model were important outcomes to determine the significance of each variable.

Research Questions

The researcher's aim for this study was to answer the following questions:

1. Do autonomy, adaptability, and persistence predict literacy achievement after controlling for each other and demographic variables? If it does, how much literacy achievement will be explained?
2. Do parent income, home language, gender, age, and disability significantly affect literacy achievement?

Data

The data collection used for this study came from the Early Childhood Longitudinal Study (ECLS) cohort that began with the kindergarten class of the 2010-2011 school year. The specific data for this study include assessments administered to

first-grade students during the school year 2011-2012, particularly during the spring 2012 term. The data were collected using three assessments: parent questionnaires reporting students' demographics, teacher questionnaires reporting students' behaviors, and Item Response Theory (IRT) reading assessment. Missing cases were treated for each independent variable: autonomy (n = 5,020), adaptability (n = 4,972), and persistence (n = 4,992).

Variables

The study used three independent variables: persistence, adaptability, and autonomy. In addition, the first-grade spring IRT reading score variable was used as a dependent variable. For students' demographics, the variables were parent income, home language, gender, age, and disability.

Autonomy, Adaptability, and Persistence. The three items: autonomy, adaptability, and persistence data were collected using a frequency-scaled teacher questionnaire. During the first-grade spring 2012 term, teachers reported how often students exhibited autonomy, adaptability, and persistence behaviors (See Appendix A). These variables were "works independently" (autonomy), "easily adapts to changes in routine" (adaptability), and "persistent in completing tasks" (persistence).

First-Grade Spring IRT Reading Score. The First-grade students reading scores from the IRT reading assessment administered during the spring term were used to identify the literacy achievement variance after considering students' autonomy, adaptability, and persistence exhibited during the fall term. The IRT assessment included two stages: routing form and varied complexities (low, middle, high). Students' IRT scores from the routing form assessment during the first stage determined the assessment

complexity (low, middle, high) they were assigned for stage two. Additionally, the assessment included three sections: basic literacy skills, vocabulary, and reading comprehension. The basic literacy skills included print familiarity, letter recognition, beginning and ending sounds, rhyming words, and word recognition. The reading comprehension section included questions for students to identify explicit text information such as definitions, facts, and supporting details. Furthermore, the assessment included questions for students to make inferences within and across texts, consider the text objectively, and judge the text for its appropriateness and quality.

Parent Income. The parent income data were collected through parent interviews during the fall 2010 and spring 2011 terms in the kindergarten year. Parents were asked to report any income range change during spring 2012. Parents identified changes as 25,000 or less or more than 25,000 and by detailed ranges such as income in a $5,000 range such as $5,000 or less and 5,001 to 10,000 and so forth until $200,001 or more.

Home Language. The students' home language information was collected through parent interviews during the kindergarten fall 2010 term. After this period, missing home language information was collected through parent interviews in subsequent terms during the kindergarten spring of 2011 and first-grade spring of 2012.

Gender. The school provided the students' gender information during the initial participant selection. Later, during the kindergarten fall 2010 term, parents were asked to confirm students' gender. After this period, missing gender information was collected through parent interviews in subsequent terms during kindergarten spring 2011 and first-grade fall 2011 and spring 2012.

Age. Student age was calculated by the number of days since birth at the assessment time and divided by 30 days to represent the age in months.

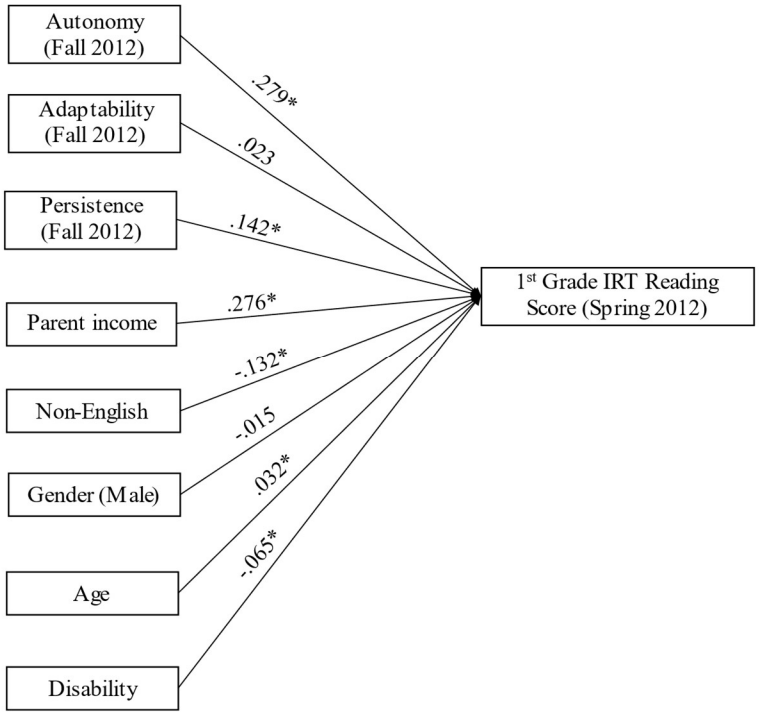
Disability. The data for disability were collected through parent interviews. The parents responded if their child was diagnosed with a disability or if the child had received therapy services. Students were coded as 1 (disability diagnosed, therapy received) and 2 (no disability diagnosed, no therapy services received).

Data Analyses

Figure 2 illustrates students' autonomy, adaptability, and persistence in an integrated hierarchical regression model with standardized coefficients.

Figure 2

Predictability of Autonomy, Adaptability, and Persistence Hierarchical Regression Model with Coefficients



Correlation Among All Variables

Including all the variables of this study, a correlation analysis was completed and presented in Table 1. The matrix correlation indicates significant correlations among the primary dependent variable (literacy achievement) and the independent variables (autonomy, adaptability, persistence, parent income, home language, gender, age, and disability).

The preliminary analysis explained that all variables were normally distributed and linear. Additionally, the analysis did not indicate a violation of the multivariate normality.

Table 1

Correlations among Variables

		1	2	3	4	5	6	7	8	9
1.	Autonomy	__								
2.	Adaptation	.552**	__							
3.	Persistence	.706**	.525**	__						
4.	Parent Income	.159**	.088**	.161**	__					
5.	Non-English	-.009	.007	-.002	-.266**	__				
6.	Gender	-.166**	-.161**	-.173**	-.001	-.011	__			
7.	Age	.079**	.036*	.061**	-.011	-.089**	.066**	__		
8.	Disability	-.145**	-.134**	-.127**	-.022*	-.094**	.127**	.090**	__	
9.	Literacy achievement	.448**	.274**	.409**	.351**	-.164**	-.110**	.069**	-.140**	__

Note: ** indicates correlation is significant at the 0.01 level (2-tailed).
*indicates correlation is significant at the 0.05 level (2-tailed)

Findings

A hierarchical design was employed, which used four blocks: 1) in Block 1, students' first-grade literacy achievement was predicted from five sociodemographic students' characteristics: parent income, non-English, gender, age, and disability; 2) in Block 2, students' autonomy behavior was added; 3) in Block 3 students' adaptation was

entered; and 4) in Block 4, students' persistence was added. The first block predicting students' first-grade literacy achievement from their sociodemographic characteristics accounted for a significant amount of variance, F (5, 3558) = 169.43, $p < .05$. The addition of students' autonomy behavior significantly increased the variance accounted for in literacy achievement, F (1, 3557) = 729, $p < .05$. This new variable accounted for a significant amount of variance in literacy achievement, F (6, 3557) = 291.6, $p < .05$. The inclusion of students' adaptation significantly increased the variance accounted for in literacy achievement, F (1, 3556) = 9.6, $p < .05$. The second new variable accounted for a significant amount of variance in literacy achievement, F (7, 3556) = 251.9, $p < .05$. The final addition of persistence to the model led to another significant increase in variance accounted for in literacy achievement, F (1, 3555) = 52.7, $p < .05$. This fourth variable accounted for a significant amount of variance in literacy, F (8, 3555) = 230.2, $p < .05$.

After adding all variables, the model included all eight predictors – parent income, non-English, gender, student age, disability, autonomy, adaptation, and persistence. Overall, the model accounted for approximately 34.1% of the variance in literacy achievement. Six of the eight were significant predictors of literacy achievement, independent of one another, $p < .05$. Parent income, age, non-English, disability, autonomy, and persistence. When all eight predictors are equal to zero, literacy achievement is expected to be 49.31. When holding the other variables constant, for every unit increase in parent income, literacy achievement is expected to increase by .882 points; for every unit increase in student age, literacy achievement is expected to increase by .135 points; non-English speaking students' literacy achievement is expected to be 5.703 points lower than English-speaking students; students with disability are expected

to 2.99 points lower in literacy than students without disability; for every unit increase in autonomy, literacy achievement is expected to increase by 5.940 points; for every unit increase in persistence, literacy achievement is expected to increase 2.839 points.

Table 2

All Blocks with Sociodemographic, Autonomy, Adaptation, and Persistence as Predictors

Block	Coefficient	Estimate	SE	*p*	*F Change*	R^2 *Change*
1	Intercept	64.83	4.70	< .05	169.4	.192
	Parent Income	1.13	.05	< .05		
	Student age	.30	.06	< .05		
	Non-English	-4.84	.70	< .05		
	Gender	3.03	.56	< .05		
	Disability	-5.20	.70	< .05		
2	Autonomy	8.22	.31	< .05	729.0	.137
3	Adaptation	1.19	.38	< .05	9.58	.002
4	Persistence	2.83	.39	< .05	52.7	.010

Discussion

The current study examined the predictability of teacher-rated students' academic autonomy, adaptability, and persistent behaviors exhibited during the fall term of first grade, for students' literacy achievement of students from different sociodemographic characteristics. Findings from the first analysis (Block 1) revealed that students from non-English speaking homes, who were males, and with disabilities, experienced around 19.2% literacy achievement toward the end of first grade. These findings concur with

prior studies suggesting that students from non-English languages spoken at home (Caughy et al., 2022) and with disabilities (Denton et al., 2021) may be at risk of underperforming their peers in literacy achievement. This study also revealed that male students displayed low performance in literacy, which aligns with other studies explaining that early childhood male students tend to underperform girls because they may express less self-regulatory behaviors and higher sensitivity to environmental circumstances than females (Montroy et al., 2016). However, recent studies indicate that proper instruction that develops cognitive skills and fosters self-regulatory behaviors closes literacy gaps in students (Ozbek et al., 2019). Other findings in this block analysis are that students with higher home income and older in an age in months demonstrate higher literacy achievement than their counterparts. This finding about home income supports prior studies claiming that students with higher home income demonstrate higher literacy achievement because they have more exposure to academic environments at home and parental involvement (Blair et al., 2015; Brandes-Aitken et al., 2019; Reinelt et al., 2019). Analyzing first-grade students' age and literacy achievement, this study revealed that older students demonstrated higher variance in literacy achievement, consistent with Murray and Harrison (2011) who reported that older students in kindergarten outperformed their counterparts in literacy achievement. A determinant factor for this finding could be that older students are more mature and demonstrate higher school readiness than young children (Bodovski & Youn, 2011; Murray & Harrison, 2011). Students develop school readiness as they increase their autonomy, adaptability, and persistence behaviors while completing academic tasks.

To predict first-grade literacy achievement above and beyond students' sociodemographic characteristics, this study added students' autonomy behaviors, which significantly increased the variance accounted for in literacy achievement to approximately 33%, with R-Square change of 13.7%, explained beyond students' sociodemographic characteristics. The finding of this analysis aligns with prior studies' results showing that students' autonomy was a strong predictor of literacy achievement. Scholars have exhorted that providing opportunities for students' academic choices increases their motivation, and they exhibit the autonomy needed for task completion (Evans & Boucher, 2015). Others have stressed the importance of a classroom environment conducive to learning (Lamme et al., 2002) that includes peers' and teachers' social interactions (Meyer & Schenndel, 2014) to increase the likelihood of literacy success. It is crucial that teachers create learning experiences that include self-regulatory behaviors along with cognitive skills (Bacchioni & Kurstedt, 2019).

When adding students' adaptation into the regression model above in the third block, the analysis revealed that the new model significantly increased the variance accounted for by around 33.1% in literacy achievement with an R-square change of .2%, which is not surprising. This study supports other scholars who have long explained that students' adaptability is vital in literacy achievement. The early elementary school years include a complex dynamic in students' learning experiences requiring flexibility and adaptation. The students' learning experiences in the classroom encompass multiple dynamics, such as the student and teacher relationship (Eisenhower et al., 2015; Lee & Bierman, 2015; Liew et al., 2018; Pratt et al., 2019); academic and social interaction with peers (Liew et al., 2018), teacher professional and emotional practices (Hassett, 2008),

and the classroom environment (Hassett, 2008; Ezhovkina & Ryabova, 2015; Lee & Bierman, 2015; Maier et al., 2012). All these factors expect students to be able to adapt cognitively, emotionally, and socially and to use self-regulatory behaviors to engage (Halliday et al., 2018) and succeed academically regardless of the academic challenges (Drake et al., 2014; Zhang et al., 2011).

The final model added students' persistence in academic tasks, which led to another significant increase in variance for an R-square change of 1%, accounting for 34.1% in literacy achievement. This finding is consistent with researchers who suggested that students' persistence in completing academic tasks is crucial to literacy success (Bulotsky-Shearer et al., 2011). Constantly changing educational reforms include increased academic challenges in which students are expected to use prior knowledge and academic behaviors such as persistence to succeed academically. Based on this finding, teachers should reflect on the importance of students' academic persistence and be cognizant of the positive contribution of students' readiness for new content (Kikas & Silinskas, 2016) and their emotional (Ashdown & Bernard, 2012); Kikas & Magi, 2017) and social (Jozsa & Barrett, 2018) skills when creating learning experiences to their students so that students are equipped to persist and succeed academically. Teachers should foster students' task persistence by developing students' motivation for learning through a teacher-emotional support system in which the students perceive a classroom environment that is conducive to learning and that the teacher provides instructional support (Kikas & Magi, 2017). Kikas and Magi also stressed the importance of developing self-concept in students to feel competent to complete academic tasks and meet the teacher's expectations.

Limitations and Future Research

Regardless of the substantial findings of this research, few limitations existed. First, the participants were only those who participated in the national surveys. Therefore, the findings from this study cannot generalize to other countries. For example, education inequalities among countries, students' academic expectations, students' personal and learning experiences, and outcomes may vary.

Second, using a Likert scale survey (never, sometimes, often, very often, no opportunities to observe), teachers reported how often students exhibited autonomy, adaptability, and persistent behaviors, which could be subjective based on teachers' perceptions. Teachers reporting students' self-regulatory behaviors from objective measures, such as the direct assessments *Head-Toes-Knees-Shoulders* task (HTKS; McClelland et al., 2014) and the *Remembering Rules and Regulation Picture* task (RRRP; Day & Connor, 2017) would gather stronger data for a better literacy achievement variance analysis.

Third, the results are correlational without providing evidence of causal effects or controlling for other confounding factors in the context. If the three mediator variables of autonomy, adaptation, and persistence were analyzed using quasi-experimental or experimental designs, the study would provide direct information on the causal dynamics of students' autonomy, adaptability, and persistence and how these causalities affect literacy achievement. One step further, the study finding would allow suggesting robust policy implications. Understanding the causality of those behaviors would help teachers and policymakers to develop and foster practical and effective instructional practices. Most of all, they would help teachers understand the importance of students' autonomy,

adaptability, and persistent behaviors in literacy success and would create learning experiences that foster the three behaviors concurrently with cognitive skills.

Implications for Educators

The present study stresses the importance of first-grade students' autonomy, adaptability, and persistent behaviors for literacy achievement. Understanding that when first-grade students exhibit these self-regulatory behaviors early in the school year increases the likelihood of literacy achievement by the end of the year, it is necessary that teachers continue developing and encouraging these behaviors throughout the year as the students learn literacy skills. There are many strategies that teachers could use to foster students' autonomy, adaptability, and persistent behaviors. However, two strategies teachers could use throughout the year for all students' learning experiences are provide opportunities for students to read and learn about topics that they most enjoy. If students are presented with high interest content, they will feel motivated to read and to complete literacy tasks. One way to match appropriate reading material with students is by providing choices for students to select reading material based on their interest and their reading ability. The idea is for teachers to motivate and engage students in literacy tasks during independent work. When students are motivated and engaged with learning experiences, they tend to persist in academic activities and overcome challenges. If students are not able to identify topics of interest, the teacher should provide varied topics for the student to explore and discuss with the teacher and peers during small group activities. The teacher should foster student interest by developing background knowledge to increase confidence and presenting books with creative activities for students to participate with peers and receive teacher guidance and support until the

students develop a special interest. Additionally, students develop social skills and resilience, which are important factors for their adaptation (Jaureguizar et al., 2018) to the myriad of academic challenges they may face while completing literacy tasks. As students strengthen their academic skills and regulate their learning behaviors (e.g., creating and using personalized charts, participating in small-group work), their persistence in completing tasks increases (Halliday et al., 2018).

Conclusion

The current study further supports the benefits of young students' academic behaviors for literacy achievement. This study has shown that first-grade students who exhibit academic autonomy, adapt to classroom learning dynamics, and persist in completing academic tasks show higher literacy achievement than those students who do not demonstrate these behaviors. The current findings may suggest important implications for teachers' instructional practices in supporting the predictors of students' autonomy, adaptability, and persistence (Bacchioni & Kurstedt, 2019; Drake et al., 2014; Neuenschwander et al., 2012). A way teachers should evaluate the students' behaviors that affect their autonomy, adaptability, and persistence while completing literacy tasks could be by teachers providing opportunities for students to engage in literacy tasks with a gradual release of responsibility (Bacchioni & Kurstedt, 2019) in which the teachers will explicitly explain concepts and procedures to student and will demonstrate the learning experience to students before they can engage in guided practice. These teacher-student engagements could provide opportunities for teachers to observe the students' behaviors through the phases of teachers' explicit explanation (students listening), demonstration (students paying attention and observing the teacher modeling), and

guided practice (students actively learning concepts and following procedures while the teacher assists as needed). The teachers should observe the students' behaviors that limit students' autonomy, adaptability, and persistence and create lessons that remediate these limitations. Also, teachers should continue encouraging factors that are contributing to these behaviors. Teachers evaluating the individual students' factors contributing to their academic autonomy, adaptability, and persistent behaviors might provide a detailed insight into students' academic actions conducive to learning. Additionally, teachers should foster behaviors that develop adaptability and persistence through small-group instruction where the teacher would have opportunities to evaluate students' peer interactions and attentional skills (Drake et al. 2014) while engaging in guided reading, strategy group, and shared reading (Bacchioni & Kurstedt, 2019). Teachers using these factors to develop more robust academic behaviors enable students to overcome tasks (Blair & Raven, 2012, 2015; Liew et al., 2018) and English language proficiency (Caughy & Brinkley, 2022) challenges as they adapt to different situations and persist in task completion. Finally, this may, in turn, help teachers create learning experiences that include cognitive and academic behaviors to increase the likelihood of literacy achievement (Ashdown & Bernard, 2012; Dias & Seabra, 2017).

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Appendix A

Teacher Reported of Students' Social Skills in the Classroom

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Social Skills

Teachers rated children in their classroom on social skills (including their ability to exercise self-control, interact with others, resolve conflict, and participate in group activities); externalizing and internalizing problem behaviors (e.g., fighting, arguing, anger, depression, low self-esteem, impulsiveness); and learning dispositions or "approaches to learning" (e.g., curiosity, self-direction, organization, and persistence). The social skills and problem behavior items were adapted from the Social Skills Rating Scale (SSRS) by Gresham and Elliot 1990 and are published by NCS Pearson. These items are copyright protected and are not listed. The approaches to learning items were created for the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K) by Atkins-Burnett. They are not copyright protected and, therefore, are listed below.

For the set of items below, please think about this child's behavior during the past month or two. Decide how often the child demonstrates the behavior described. We realize that some items apply more to older children, but please answer as accurately as you can. For each item, mark one of the following responses:

Never	→	Child never exhibits this behavior.
Sometimes	→	Child exhibits this behavior occasionally or sometimes.
Often	→	Child exhibits this behavior regularly but not all the time.
Very often	→	Child exhibits this behavior most of the time.
No Opportunity	→	No opportunity to observe this behavior.

	How Often?				
	Never	Some-times	Often	Very Often	No Opportunity to Observe
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
11. Keeps belongings organized.	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
14. Shows eagerness to learn new things.	☐	☐	☐	☐	☐
15. Works independently.	☐	☐	☐	☐	☐

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	How Often?				
	Never	Some-times	Often	Very Often	No Opportunity to Observe
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
21. Easily adapts to changes in routine.	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
23. Persists in completing tasks.	☐	☐	☐	☐	☐
24. Pays attention well.	☐	☐	☐	☐	☐
25. Follows classroom rules.	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

CHAPTER V

DISCUSSION

The quantitative collected paper dissertation sought to (1) examine the mediating effects of students' self-regulatory behaviors and attention difficulties on literacy achievement; (2) determine if the outcome has a long-term effect from first to third grade; and (3) analyze if these direct, mediating, and long-term effects differ for students from various sociodemographic backgrounds. Additionally, this dissertation sought to (4) investigate the effect of autonomy, adaptability, and persistence on students' literacy and (5) if these effects differ for students from various sociodemographic backgrounds.

The three studies in this dissertation further the understanding of the positive contribution of first-grade students' self-regulatory behaviors on literacy achievement and how these effects are concurrently and longitudinally different for students with varied sociodemographic characteristics. Different statistical methods were employed to explain these dynamics. Next, the findings of the effects of these dynamics are concluded.

Mediating Effects of Self-Regulatory Behaviors and Attention Difficulties

The first study explored the mediating effects of first-grade students' self-regulatory behaviors and attention difficulties on literacy achievement. Understanding that prior research has explained separately that self-regulatory behaviors and attention difficulties significantly affect students' literacy achievement, the researcher analyzed the two constructs in the same model while considering students' specific sociodemographic characteristics.

By exploring the mediating effects of students' self-regulatory behaviors between their sociodemographic characteristics and literacy achievement, the current study found

that first-grade students' self-regulatory behaviors measured during the fall term positively mediated their spring literacy achievement. This finding is important because it validates that students regulating their behaviors facilitate literacy achievement regardless of students' differential sociodemographic characteristics. Additionally, exploring the mediating effects of students' attention difficulties revealed that students who demonstrated attention difficulties in the classroom showed lower literacy achievement. This study may build a sense of urgency for teachers to understand the repercussion of students' distractibility in literacy development and further literacy achievement.

Analyzing the indirect path between students' sociodemographic characteristics and literacy achievement mediated by students' attention difficulties revealed not surprising adverse effects of students from homes with low income and speaking a language other than English or a dual language on literacy achievement when mediated by students' attention difficulties. These findings contribute to prior research that students from low-income homes underperformed their counterparts. Studies have explained that students from low-income homes have limited learning experiences at home that contribute to school readiness. Concerning English language proficiency, this study adds to the literature that students who speak a language other than English at home have limited English language proficiency, hindering immediate literacy achievement. Additionally, this study revealed that students from homes whose parents could not identify a primary language spoken at home (English or the other language) underperformed in literacy achievement compared to students whose parents identified English as the primary language spoken at home. As explained before from the literature reviewed, students who speak a dual language have shared time learning both languages,

giving them limited opportunities to strengthen the English language. Therefore, although these students equally speak a dual language at home, they may possess literacy limitations in both languages.

Consequently, learning experiences in school, from the time students enter kindergarten through the early elementary school years, should include activities that foster the development of dual language in conjunction with content learning. For example, teachers should develop a classroom environment and teaching practices that support and encourage cultural and linguistic connections between students' personal experiences and new academic content so that dual-language students feel part of and comfortable in the school context (Castro et al., 2011). Also, Castro et al. suggest that teachers should provide opportunities for students to engage in home language-based small-group learning experiences that provide dual-language learners additional support in learning new content and developing dual language.

To further validate the positive mediating effects of self-regulatory behaviors, the researcher of the present study investigated the direct effects between sociodemographic characteristics and literacy achievement. This study revealed that students' home income, home language (non-English, dual-language, and only English), disabilities, gender, and age were directly associated with students' literacy achievement. This study added to prior studies that suggested that students from low-income homes who speak a dual language (English and another language) or a language other than English underperform students with higher home income and who use English as a primary language at home. These findings are important to consider because, as learned from the existing literature, students who regulate their academic behaviors increase their literacy achievement.

After exploring the direct and mediating effects of the students' self-regulatory behaviors and attention difficulties concurrent with their literacy achievement, the researcher was intrigued with the long-term effects of students' self-regulatory behaviors from first to third grade and how these effects differed for students of varied sociodemographic characteristics. To identify the long-term effects, the researcher conducted the second study explained next.

Long-Term Effects of Self-Regulatory Behaviors from First to Third Grade

The researcher theorized two models in this study to explain the link between early self-regulatory learning behaviors and first-grade literacy achievement. The first model explained the positive, strong influence of first-grade self-regulatory behaviors on literacy achievement toward the end of that school year. The second model described the significant faded influence of self-regulatory behaviors through second and third grade.

As a baseline, this study identified the positive influence of first-grade self-regulatory behaviors measured during the fall on their literacy achievement measured during the spring term of the same school year. This study's results correlated with the first study's findings, which explained that first-grade students' self-regulatory behaviors are positively associated with their immediate literacy achievement. However, when analyzing the trajectory of the first-grade students' self-regulatory behaviors on literacy achievement, this study found that self-regulatory behaviors' effects on literacy achievement faded through the second and third-grade years. Recognizing that self-regulatory behaviors disappear gradually through the years brings the insight that self-regulatory behaviors are skills that need constant reinforcement, particularly for students in first, second, and third grade. It is vital to keep in mind that there could be factors that

lead to students' self-regulatory behaviors to deteriorate over time. The data employed in this study are insufficient to identify these detrimental components. Future research should focus on determining the elements that influence the weakening of self-regulatory behaviors over the years.

When comparing the influence of students' sociodemographic characteristics on literacy achievement during the same first-grade year, the findings revealed that students with higher home income and who used English at home as a primary language showed higher literacy achievement over the students with lower home income and spoke at home another language other than English. Over the years, home income was not significant, probably because of other more critical factors than income not analyzed in this study. However, students who spoke a dual or a language at home other than English demonstrated literacy growth through second and third grade. These findings could be related to students' continuous English language development through the years. For students with disabilities, their first-grade self-regulatory learning behaviors positively influenced their first-grade literacy achievement in the same year. However, when studying the long-term trajectory to second and third grade, there was no significant influence on later literacy achievement. Although students with disabilities did not significantly influence their literacy achievement through third grade, these students demonstrated literacy growth over the next two years. This finding is concerning because it may indicate that, although students with disability are demonstrating growth through third grade, they are not learning adequately to demonstrate significant literacy gains. Tremendous efforts should focus on intervening early to increase learning gains in students with disabilities.

Understanding that students' self-regulatory behaviors have a concurrent and long-term effect on literacy achievement, I was interested in analyzing the predictability of some specific students' self-regulatory behaviors, such as autonomy, adaptation, and persistence. These three behaviors were examined as part of the construct of self-regulatory behaviors explored in this dissertation's first and second studies. The third study of the collected paper dissertation is explained next.

Predictability of Autonomy, Adaptation, and Persistence in Literacy Achievement

Exploring students exhibited autonomy when engaging in academic tasks, abilities to adapt to classroom situations, and persistence in completing academic tasks; this study analyzed a hierarchical regression model to explain the literacy achievement gaps and later gap reductions as each student behavior was added to subsequent models. Four models (blocks) were analyzed. The first block included all students' sociodemographic characteristics (parent income, non-English speaking, gender, student age, and disability) to identify the literacy achievement gap. This study found that the students' literacy gap accounted for approximately 19.2%, and as each students' behavior was added into subsequent blocks, the literacy gap reduced significantly. For example, for the fourth and last block, all eight predictors (parent income, non-English speaking, gender, student age, disability, autonomy, adaptation, and persistence) were added to the model, and the study revealed that the final model accounted for approximately 34.1% of the variance in literacy achievement. These findings indicate the significance of students' autonomy, adaptability, and persistence in literacy achievement. The current study analyzing students' autonomy, adaptation, and persistence in the same context expands to other studies that have studied those behaviors in isolation.

Implications for Practice

In times of educational reforms making teachers, school administrators, and school districts accountable for students' academic success, where states mandate specific content standards for students to master by the end of each grade level through the K-12 academic trajectory, teachers may focus students' learning experiences only on cognitive skills, excluding non-cognitive skills. This collected paper dissertation argues that non-cognitive skills, such as students' self-regulatory behaviors, are crucial for literacy success. Based on the concurrent and long-term positive relationships of students' self-regulatory behaviors on literacy achievement, students' stakeholders should understand the value of the synchronal development of self-regulatory and cognitive skills in students. Just as the first and third studies of the collected papers described, first-grade students' self-regulatory behaviors positively impact literacy achievement. This study explains the self-regulatory behaviors variable as first-grade students' ability to be organized, eager to learn new things, work independently, adapt to academic situations, complete tasks, pay attention to instructions and directions, and follow directions.
In addition, the third study specifically found positive predictability of autonomy, adaptability, and persistence in literacy achievement. Therefore, teachers creating lessons that foster these behaviors may increase the likelihood of literacy achievement. On the negative side, first-grade students' attention difficulties negatively affected their literacy achievement. The attention difficulties construct was explained by the students' easy distractions doing activities, moving from task to task without completing, listening to stories, and having trouble sitting still. Teachers transforming these behaviors into positive actions, such as students increased focus on doing activities for completion,

listening to stories, and sitting still based on task expectations, may increase the probability of literacy achievement. Teachers should develop the aforementioned behaviors using strategies that best accommodate students based on their socio-emotional competencies, learning motivation levels, and interests. Teachers creating learning experiences that include socio-emotional skills training enable students to demonstrate less restless and inattentive behaviors and increase their academic skills Koglin & Petermann (2011). Koglin and Petermann, for example, argued that designing literacy classroom lessons (through story reading) that develop emotional competence, problem-solving, and social skills improves young children's social skills and emotional adjustment while decreasing problem behaviors. Additionally, Koglin and Petermann noticed reduced restlessness and increased attention behaviors by incorporating behavioral control cards that display the target behavior and stickers to reward the appropriate behavior in learning activities. Implementing behavioral cards and rewards during students' learning experiences increased the academic achievement of young children (three to six years old), particularly those from economically disadvantaged households (Koglin & Petermann, 2011).

Although teachers have no control over the students' differential sociodemographic characteristics, there are significant implications for practice to be considered. Understanding students' limited personal experiences and parental academic support, teachers' instructional practices may contribute to closing students' academic gaps by including learning experiences that build background knowledge and literacy skills that students will need to learn new content. Additionally, to remediate students' literacy gaps, concurrently fostering self-regulatory behaviors and cognitive skills may

increase students' literacy success. Limited English language proficiency was also problematic for students' literacy. Therefore, teachers developing students' English proficiency through literacy skills along with self-regulatory behaviors may increase the probability of increasing students' later success.

Understanding that first-grade students from homes with low income and who speak a dual language (including English) or another language other than English at home underperform compared to their counterparts and that self-regulatory behaviors positively mediate literacy achievement, it is necessary that teachers consider these students' risk factors to academically address in the classroom these limitations by continuously and concurrently fostering academic, English language development, and self-regulatory skills in students all academic learning experiences may boost literacy skills.

Another critical contribution and concerning finding of this study is that students with disabilities consistently underperform the students in general education programs. However, as was highlighted before, students with disabilities who can regulate their academic behavior show higher literacy achievement, although not at the same proficiency level as students without disabilities. In addition, this study finds that students with disabilities can develop self-regulatory behaviors and help them develop literacy skills, indicating that it is crucial to continue developing students with disabilities' academic behaviors conducive to learning. It is vital that teachers create lessons that include direct strategy instruction and explicit procedures for teaching self-regulatory skills to students with learning disabilities and attention difficulties (Sanders et al., 2021). Sanders et al. stress the importance of teachers exposing students with disabilities to the

six stages of strategy acquisition, which include teachers developing students' background knowledge, discussing the importance of learning and how to use a strategy, modeling the learning experience (teacher thinks aloud), students memorizing and reciting necessary activity steps or procedures, teachers supporting students during collaborative work, and teachers monitoring students' self-regulatory behaviors and achievement while working independently. These suggested self-regulatory strategies should be taught explicitly, systematically, and with fidelity. Creating structured and predictable lessons could facilitate the learning experiences of students with disabilities, later increasing the likelihood of literacy achievement. Once students understand the steps and logistics of the lessons, they can concentrate on the new concept introduced in the lessons, facilitating their learning achievement.

The first-grade students' self-regulatory learning behaviors trajectory through second and third grade was found to fade their effect on literacy achievement. This finding urges the need to develop self-regulatory learning behaviors in students continuously. In addition, classroom learning experiences should continue promoting academic behaviors that facilitate literacy success.

The second study revealed that students who used another language other than English at home demonstrated literacy growth two years later. Therefore, providing students with learning experiences in school that promote English language development is crucial due to its benefits for future literacy achievement.

As demonstrated in the second study, students with disability showed learning potential. However, not all students might learn at the expected pace. Therefore, teachers

considering students with disabilities learning abilities and addressing their specific needs so that students can demonstrate significant gains through the years is vital.

Limitations and Future Research

Regardless of the significant results of this collected paper dissertation, there are some limitations to consider for future research. Although the first study created and validated the two constructs: self-regulatory behaviors and attention difficulties with highly correlated indicators (behaviors), the analysis did not allow further exploration of which behavior has the highest prediction for literacy achievement. Therefore, future research is warranted to investigate which student behaviors have the highest predictability for teachers' better use and continuous development. Additionally, the data did not permit further analysis of the factors contributing to these students' behaviors. As a result, quasi-experimental research will allow for establishing a cause-and-effect relationship between the unknown factors of this study and the behaviors explaining self-regulatory behaviors and attention difficulties.

The variables used for non-English and dual language did not allow further exploration of the students' English proficiency levels. Future research should investigate the differential effects of students' English proficiency levels on self-regulatory behaviors, attention difficulties, and literacy achievement. Additionally, further studies should focus on identifying which self-regulatory behaviors better contribute to students' English and dual-language development while the students continue developing English literacy skills. Students' autonomy, adaptability, and persistent behaviors were hierarchically regressed to investigate their predictability in literacy achievement. The findings indicate that these behaviors analyzed in the same model increase literacy skills.

However, exploring factors contributing to students exhibiting these behaviors would be practical for a better understanding of the dynamic of these behaviors.

The data used to identify students with disabilities included parents' reports about their child receiving additional services outside the classroom. Further research should specify the type and severity of the students' disabilities for a better understanding of the differential effects of their disability on literacy achievement. Additionally, further research should analyze which self-regulatory behaviors are highly predictable of literacy achievement based on students' specific type and level of exceptionality. These findings would help develop learning experiences and interventions for students' academic needs and abilities.

Studying first-grade students' self-regulatory learning behaviors has been found to diminish over the years through second and third grade. The second study explored the trajectory of self-regulatory learning behaviors as a construct without considering specific students' academic behaviors that might contribute differently to the fading effect through third grade. Further research should consider specific academic behaviors.

The second study showed that students with disabilities have learning potential, although not at a significant level. Future research is warranted in identifying specific learning behaviors that better influence literacy achievement. Nevertheless, the findings of this study may facilitate teachers of students with disabilities to help them to achieve literacy skills at a significant level.

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